Courses and Degrees, 1993-94
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Stanford, California
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Catalog Mailing
Old Union, Stanford University
Stanford, California 94305-3005

Information may be obtained free from the above address or at the Registrar's Information Window, Old Union.

Telephone number for all University departments: Area code: (415) 723-2300
ACADEMIC CALENDAR 1993-94

AUTUMN QUARTER, 1993

Sep 27-28 (Mon-Tue) Last day to arrange payment of University fees
  29 (Wed) Instruction begins
Sep 30 (Thu) Conferral of degrees — Summer Quarter
Nov 25-26 (Thu-Sun) Thanksgiving recess (no classes)
Nov 28 (Sun) Last day for filing A.B., B.S., and B.A.S. application for January (Autumn Quarter) conferral
Dec 10 (Fri) Last day for filing candidacy applications for Educational Specialist or Engineer degree for April (Winter Quarter) conferral
  10 (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
13-17 (Mon-Fri) End-Quarter examinations

WINTER QUARTER, 1994

Jan 3 (Mon) Last day to arrange payment of University fees
  4 (Tue) Instruction begins
  6 (Thu) Conferral of degrees — Autumn Quarter
  17 (Mon) Observance of Martin Luther King Day (holiday, no classes)
Feb 21 (Mon) Observance of Presidents’ Day (holiday, no classes)
  21 (Mon) Last day for filing A.B., B.S., and B.A.S. application for April (Winter Quarter) and June (Spring Quarter) conferral
  21 (Mon) Last day for filing graduate Graduation Application for June commencement diploma
Mar 6 (Sun) Observance of Founders’ Day
  11 (Fri) Last day for filing candidacy applications for Educational Specialist or Engineer degree for June (Spring Quarter) conferral
  11 (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
14-18 (Mon-Fri) End-Quarter examinations

SPRING QUARTER, 1994

Mar 28 (Mon) Last day to arrange payment of University fees
  29 (Tue) Instruction begins
Mar 31 (Thu) Conferral of degrees — Winter Quarter
Apr 25 (Mon) Filing deadline for undergraduate financial aid applications for matriculated undergraduates
May 30 (Mon) Memorial Day (holiday, no classes)
June 1 (Wed) Last day for filing candidacy applications for Educational Specialist or Engineer degree for September (Summer Quarter) conferral
  1 (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
  2 (Thu) No Classes
  3-8 (Fri-Wed) End-Quarter examinations
  11 (Sat) Baccalaureate Saturday and Senior Class Day
  12 (Sun) Commencement

SUMMER QUARTER, 1994

20 (Mon) Last day to arrange payment of University fees
  21 (Tue) Instruction begins
July 4 (Mon) Independence Day (holiday observance, no classes)
Aug 12-13 (Fri-Sat) Eight-week term examinations
  13 (Sat) Eight-week term closes
29 (Mon) Last day for filing candidacy applications for Educational Specialist or Engineer degree for January (Autumn Quarter) conferral
  29 (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
30 (Tue) Quarter closes

1994-95
First day of classes          Autumn          Winter          Spring          Summer (8-week term)
Sep 28                        Sep 28          Jan 10          Apr 4           June 27
Last day of finals           Dec 16          Mar 24          June 14         Aug 19
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HISTORY OF THE UNIVERSITY

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

The University bears the name of the Stanford's 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 after 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. But, as the Stanford's 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, 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."

There were 559 men and women in the first student body, 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 required entrance subject.

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, 10-year job of organizing the departments into schools. Several regroupings occurred thereafter, but since 1948 the school organization has been as follows: Business, Earth Sciences, Education, Engineering, Humanities and Sciences, Law, and Medicine.

Within the seven schools there are approximately 70 departments. In addition there are more than 30 institutes, centers, programs, and laboratories that are not organized within the schools. Some of the major ones are the Center for Integrated Systems; the Institute for International Studies; the Hoover Institution on War, Revolution, and Peace; the Stanford Linear Accelerator Center; and the W. W. Hansen Experimental Physics Laboratory.

Stanford early acquired a reputation as a 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 national and international status as a major teaching and research university was achieved. Geography, demography, and the federal govern-
ment'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 1991-92 the completion or graduation rate for students who entered Stanford University in 1986 on a full-time basis was 92 percent. Enrollment in Autumn Quarter 1992 totaled 13,293, of whom 6,564 were undergraduates and 7,329 were graduate students. Blacks, Hispanics, Puerto Ricans, and Native Americans numbered 1,286 undergraduates and 716 at the graduate level. Stanford awarded 4,232 degrees in 1991-92, of which 1,669 were baccalaureate and 2,563 were advanced degrees.

Among the 1,408 faculty, there are nine 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, and 6 Pulitzer Prize winners, and 14 MacArthur Prizes winners.

Books on Stanford history that may be obtained in libraries and some bookstores are:
- 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

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.
The following description of academic degree requirements applies to all students of Stanford University. For departmental or school requirements, please see the appropriate department and school sections in this bulletin.

To supplement information provided here, please see the Stanford University bulletin Information. Information is published each March and is available, without charge, from the Registrar’s Information Window, Old Union lobby, or from Catalog Mailing, Old Union, Stanford University, Stanford, CA 94305-3005. It provides details on Stanford University’s organization as well as descriptions and practices regarding matters such as registration, tuition and fees, leaves of absence, academic standing, student services, and the Fundamental Standard and Honor Code.

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

The University confers the degree of Bachelor of Arts and Science (B.A.S.) 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 in lieu 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, 5 above in addition to the major requirements.

DUAL BACHELOR'S DEGREE AND B.A.S. 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. A student should submit this statement 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 departmental 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 under "The Major" heading to follow.)

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.

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 131, 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.

CREDIT FOR 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.

OUTSIDE ACADEMIC CREDIT

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 departmental 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 regarding transfer credit is available from the Office of the Registrar’s Transfer Credit Evaluator, room 132, Old Union.

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

The requirements for a coterminal bachelor’s-master’s program are (1) 180 units for the bachelor’s degree plus 36 (or higher departmental requirement) unduplicated units for the master’s degree and (2) fifteen full-tuition quarters or three full-tuition quarters beyond the quarter in which 180 units are completed. The requirements for the coterminal program with 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). Departmental requirements
may be higher. Units for a given course may not be counted to meet the requirements of more than one degree, i.e., no units may be double-counted. No courses taken more than two quarters prior to admission to the coterminal master’s program may be used to meet the 36-unit University minimum requirement for the master’s degree.

For coterminal students, the quarter following completion of 180 units (or 225 units for dual-undergraduate-degree students) is identified as the first graduate quarter. Beginning with this quarter, coterminal students are subject to graduate student policies and procedures, as described in the “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 coterminal student is assigned an adviser in the master’s department to assist him or her in planning a program of study to meet the requirements for the master’s degree. The plan is outlined on the Program Proposal for a Master’s Degree, which is approved by the master’s department by the end of the first graduate quarter.

Authorizations for master’s programs expire three calendar years from the first graduate quarter. An extension requires review of academic performance by the department.

Conferral of each degree is applied for 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 departmental 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 has 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

PURPOSE

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 (CUS), 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, e.g., 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 at the back of 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. 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 140A, 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. Transfer students who enter 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.

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 Graduation Assistant, room 140A, Old Union.

UNDERGRADUATES WHO ENTERED PRIOR TO AUTUMN 1991

Stanford has a long tradition of assuring 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 140A, Old Union.

THE LANGUAGE REQUIREMENT

Undergraduates who entered Stanford in September 1982 or thereafter are required to complete at least one year of college-level study in a single foreign language. Alternatively, students may demonstrate, by a Stanford departmental examination, competency at a level comparable to the completion of the third quarter of first-year foreign language study at Stanford. Students whom the Office of Undergraduate Admissions determines to have completed the third-year course of one foreign language in high school will have satisfied this requirement.

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 Distribution 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 FOR THE MAJOR

Undergraduates must select a major by the time they achieve junior status (85 units completed). All undergraduate major programs listed in this bulle-
tin, 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 departmental 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 departmental or program requirements lies ultimately with the individual student working in consultation with the major adviser.

The student pursuing a single degree, either the Bachelor of Arts (A.B.) or Bachelor of Science (B.S.), may formally declare more than one major within the degree program. This may be done 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. If a degree is formally to reflect more than a single major, the student must meet the following conditions:

1. Satisfy the requirements for each major.
2. The courses proposed as satisfying the requirements of one declared major may not overlap with those of the other declared major, unless:
   a) overlapping courses constitute introductory skill requirements (e.g., introductory mathematics or foreign language), or
   b) overlapping courses enable the student to meet school requirements (e.g., for two majors within the School of Engineering).
3. At the time the student applies to graduate, the major departments or programs must be cognizable of the courses the student proposes to satisfy the declared majors and of the limitation of condition (2) above, and they must attest to the student's having satisfied the pertinent major requirements.

An undergraduate who completes course requirements for more than one major, but with overlapping courses, may elect to receive a degree in one of the majors and to have a notation on his or her transcript that the requirements of the secondary major were also completed. Secondary majors are not noted on the diploma. Specific requirements for secondary majors and for multiple majors with a single baccalaureate program are available from the Registrar's Graduation Assistant, Old Union, room 140A.

LIMITS ON REQUIREMENTS FOR MAJORS

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. Departmental 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 students who are interested in pursuing an area of scholarly inquiry that falls outside the purview of an established academic department or program of the University. For details concerning this program, refer to the "Individually Designed Majors" section of this bulletin.

UNDERGRADUATE ACADEMIC ADVISING

The Undergraduate Advising Center (UAC) provides and coordinates information and services which 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 pre-
liminary 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 transfer students are assigned an adviser by the UAC until they declare a major. By the time junior status is achieved, 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 Exchange Program 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 departmental 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. A full-tuition quarter is payment for 11 or more units per quarter during the academic year or 15 units in the Summer Quarter. Residency for partial tuition quarters accrues (as a percentage of the quarter) 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.

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

REGISTRATION REQUIREMENTS

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 for study in absentia. Leaves of absence may be requested, in advance of departure, for up to one year.

Registration is required for the quarter (or the quarter immediately preceding) in which a departmental project, thesis, or, dissertation is submitted or in which an Application to Graduate is filed via Axess for the conferral of a 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 Advanced Graduate Registration status for 9-unit registration.

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 graduate students who have completed all degree requirements and 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.

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.

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

ADDITIONAL DEGREES AND CHANGES OF MAJOR OR DEGREE LEVEL

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.

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 and letters of recommendation. An additional graduate application fee is not required. Verification of funding to cover the new degree objective is required for international students changing departments or degree programs if the changes will lengthen their stay.

CONFERRAL OF DEGREES

The Application to Graduate is filed via Axess to initiate approval for conferment for all graduate degrees. Preferably, it should be filed in the second week (but no later than the last day of classes) of the degree quarter. There is an earlier deadline for students graduating in June who wish to participate in Commencement. See the University Calendar on the first page of the Time Schedule for specific dates.

The Graduate Degree Support Section should be notified in writing when conferment plans change. Students who withdraw their conferment request or who fail to complete degree requirements must file a new Application to Graduate for a subsequent quarter. A separate Application to Graduate is required for each degree and conferment 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 who have fulfilled other requirements prescribed by the schools or departments concerned. The University minimum unit requirement for the A.M. or M.S. degrees 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). Departmental specifications may be higher. Up to 9 units of work done as a graduate student at another university may be used to meet departmental requirements that exceed the 36 unit minimum. 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, three copies, each 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.

A second Stanford master’s degree requires an additional 36 unduplicated units and three 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 laid down by the faculty of the Graduate School of Business and the University. (Full particulars concerning these requirements will be found in the Graduate School of Business pamphlet.) The requirements for unduplicated units and residency for an A.M. or M.S. degree pursued concurrently with the M.B.A. degree are determined by the department offering the master's degree.

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 non-law doctoral degree, or who have been admitted to a non-law 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 not more than two consecutive academic years, successfully complete 30 term units of work in the School of Law, including three first-year courses in the first autumn term and at least one course or seminar requiring a research paper. All work shall conform to the rules and regulations of the University and of 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 which 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.

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 (e.g., 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 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 which 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 bulletin School of Medicine.

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 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 candidacy for the doctoral degree is an acknowledgement 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 in a timely manner. Therefore, candidacy is valid for five years unless terminated by the department for unsatisfactory progress. Extensions of candidacy require review by the department of a 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. (On occasion, permission for appointment of a reader who is not on the Academic Council may be approved if that person is particularly well qualified to consult on the dissertation topic.) 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 departmental 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. program. 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 must be on the Stanford Academic Council. (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 examining committee. The chair can be from the student’s minor department provided that the chair contributes an area of expertise that is not on the Academic Council. (On occasion, from the major department. All members must be on the Stanford Academic Council. (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 examining 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 Committee consists of at least five Stanford faculty members, four examiners and the committee chair from another department. All members must be on the Stanford Academic Council. (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 examining 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.

The candidate passes the examination if the examining committee casts four favorable votes out of five or six, five votes out of seven, or six 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 departmental 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
DEGREES

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. If a minor department chooses to require passing of Ph.D. qualifying or field examinations, the unit specification may be reduced. 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, which is normally submitted at the time of admission to candidacy, specifies whether representation from the minor department on the University oral examination committee is required.

NONMATRICULATED GRADUATE STUDY

Persons holding bachelor’s degrees (or equivalent) from recognized U.S. colleges and universities of recognized standing who hold a U.S. bachelor’s degree or its equivalent are eligible to apply for graduate nonmatriculated status. Nonmatriculated status is granted to students of demonstrated ability who are not seeking advanced degrees but who would benefit from course work at Stanford for a variety of reasons. A 3.0 or ‘B’ letter grade indicator (LGI) in prior studies is required. Nonmatriculated admission is valid only for a given academic year or a part thereof. Students who wish to enroll in a subsequent academic year must reapply. Nonmatriculated students receive academic credit for courses satisfactorily completed and may obtain an official transcript for the usual fee. 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 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 degree programs must meet the standard admissions requirements and should not anticipate special priority because of work completed as nonmatriculated students. Students who are admitted to degree programs 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.
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 and Degrees, 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 and Degrees 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 and Degrees 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.
GRADUATE SCHOOL OF BUSINESS

Emeriti: (Professors) George L. Bach, Robert T. Davis, Herbert E. Doggall, 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: David P. Baron, Paul R. Johnson, George G. C. Parker, Jerry I. Porras
Assistant Dean: Jeffrey H. Moore


Associate Professors: Jonathan Bendor, Faruk Gul, Kevin Keller, Roderick M. Kramer, Rajiv Lal, James M. Lattin, William S. Lovejoy, Rodolfo E. Manuelli, Maureen F. McNichols, Peter C. Reiss, Itamar Simonson, Seungjin Whang


Professor (Teaching): George G. C. Parker


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


Visiting Professors: Henri-Claude de Bettignies, Severin Borenstein, Paul Krugman

Visiting Associate Professors: Punam Anand, Thomas W. Gillman

Visiting Assistant Professor: Douglas A. Shackelford

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 managerial experience and to include some mathematics and economics in their undergraduate programs. Possible options within the M.B.A. program include a specialty in Public Management, a program leading to the joint J.D./M.B.A. degree, health services management, and joint master's degrees in business and engineering.

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

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

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

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, geomechanics, geophysics, geostatistics, hydrogeology, petroleum engineering, and petroleum geology; (2) to conduct research in the earth sciences; and (3) to provide opportunities for Stanford undergraduates to learn about our planet’s history, to understand the natural energy and resource base that underlies our economy, and to appreciate the geological and geophysical hazards that 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 which 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), e.g., 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 January 1 for awards which become effective in Autumn Quarter of the following academic year.

EARTH SYSTEMS PROGRAM

Director and Chair of the Steering Committee:
Jonathan Roughgarden
Steering Committee: Gary Ernst (Dean, School of Earth Sciences), Walter Falcon (Institute for International Studies), Lawrence Goulder (Economics and Institute for International Studies), Jeffrey Koseff (Civil Engineering), Donald Lowe (Geological and Environmental Sciences), Gilbert Masters (Civil Engineering), James Sweeney (Engineering Economic Systems), Peter Vitousek (Biological Sciences)

Affiliated Faculty by Track:
Anthrosphere: Walter Falcon, Lawrence Goulder, Thomas Heller, Rosamond Naylor, Donald Kennedy, James Sweeney, Gavin Wright
Biosphere: Harold Mooney, Jonathan Roughgarden, Stephen Schneider, Peter Vitousek
Environmental Technology: Jeffrey Koseff, Gilbert Masters, Steven Monismith, Paul Roberts
Geosphere: Gary Ernst, Donald Lowe, Gail Mahood, Jonathan Stebbins
Land Systems Management: Irwin Remson, emeritus
Academic Coordinator: Susan Alexander

The Earth Systems Program (ESys) was conceived in 1990 to meet new teaching and research needs at Stanford, and was approved as an undergraduate major by the Faculty Senate in January, 1992. 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 coupled 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 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 to 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 adviseradvisor. Sample senior projects are available at the program office.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

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 in the sciences. The student also selects a track of 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>
</tr>
<tr>
<td>or Civ. Engr. 170. Introduction to 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>
</tr>
<tr>
<td>ESys 210. Senior Seminar</td>
<td>S 2</td>
</tr>
</tbody>
</table>
### REQUIRED COGNATE COURSES

Biology (any one course below):
- Bio. 31. Biochemistry, Genetics, and Molecular Biology **A** 5
- Bio. 33. Plant and Population Biology **S** 5

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

Geological and Environmental Sciences:
- Geol. & Envir. Sci. 1. Planet Earth **A,WS** 4

Mathematics*:
- Math. 19. Calculus and Analytic Geometry **A** 3
- Math. 20. Calculus and Analytic Geometry **W** 3
- Math. 21. Calculus and Analytic Geometry **S** 4
  or
- Math. 41. Calculus and Analytic Geometry **A** 5
- Math. 42. Calculus and Analytic Geometry **W** 5

Probability and Statistics (any one course below):
- Bio. 141. Biostatistics **W** 4
- Geol. & Envir. Sci. 160. Introduction to Statistical Methods for Earth and Environmental Sciences **S** 4
- Stat. 116. Theory of Probability **A,S** 4
- Stat. 190. Statistics for Social Scientists **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.

Majors in the environmental technology track must take Bio. 31. The Biology requirement is automatically satisfied by the courses of the biosphere track — see below. Human Biology 2A can be substituted for Bio. 33.

**ECONOMICS**
- Econ. 1. Elementary Economics **5**
- Econ. 51. Economic Analysis I **5**
- Econ. 52. Economic Analysis II **A,W,S** 5
- Econ. 118. Economics of Development **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 Anthrosphere.

### TRACKS

#### GEOSPHERE
- Geol. & Envir. Sci. 80. Earth Materials **A** 5
- Geol. & Envir. Sci. 150. The Oceans: An Introduction to the Marine Environment **S** 3
- Geol. & Envir. Sci. 170. Environmental Geochemistry **W** 4
- Geophys. 4. Natural Hazards and Man **W** 3
  or Geol. & Envir. Sci. 5. The Earth's Nonrenewable Resources **W** 3

#### BIOSPHERE
- Bio. 31*. Biochemistry, Genetics, and Molecular Biology **A** 5
- Bio. 32*. Cell and Developmental Biology **W** 5
- Bio. 33*. Plant and Population Biology **A** 5
- Bio. 111. Evolutionary Genetics **S** 4
- Bio. 176. Principles of Ecology (same as Geophys. 176) **A** 3

* One of the following:
- Bio. 124. Plant Adaptations **W** 4

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

#### ANTHROSPHERE*
- Econ. 52. Economic Analysis II **A,W,S** 5
- Econ. 118. Economics of Development **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 Anthrosphere.

#### LAND SYSTEMS MANAGEMENT
- Civ. Engr. 106. Water Resources **W** 4
- Geol. & Envir. Sci. 130. Environmental Earth Sciences I **A** 4
- Geol. & Envir. Sci. 131. Environmental Earth Sciences II **W** 4
- Geol. & Envir. Sci. 132. Environmental Earth Sciences III **S** 5

#### ENVIRONMENTAL TECHNOLOGY
- Civ. Engr. 106. Water Resources **W** 4
- Civ. Engr. 160N. Mechanics of Fluids **A** 5
- Engr. 20. Introduction to Chemical Engineering **S** 3

* Two of the following:
- Civ. Engr. 170*. Environmental Science and Technology **A** 3
- Civ. Engr. 171. Environmental Planning **4**
- Civ. Engr. 172. Air Quality Management **W** 3

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

### UPPER-DIVISION ELECTIVES

Three intermediate to advanced courses consistent with primary track are required of all majors and are to be selected with 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.
SUMMARY OF COURSE REQUIREMENTS AND UNITS

Earth Systems Introduction and Core 13
Required Allied Courses 42-45
Tracks
Geosphere 17
Biosphere 15-24
Anthroposphere 24-25
Land Systems Management 23
Environmental Technology 22-33
Upper-Division Electives 9-15
Senior Project or Internship 9
Senior Seminar 2
Total units (depending on track, electives) .... 89-114

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. 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. Finally, 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 which 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 which 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 upon completion of that degree’s requirements, or of receiving two degrees concurrently at the end of the master’s program.

Four levels of requirements must be fulfilled to receive a 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, and including 18 units at the 200-level or above,
leading to further focus within the student’s track; and

4. participation in the spring 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 advisor’s approval.

**Course No. and Subject Units**

<table>
<thead>
<tr>
<th>Differential Equations</th>
<th>Math. 130. Ordinary Differential Equations 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear Algebra:</td>
<td>Math. 103. Matrix Theory and its Applications 3</td>
</tr>
<tr>
<td>Math 113. Linear Algebra and Matrix Theory 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or Geol. &amp; Envir. Sci. 160. Statistical Methods for Earth and Environmental Sciences 4</td>
</tr>
<tr>
<td></td>
<td>or Bio. 141. Biostatistics 4</td>
</tr>
<tr>
<td>Optimization Theory:</td>
<td>Econ. 180. Mathematics for Economists 5</td>
</tr>
<tr>
<td></td>
<td>or Econ. 181. Optimization and Economic Analysis 5</td>
</tr>
<tr>
<td></td>
<td>or Bio. 181. Behavioral Ecology 3</td>
</tr>
<tr>
<td>Thermodynamics:</td>
<td>Chem. 135. Physical Chemistry Principles 3</td>
</tr>
<tr>
<td></td>
<td>Geol. &amp; Envir. Sci. 171. Geochemical Thermodynamics 3</td>
</tr>
<tr>
<td>Geochemical Cycling:</td>
<td>Geol. &amp; Envir. Sci. 170. Environmental Geochemistry 4</td>
</tr>
<tr>
<td></td>
<td>or Geol. &amp; Envir. Sci. 150. The Oceans: An Introduction to the Marine Environment 3</td>
</tr>
</tbody>
</table>

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, etc.), 2 units.

**TRACKS**

**GEOSPHERE**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Required courses:</strong></td>
<td></td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 90. Chemistry of the Earth</td>
<td>A 3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 150. The Oceans: An Introduction to the Marine Environment</td>
<td>W 3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 151. Sedimentary Geology and Petrography: Depositional Systems</td>
<td>W 4</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 170. Environmental Geochemistry</td>
<td>A 4</td>
</tr>
<tr>
<td>or Geol. &amp; Envir. Sci. 230. Hydrogeology</td>
<td>A 5</td>
</tr>
<tr>
<td>or Civ. Engr. 261. Hydrology</td>
<td>A 3</td>
</tr>
<tr>
<td><strong>Other recommended courses:</strong></td>
<td></td>
</tr>
<tr>
<td>Civ. Engr. 262. Surface Waters</td>
<td>W 3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 6. Management of Earth Resources</td>
<td>S 3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 231. Introduction to Groundwater Solute Transport</td>
<td>S 3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 235. Roles of Fluids in Geologic Processes</td>
<td>S 3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 245. Computer Simulation in Geology</td>
<td>S 3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 251. Sedimentary Basins Petrography</td>
<td>A 3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 252. Sedimentary Petrography</td>
<td>2</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 255. Introduction to Micropaleontology</td>
<td>W 5</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 264. Low Temperature Aqueous Geochemistry</td>
<td>A 3</td>
</tr>
<tr>
<td>Geophys. 150. Plate Tectonics</td>
<td></td>
</tr>
<tr>
<td>Geophys. 290. Tectonophysics</td>
<td></td>
</tr>
<tr>
<td>Pet. Engr. 103. Energy Resources</td>
<td>A,S 3</td>
</tr>
</tbody>
</table>

**BIOSPHERE**

| Recommended courses:                        |                |
| Bio. 118. Genetics                          | A 3            |
| Bio. 120. General Botany                    | A 3            |
| Bio. 124. Plant Adaptations                 |                |
| Bio. 125. Ecosystems of California           | S 4            |
| Bio. 128. Systemics and Ecology of Vascular Plants | S 5            |
| Bio. 137. Plant Genetics                    |                |
| Bio. 138H. Biomechanics of Intertidal Organisms |                |
| Bio. 156. Plant Physiology                  |                |
| Bio. 180. Conservation Biology              | S 4            |
| Bio. 184. Biology of Insects                |                |
| Bio. 189. Biology of Birds                  | S 3            |
| Bio. 215. Biochemical Evolution             |                |
| Bio. 228. Advanced Plant Systemics          | A,W,S 2        |
| Bio. 281. Behavioral Ecology                |                |
| Bio. 283. Theoretical Population Genetics   | A 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 W 5
  or Econ. 242. Public Finance and Taxation II S 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)

  3-5 units, Win (Ernst, Roughgarden, Heller, Schneider, Goulder, Naylor, Kennedy)

110. Geosphere — (Same as Geological and Environmental Sciences 2.) The earth is a dynamic planet, its surface continuously remodeled 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 represents 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 metazoa, history of glaciations and climate, the role of extraterrestrial events in geological and biological evolution. Enroll concurrently in Geological and Environmental Sciences 3 to examine the materials and organisms discussed. Students intending to major in geology must take 3 either concurrently or in a subsequent year. DR:5(7)

  3 units, Aut (Lowe, Staff)

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: Biology or Human Biology core.

  3 units, Win (Vitousek, Mooney)

112. Anthrosphere: Human Interactions with the Earth and Environment — (Same as Economics 155.) Analysis of economic sources of environmental problems in a market economy and evaluation of alternative policies (regulation, taxation, marketable permits) for dealing with these problems. Regional issues (local air and water pollution, traffic congestion) and global issues (climate change, stratospheric ozone depletion). 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 or 51Q.

  3-5 units, Win (Goulder)

210/290. Multidisciplinary 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 centered on an interdisciplinary topic in Earth Systems selected by consultation with the Academic Coordinator.

  2 units, Spr (Alexander)

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. A 10-15 page senior thesis is required.

  9 units, quarter by arrangement (Staff)

260. Internship — Supervised field, lab, private sector or advocacy project, normally through an intern-
ship 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 (Alexander)

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†, Michael O. McWilliams†, Elizabeth L. Miller, Jonathan F. Stebbins

Associate Professor (Research): Atilla Aydin

Courtesy Professor: 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

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

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, through 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 pre-defined 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 pre-defined 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 comprise 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 (e.g., volcanic eruptions and earthquakes), and the ways in which society affects the planet (e.g., the pollution of ground water 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 experiences 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>
</thead>
<tbody>
<tr>
<td>G&amp;ES 1. Planet Earth</td>
<td>A,W,S 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</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 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>
</tr>
<tr>
<td>G&amp;ES 160. Introduction to Statistical Methods for Earth and Environmental Science</td>
<td>S 4</td>
</tr>
<tr>
<td>G&amp;ES 181. Igneous and Metamorphic Processes</td>
<td>W 5</td>
</tr>
<tr>
<td>G&amp;ES 190A,B. Advanced Geological Research in the Field</td>
<td>Sum 10</td>
</tr>
<tr>
<td>Subtotal.......................... 45-48</td>
<td></td>
</tr>
</tbody>
</table>

**REQUIRED SUPPORTING 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. 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>
</tbody>
</table>

Choose one of the following groups of Mathematics courses:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 20. Calculus</td>
<td>W,S 3</td>
</tr>
<tr>
<td>Math. 21. Calculus</td>
<td>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>
</tbody>
</table>

Choose one of the following groups of Physics courses:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 22. Mechanics and Heat Lab</td>
<td>A,Sum 1</td>
</tr>
<tr>
<td>Physics 23. Electricity and Optics</td>
<td>W,Sum 3</td>
</tr>
<tr>
<td>Physics 24. Electricity and Optics Lab</td>
<td>W,Sum 1</td>
</tr>
<tr>
<td>or Physics 51. Mechanics†</td>
<td>W 4</td>
</tr>
<tr>
<td>Physics 53. Electricity and Magnetism†</td>
<td>S 4</td>
</tr>
<tr>
<td>Physics 55. Light and Heat†</td>
<td>A 4</td>
</tr>
<tr>
<td>Subtotal...................... 30-34</td>
<td></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:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biol. Sci. 117. Biology and Global Change</td>
<td>W 3</td>
</tr>
<tr>
<td>Chem. 33. Structure and Reactivity</td>
<td>W,S 4</td>
</tr>
<tr>
<td>Comp. Sci. 106A. Programming Methodology</td>
<td>A,W,S 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 6. Management of Earth Resources</td>
<td>S 3</td>
</tr>
<tr>
<td>G&amp;ES 8. Management of Geologic Hazards</td>
<td>W 3</td>
</tr>
<tr>
<td>G&amp;ES 112. Structural &amp; Engineering Geology II</td>
<td>W 3</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 170. Environmental Geochemistry</td>
<td>W 4</td>
</tr>
<tr>
<td>G&amp;ES 185. Volcanology</td>
<td>S 4</td>
</tr>
<tr>
<td>G&amp;ES 187. Hydrothermal Cycling and Concentration of Elements in the Earth's Crust</td>
<td>A 4</td>
</tr>
<tr>
<td>Geophys. 150. Plate Tectonics</td>
<td>S 3</td>
</tr>
<tr>
<td>Geophys. 182. Reflection Seismology</td>
<td>W 3</td>
</tr>
<tr>
<td>Geophys. 190. General Geophysics</td>
<td>A 4</td>
</tr>
<tr>
<td>Physics 27. Evolution of the Cosmos</td>
<td>A 3</td>
</tr>
<tr>
<td>Subtotal...................... 12-19</td>
<td></td>
</tr>
<tr>
<td>Total.......................... 87-101</td>
<td></td>
</tr>
</tbody>
</table>
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 utilization 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 anticipation, recognition, and definition or diagnosis of 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 8. Management of Geologic Hazards</td>
<td>W 3</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>
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<td>A 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 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>
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**REQUIRED SCIENCES AND MATHEMATICS**

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<tr>
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<td>S 4</td>
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<tr>
<td>Physics 55. Light and Heat†</td>
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</tr>
</tbody>
</table>

**Subtotal**…………………………………………………………33-38

* 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:

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<td>W 3</td>
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<tr>
<td>Civ. Engr. 266. Environmental Policy Design and Implementation</td>
<td>S 4</td>
</tr>
<tr>
<td>Comp. Sci. 106A. Programming Methodology</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>Engr. 60. Engineering Economy</td>
<td>A,W 3</td>
</tr>
<tr>
<td>G&amp;ES 2.3. Earth History and Lab</td>
<td>A 5</td>
</tr>
<tr>
<td>G&amp;ES 6. Management of Earth Resources</td>
<td>S 3</td>
</tr>
<tr>
<td>G&amp;ES 112. Structural and Engineering Geology II</td>
<td>W 3</td>
</tr>
<tr>
<td>G&amp;ES 115. Engineering Geology Practice</td>
<td>S 3</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 171. Geochemical Thermodynamics</td>
<td>A 3</td>
</tr>
<tr>
<td>G&amp;ES 185. Volcanology</td>
<td>S 4</td>
</tr>
<tr>
<td>Geophys. 170. Environmental and Geotechnical Geophysics</td>
<td>S 3</td>
</tr>
<tr>
<td>Pet. Engr. 103. Energy Resources</td>
<td>A,S 3</td>
</tr>
</tbody>
</table>

**Subtotal**…………………………………………………………12-19

**Total**…………………………………………………………………93-108
ENGINEERING GEOLOGY AND HYDROGEOLOGY

The Engineering Geology and Hydrogeology curriculum is intended for undergraduate students who are interested in the application of geological and engineering data and principles to the study of rock, soil, and water for the purpose of assuring that geological and environmental factors affecting engineering structures and groundwater resources are properly recognized and interpreted. 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 structural geology.

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: Geological and Environmental Sciences and from Engineering. Any substitutions for core courses must be approved by the adviser and the department chair. In addition, four elective courses, consistent with the core curriculum and required of all majors are to be selected with the advice and consent of the adviser. Typically, electives are selected from the list below. Letter grades are required, if available, in all courses.

### CORE COURSES

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>G&amp;ES 1. Planet Earth</td>
<td>A,W,S 4-5</td>
</tr>
<tr>
<td>G&amp;ES 8. Management of Geologic Hazards</td>
<td>W 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 111. Structural and Engineering Geology I</td>
<td>A 3</td>
</tr>
<tr>
<td>G&amp;ES 112. Structural and Engineering Geology II</td>
<td>W 3</td>
</tr>
<tr>
<td>G&amp;ES 115. Engineering Geology Practice</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>G&amp;ES 230. Hydrogeology</td>
<td>A 5</td>
</tr>
<tr>
<td>G&amp;ES 231. Introduction to Groundwater Solute Transport</td>
<td>S 4</td>
</tr>
<tr>
<td>G&amp;ES Subtotal</td>
<td>37-38</td>
</tr>
<tr>
<td>Civ. Engr. 106. Water Resources</td>
<td>W 4</td>
</tr>
<tr>
<td>Civ. Engr. 160N. Mechanics of Fluids</td>
<td>A 5</td>
</tr>
<tr>
<td>Civ. Engr. 190. Geotechnical Engineering</td>
<td>A 4</td>
</tr>
<tr>
<td>Comp. Sci. 106A. Programming Methodology</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>Engineering Subtotal</td>
<td>23</td>
</tr>
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</table>

### REQUIRED SUPPORTING SCIENCES AND MATHEMATICS

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 31. Chemistry Principles</td>
<td>A,W 4</td>
</tr>
<tr>
<td>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>Physics 51. Mechanics</td>
<td>W 4</td>
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<tr>
<td>Subtotal</td>
<td>23</td>
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### SUGGESTED ELECTIVES

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civ. Engr. 180A. Introduction to Structural Analysis</td>
<td>A 3</td>
</tr>
<tr>
<td>Civ. Engr. 180B. Structural Analysis</td>
<td>A 4</td>
</tr>
<tr>
<td>Civ. Engr. 270. Movement, Fate, and Effects of Contaminants in Surface Waters and Groundwater</td>
<td>A 3</td>
</tr>
<tr>
<td>Civ. Engr. 291. Foundation Engineering</td>
<td>S 3</td>
</tr>
<tr>
<td>Civ. Engr. 293. Experimental Soil Mechanics</td>
<td>W 2</td>
</tr>
<tr>
<td>Engr. 30. Engineering Thermodynamics</td>
<td>A,W 3</td>
</tr>
<tr>
<td>Engr. 50. Introductory Science of Materials</td>
<td>W,S 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 215. Advanced Structural Geology and Rock Mechanics</td>
<td>S 3-4</td>
</tr>
<tr>
<td>G&amp;ES 216. Rock Fracture Mechanics</td>
<td>S 3-4</td>
</tr>
<tr>
<td>G&amp;ES 217. Characterization and Hydraulics of Rock Fracture</td>
<td>W 3</td>
</tr>
<tr>
<td>G&amp;ES 235. Role of Fluids in Geologic Processes</td>
<td>S 3</td>
</tr>
<tr>
<td>Geophys. 170. Environmental and Geotechnical Geophysics</td>
<td>S 3</td>
</tr>
<tr>
<td>Geophys. 190. General Geophysics</td>
<td>A 4</td>
</tr>
<tr>
<td>Mech. Engr. 100. Differential Equations in Engineering</td>
<td>W 3</td>
</tr>
<tr>
<td>Mech. Engr. 111. Stress, Strain, and Strength</td>
<td>A 3</td>
</tr>
<tr>
<td>Subtotal</td>
<td>11-17</td>
</tr>
<tr>
<td>Total</td>
<td>94-101</td>
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</tbody>
</table>

### LAND RESOURCES

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 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</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>W 5</td>
</tr>
<tr>
<td>Urban Studies 170. Introduction to Urban Design</td>
<td>W 5</td>
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Subtotal ........................................ 65-66

REQUIRED ENGINEERING, SUPPORTING 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>Math. 20. Calculus.</td>
<td>W,S 3</td>
</tr>
<tr>
<td>or Math. 41. Calculus</td>
<td>A 5</td>
</tr>
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</table>

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

ELECTIVES

Choose one course from each of the following groups:

**Group A**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng. 60. Engineering Economy</td>
<td>A,W 3</td>
</tr>
<tr>
<td>G&amp;ES 8. Management of Geologic Hazards</td>
<td>W 3</td>
</tr>
<tr>
<td>Pet. Engr. 103. Energy Resources</td>
<td>A,S 3</td>
</tr>
</tbody>
</table>

**Group B**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Research Inst. 103. The World Food Economy</td>
<td>W 4</td>
</tr>
<tr>
<td>Food Research Inst. 121. Development and Population Interactions in the Third World</td>
<td>W 5</td>
</tr>
</tbody>
</table>

**Group C**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art 3. Introduction to the History of Architecture</td>
<td>S 5</td>
</tr>
<tr>
<td>Art 175 A. Modern Architecture I</td>
<td>W 4</td>
</tr>
<tr>
<td>Art 175 B. Modern Architecture II</td>
<td>S 4</td>
</tr>
<tr>
<td>Art 176. American Architecture and Urbanism</td>
<td>A 4</td>
</tr>
</tbody>
</table>

**Group D**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Studies 110. Introduction to Urban Studies</td>
<td>A 4</td>
</tr>
<tr>
<td>Urban Studies 151. Urban Growth and Change</td>
<td>5</td>
</tr>
</tbody>
</table>

Subtotal ........................................ 16-18

Total ........................................... 90-94

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 to undertake independent study and research on a topic of special interest culminating in a written report. The honors program is open to all seniors having 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 prior to the start of their senior year.

Application to enter the honors program involves a formal review of the student’s academic record and submittal of a research proposal to the department Undergraduate Activities Committee. Normally, a student selects a research topic and prepares a research proposal in consultation with a faculty adviser of his/her choosing. Research undertaken for the honors program can be of a theoretical, field, or experimental nature or may involve 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; three 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 an oral presentation of research results are required of honors students. A formal written report must be submitted to the student’s research adviser no later than the fourth week of the student’s final senior quarter. To graduate with honors, the report must be read, approved, and signed by the student’s faculty adviser and a second member of the faculty. Before the end of the senior year, each honors candidate gives a public seminar on his or her research results.
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 of 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, and 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 eighteen 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 the geologic processes involved, 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 that are used for experiments in which actual sedimentary basins are simulated.

The program lies at the interface between geology, physics, mathematics, computer programming, and computer graphics. Students in the program should have demonstrated aptitude for mathematics and computer programming, and should be at home in courses in geology, geophysics, fluid mechanics, petroleum reservoir engineering, mathematics, and computer science. 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/or 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 as well as the applied aspects of groundwater resources. Key department faculty in hydrogeology are Professors Gorelick and Remson, but there are
SPECIALIZATIONS

Geochemistry, Petrology, and Mineralogy — The research and teaching interests of a number of the faculty in the Department of Geological and Environmental Sciences involve geochemistry and its applications in hydrothermal systems, igneous and metamorphic petrology, ore deposits, mineralogy and mineral physics, mineral surface and colloid reactions (see separate description of graduate program in Surface and Aqueous Geochemistry), and the atomic-level structure and properties of earth materials. Techniques include field-oriented studies, computer prediction and modeling, detailed trace and major element analysis, x-ray scattering and spectroscopic studies of earth materials, and laboratory experimentation at high temperatures and pressures on phase equilibria and mineral-fluid interactions. The scale of problems studied ranges from global to atomic. Students with strong backgrounds in chemistry are especially urged to contact faculty in these fields, including Professors Bird, Bohlen, Brown, Coleman, Einaudi, Ernst, Liou, Mahood, Parks, and Stebbins.

Quantitative Structural Geology, Geomechanics, and Neotectonics — Research opportunities in this specialization leading to the M.S. or Ph.D. degree are available in the areas of quantitative structural geology, neotectonics, engineering geology, rock fracture mechanics, aquifer and reservoir visualization and characterization, and geomechanics. The program advisers are Professors Aydin and Pollard. Other faculty members who have related research interests and participate in the program are Professors Mavko and Nur (rock physics), Segall (crustal deformation and fault mechanics), and Zoback (tectonophysics) from the Department of Geophysics.

The 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 the assessment of natural hazards related to earthquakes and volcanoes. 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, but 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, paleoecology, paleomagnetism, and sedimentology, 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, paleoclimatology 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. 40Ar/39Ar and fission track geochronology laboratories support studies aimed at understanding the thermal history of sedimentary basins and of igneous and metamorphic terranes, determining rates of geologic processes and 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, McWilliams, Miller, Page (emeritus), Pollard, Sleep, and Thompson (emeritus) in Geological and Environmental Sciences, and Klemperer, Nur, Segall, and Zur 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 and 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 GeES 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 geosciences, environmental engineering, 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 formation of dikes, sills, and magma reservoirs; deformation and seismic signatures of volcanic activity; planetary volcanology; geologic evolution of caldera systems; eruption triggers; explosive volcanism and emplacement of pyroclastic flows; magma degassing and impact of volcanic gases on the atmosphere.

**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 for 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 departmental 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 departmental requirements include the following:
1. The Department of Geological and Environmental Sciences requires 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 designated 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 must be a faculty member in the department and who 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 being 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, which 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 candidate must prepare a doctoral dissertation that is a contribution to knowledge and is the result of independent research. The format of the dissertation must meet University guidelines. The student is strongly urged to prepare dissertation chapters that, in scientific content and format, are readily publishable.

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 draft dissertation. The readers are charged to read the draft and to certify in writing to the department that it is adequate to serve as a basis for the University oral examination. 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. May be taken without the weekly lab for 4 units. Recommended: high school chemistry and physics. DR:5(7)

2. Earth History — (Same as Earth Systems 110.) 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. Students intending to major in geology must take G&ES 3 either concurrently or in a subsequent year. DR:5(7)

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.

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) T 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, metals from the sea, water resources, strategic minerals, and the world resource situation. DR:6(8)

3 units, Win (Staff) MWF 2:15

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 pro-
provided. Students provide own clothing. Fee.

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

8. Management of Geologic Hazards — The application of earth science to identification and management of geologic hazards within the modern regulatory framework. Emphasis on developing geologic techniques to recognize natural geologic hazards and select mitigation measures to manage risk. Topics: geologic problems associated with earthquakes, landslides, floods, stream and erosion, land subsidence, underground water, environmental abuses, and planning and engineering design alternatives. Necessary geologic fundamentals are introduced. Enrollment limited to 20. Prerequisite: 1 or consent of instructor. DR:6(8)

3 units (Hall) alternate years, given 1994-95

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 5. Introductory lectures, followed by a five-day field trip to study the geology and desert environment of Death Valley during Winter break. First hand 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

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. Chemistry of the Earth — (Formerly Geology 170) 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, Aut (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 areas vary each year, but each site displays 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 the Stanford University bulletin 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 important physical processes. Applications: the role of geologic structures in the evolution of earth's crust, natural resource recovery, and geologic hazards. Topics: basic structural quantities, techniques of mapping, and use of descriptive geometry for analyzing field data. Measurement of deformation, physical properties of rock, and an introduction to continuum mechanical models of structures. Prerequisites: 1, calculus, Macintosh skills.

3 units, Aut (Pollard) MWF 10
computer labs and two field trips
by arrangement
112. Structural and Engineering Geology II — Second of a two-course sequence. Topics: the description and growth of fractures in rock; the 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, Win (Pollard) MWF 10 computer labs and two field trips by arrangement

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. Enrollment limited to 20. Prerequisites: 1, 8, 102, 111, 112, or consent of instructor.

3 units (Staff) by arrangement alternate years, not given 1994-95

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

144. Multivariate Statistical Methods for Earth Sciences — (Graduate students register for 244.) Applications from a variety of subjects, including composition analysis, image processing, taxonomy, classification, and trend detection. Computer implementation. Prerequisite: Statistics 110. Recommended: Math. 103.

3-5 units (Switzer) alternate years, given 1994-95

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, occasional demonstrations, and a 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, Win (Lowe, Graham) MWF 9 lab T 1:15-4, field trips by arrangement

4 units, Spr (Ingle) MWF 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

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 (Parks, Brown)

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

3 units, Aut (Bird) MWF 9

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. Prerequisite: 80, 171 or equivalents.

5 units, Win (Liou, Stebbins) TTh 10-11:30
lab TTh 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)
alternate years, 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)
alternate years, given 1994-95

187. Hydrothermal Cycling and Concentration of Elements in the Earth's Crust — Investigates the geology of hydrothermal systems, their products and processes, including: structural, mineralogical, chemical, fluid inclusion, and isotopic characterization of fractures/veins and altered rocks: geologic settings, distribution, 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)
alternate years, 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 laboratory 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 “Honors Program” above under “Undergraduate Programs.”

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, Win (Miller) TTh 4-5:30
alternate years, not given 1994-95

211. Topics in Regional Geology and Tectonics—Seminar.

2 units, Win (Miller)


3-4 units (Pollard)
alternate years, given 1994-95


3-4 units, Spr (Pollard) MWF 10
alternate years, not given 1994-95

217. Characterization and Hydraulics of Rock Fractures—Interdisciplinary survey of natural fractures and their geological, geophysical, mechanical, 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 present the results of their recent and on-going investigations. One weekend field trip required. Prerequisite: equivalent of first-year graduate student in Geological and Environmental Sciences, Geophysics, or Petroleum Engineering.

3 units (Aydin)
alternate years, given 1994-95

230. Hydrogeology—Theory of underground water, analysis of field data and pumping tests, geologic groundwater environments, solution of field

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.

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.

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 well bore storage, well bore skin, aquifer boundaries, and heterogeneities such as faults and fracture zones; natural and forced gradient tracer tests. Prerequisite: 230.

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 extractive industry and environmental sciences. Prerequisites: introductory calculus and linear algebra, Statistics 116 or equivalent.

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.

242A,C. Topics in Advanced Geostatistics — (Same as Petroleum Engineering 243.) 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.


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 three-dimensional flow models. Stochastic procedures introduced. Emphasis on graphic display, with use of three-dimensional graphics computers. Prerequisite: elementary computer programming.

247. Oil Field Exploration and Development — (Same as Petroleum Engineering 247.) Analyzes an actual oil exploration or exploitation venture that includes drilling one or more wells. Students prepare comprehensive analyses and recommendations that include interpretations of the geology, engi-
neering specifications for wells, lease acquisition, and preparation of financial forecasts. An actual well may be drilled later based on the recommendation.

3 units, Spr (Harbaugh, Kourt) W 2:15-4:40

248. Risk Analysis in Petroleum Exploration — (Same as Petroleum Engineering 248.) Use of formal procedures to make optimal 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, Win (Harbaugh) TTh 10-12

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) alternate years, 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 (Lowe) TTh 1:15-3:05 alternate years, given 1994-95

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, not given 1994-95

252L. Sedimentary Petrography Laboratory — Lab study of siliciclastic sedimentary rocks in thin section.

2 units (Lowe) alternate years, not given 1994-95


3 units, Spr (Graham) TTh 1:15-3:05


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

255. Introduction to Micropaleontology — Microscopic marine fossils including diatoms, ostracods, and radiolarians with emphasis on foraminifera. Principles of classification, evolutionary trends, common genera, ecology, and environmental distribution of foraminifera. Application of planktonic and benthic foraminifera to interpretation of paleoenvironments, paleoceanographic and paleoclimatic analysis, and correlation of marine sequences. Paleoenvironmental and age analysis of an unknown microfossil sample serves as a term research project.

5 units, Aut (Ingle) alternate years, not given 1994-95

256. Advanced Micropaleontology — The use of marine microfossils (mainly benthic and planktonic foraminifera) to solve fundamental geologic and oceanographic problems. Applications to geochronology, correlation, paleoecology, and paleoceanography. Individual analysis of a series of unknown samples provides intensive experience in applying basic concepts of biostratigraphy and paleoenvironmental analysis to interpretation of Paleozoic, Mesozoic, and Cenozoic microfossil assemblages. Lectures on classic and current examples of research in this field. Prerequisite: 255.

3 units, Win (Ingle) alternate years, not given 1994-95

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

2 units, Win (Graham) by arrangement

261. Physics and Chemistry of Minerals and Mineral Surfaces — Discussion of the concepts of symmetry and periodicity in crystals; physical properties of crystals and their relationship to atomic-
level structure; basic structure types; crystal chemistry and bonding in solids and their relative stability; interaction of x-rays with solids and liquids (scattering and spectroscopy); structural variations in silicate glasses and liquids; UV-visible spectroscopy and the color of minerals; review of the mineralogy, crystal chemistry and structures of selected rock-forming silicates and oxides; mineral surface and interface geochemistry.

4 units, Spr (Brown) alternate years, not given 1994-95

262. Thermodynamics and Disorder in Minerals and Melts — Thermodynamic properties of crystalline, glassy, and molten silicates and oxides in light of microscopic information about short range structure and ordering. Measurements of bulk properties, e.g., enthalpy, density, and their pressure and temperature derivatives, and structural determination by spectroscopies such as Nuclear Magnetic Resonance and Mössbauer. Basic formulations for configurational entropy, heats of mixing in solid solutions, activities, and the energetics of exsolution, phase transitions, and nucleation. Quantitative models of silicate melt thermodynamics are related to atomic-scale views of structure. A general view of geothermometry and geobarometry. Prerequisites: introductory mineralogy and thermodynamics.

4 units, Spr (Siebbins) alternate years, not given 1994-95

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 — Introduction to 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.

3 units, Spr (Parks) MWF 9

267. Solution-Mineral Equilibria: Theory — Procedures for calculating and evaluating the thermodynamic properties of reversible reactions among rock-forming minerals and aqueous solutions in geologic systems. The concepts and principles of chemical thermodynamics relevant to geochemical processes. The thermodynamic behavior of minerals, H₂O, CO₂, and electrolyte solutions at high temperatures and pressures. Emphasis is on the generation and utility of phase diagrams depicting solution-mineral equilibria relevant to phase relations associated with diagenetic, hydrothermal and metamorphic processes, and the prediction of temperature, pressure, and the chemical potential of thermodynamic components compatible with observed mineralogic phase relations in geologic outcrops. Individual research topics. Prerequisite: 171.

2 units (Bird) alternate years, given 1994-95

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, Win (Einaudi) MWF 11 alternate years, not given 1994-95

270. Petrologic Phase Equilibria — Principles of phase equilibria 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, Aut (Ernst) by arrangement alternate years, given 1994-95

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 tectonothermal framework that allows a quantitative assessment of the evolution of metamorphic belts. Two lectures, one lab weekly.

3 units (Bohlen) alternate years, given 1994-95

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 (Tingle) TTh 9

275L. Electron Microanalysis Laboratory — Operation of the JEOL 733 electron microprobe and associated computer software for quantitatively
analyzing materials. Secondary and backscattered electron imaging and x-ray chemical mapping. Limited enrollment.

2 units, Win or by arrangement (Tingle)


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 1994-95

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 basalts 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 tectonic analysis. Prerequisite: introductory course in igneous petrology.

3 units, Spr (Mahood, Sparks) TTh 10-11:30 alternate years, not given 1994-95

292. Field Mapping of Mineral Deposits — Seven-day field trip to a mineral district in California or Nevada, emphasizing detailed mapping of outcrops, adits, and (where possible) underground workings. In Spring Quarter students prepare maps and produce a report suitable for presentation to management or for publication. Register Spring Quarter. Prerequisite: 187.

3 units, Spr break (Einaudi)

299. Special Problems in Geological and Environmental Sciences — Individual research or guided reading on special problems.

any quarter (Staff) by arrangement

310. Advanced Field Mapping — 10-14 days mapping in a structurally complex region. Emphasis is on collecting detailed structural, stratigraphic, and sedimentologic data to solve a topical problem in either regional and/or local geology. Prerequisite: consent of instructor.

3 units (Miller) by arrangement

312. Seminar in Structural Geology

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

314A,B,C. Research Seminar: Quantitative Structural Geology, Neotectonics, and Geomechanics — Selected topics. May be repeated for credit.

1 unit, Aut, Win, Spr (Pollard, Aydin) by arrangement

330A,B,C. Advanced Topics in Hydrogeology — Critical discussion of modern topics in groundwater hydrology. Topics: questioning classic explanations of physical processes; and consideration of coupled physical, chemical, and biological processes effecting heat and solute transport.

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

332. Seminar in Hydrogeology

1-2 units, any quarter (Gorelick)

342A,B,C. Seminar: Geostatistics — Discussion of classic results and current research in geostatistics. Topics selected on basis of interest and timeliness. May be repeated for credit.

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


1 unit, Spr (Harbaugh) Th 3:15-5

350. Seminar in Sedimentary Geology

1-3 units, Win, Spr (Staff) by arrangement

360. Topics in Low Temperature Surface and Aqueous Geochemistry — Guided independent study, analysis, and critical oral and written reports on selected topics in environmental, surface, and/or aqueous geochemistry under earth-surface conditions. Prerequisites: 80, 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 co-requisite: 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, Neotectonics, 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 Paleoecology
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

GEOPHYSICS

Emeritus: George A. Thompson (on active duty)
Chair: Mark D. Zoback
Professors: Jon F. Claerbout, Robert L. Kovach, Amos M. Nur, Jonathan Roughgarden*, Norman H. Sleep, Mark D. Zoback
Associate Professors: Steven Gorelick†, Jerry M. Harris, Simon L. Klemperer, Michael O. McWilliams†
Assistant Professor: Gregory C. Beroza
Professor (Research): Antony Fraser-Smith**
Associate Professors (Research): Gerald M. Mavko, Paul Segall
Research Associates: Colleen A. Barton, Jack Dvorkin, Daniel Moos, Lev Vernik
Courtesy Professors: Stephan A. Graham, David D. Pollard
Lecturer: Phillip Farrell
Consulting Professors: Biondo Biondi, William Ellsworth, Cecil Green, Rosemary Knight, Walter Mooney, Francis Muir, William Ostrander, William Savage, Uri tenBrink, George Zandt

* Joint appointment with Biological Sciences.
† Joint appointment with Geological and Environmental Sciences.
** Joint appointment with Electrical Engineering.

Geophysics is the branch of earth science concerned with exploration and analysis of 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 broad-band 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 measurement of in situ stress at great depth. Current research activities include earthquake mechanics, geophysical well logging, application of seismology to the study of present-day tecton-
ics, near field seismology, seismic studies of the continental lithosphere, isotopic age dating, palaeomagnetic 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.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

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 170, 171. Thermodynamics
Elect. Engr. 141. Electromagnetic Fundamentals, or Physics 120. Electricity and Magnetism
Geol. and Envir. Sci. 1. Planet Earth
Geol. and Envir. Sci. 80. Rocks and Minerals
Geol. and Envir. Sci. 102. Introduction to Field Geology
Geol. and Envir. Sci 111, 112. Structural 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, 191. Other suggested Geophysics electives are 102, 180, 195, 262, 276, 284, 285.

Recommended elective courses which 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 to 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 (EE) 142, EE 261, Engineering 102 W, and Physics 210, 211, or Math. 220A, 220B, and five of the following: Geophysics 102, 174, 195, 262, 284, 287, 288, or 290. Additional advanced courses are to be 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 prior to 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 the event of 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 removed. 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 which 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 the University oral examinations. They are given one additional year in which to submit dissertations.

University requirements regarding the M.S. and Ph.D. are described in the “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, Win (Kovach) MWF 10

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, analysis of terrane displacement. Students conduct a small-scale paleomagnetic study as a research project. Prerequisite: Geological and Environmental Sciences 1 or 2. Recommended: 150, Geological and Environmental Sciences 110, Physics 53.

3 units, Spr (McWilliams) by arrangement alternate years, not given 1994-95

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.

3 units, Spr (Sleep) MWF 1:15 alternate years, not given 1994-95

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) MWF 1:15 alternate years, not given 1994-95


3 units, Aut (Kovach, Beroza) MWF 9


3 units, Aut (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, Win (Klemperer, Ostrander) MWF 10

183. 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: concurrent or prior registration in 182, or consent of instructor.

2 units, Win (Klemperer) MW 11, lab F 11

184. 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, Spr (Klemperer, Graham) MW 9, lab M 2:15

185A,D,E,G,H,J,K,L,M,S,T,U,V,Y. Research Seminars — Limited to Geophysics undergraduates and coterminal master candidates. Opportunity for undergraduates to participate directly in an ongoing research project: experimental and computational work, joining in reading and study groups, giving seminar papers, and doing original research for the undergraduate thesis. Prerequisite: consent of instructor.

185A. Research Seminar: Reflection Seismology — Departmental research in reflection seismology and petroleum prospecting.

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.

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.


2 units, Aut, Win, Spr (Klemperer, Sleep, Thompson) MW 3-4:15

**185H. Research Seminar: Earthquake Seismology** — 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.

2 units, Aut, Win, Spr (Beroza) 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 includes field measurements of gravity anomalies, magnetic anomalies, and seismic velocity. Recommended: Geological and Environmental Sciences 110.

4 units, Aut (Sleep) MWF11

**195. Terrestrial Planets** — Study of the available data of geology, volcanology, petrology, geodesy, heat flow, high pressure lab work, seismology, and solid state physics for developing up-to-date understanding of the properties and processes of the interiors of the terrestrial planets. Emphasis on current unresolved problems, including the formation of the planets and their thermal histories.

3 units (Sleep) alternate years, given 1994-95

**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

**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 (Nur) T11-1 Th 11-12

GEOPHYSICS 51

Provides a rigorous introduction to these methods and a context for them in current research on earthquakes and earth structure. Prerequisite: 174.

3 units, Spr (Beroza) alternate years, not given 1994-95


3 units (Beroza, Segall) alternate years, given 1994-95

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, O. Prerequisites: complex numbers, simultaneous equations.

3 units, Aut (Claerbout) MWF 10


Prerequisite: 174.

3 units (Beroza) alternate years, given 1994-95

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 (Segall) alternate years, not given 1994-95

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 (Segall) alternate years, given 1994-95


3 units (Zoback) alternate years, not given 1994-95


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 — Departmental research in reflection seismology and petroleum prospecting.

2 units, Aut, Win, Spr (Claerbout)


2 units, Aut, Win, Spr (Mavko, Nur)

by arrangement

385E. 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.

2 units, Aut, Win, Spr (Klemperer, Sleep, Thompson) MW 3:4-15


2 units, Aut, Win, Spr (Sleep)

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

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

385L. Research Seminar: Seismotectonics — Research using in situ stress measurements and other geophysical data to understand structure and processes in seismically active areas.
2 units, Aut, Win, Spr (Zoback) by arrangement

385M. Research Seminar: Earthquake Seismology — Research on earthquake source processes and their tectonic implications. Prerequisite: consent of instructor.
2 units, Aut, Win, Spr (Beroza) by arrangement

385S. Research Seminar: Seismic Tomography — Current research in transmission and reflection tomography including topics on forward modeling, inversion, and data acquisition.
2 units, Aut, Win, Spr (Harris) by arrangement

385T. Research Seminar: Crustal Deformation — Current research in crustal deformation with application to active tectonic and volcanic processes. Conventional and space techniques, data analysis, inversion of surface data to constrain physical processes in the earth.
2 units, Aut, Win, Spr (Segall) by arrangement

385U. Research Seminar: Fault Mechanics — Current research into the mechanics of faulting, fracture mechanics, friction, models of strain and post-seismic deformation, pore fluid effects, and induced seismicity.
2 units, Aut, Win, Spr (Segall) by arrangement

385V. 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: 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.
2 units, Aut, Win, Spr (Mavko) by arrangement

385Y. Seminar in Theoretical Ecology — (Same as Biology 384.) Current topics in theoretical ecology, especially interface between earth sciences and ecology/evolutionary biology. Examples: molecular systematics and plate tectonic reconstruction; physical oceanography and marine population dynamics, species selection and evolution of sex, species election, remote sensing and population dynamics, dynamics of spatially distributed populations, niche theory and coevolution of competing species.
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 (on active duty), Marshall B. Standing
Chair: Franklin M. Orr, Jr.
Associate Chair: Roland N. Horne
Assistant Professor: Martin J. Blunt
Professor: (Research): F. John Fayers
Courtesy Professor: George M. Homsy
Consulting Assistant Professor: Jane Woodward
Visiting Professor: Magnar Dale

* 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 characterization of the spatial distribution of reservoir properties, drilling of wells, design and operation of production facilities, selection and implementation of methods for enhancing fluid recovery, prediction of recovery process performance, monitoring of reservoirs, and 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 the optimization of oil recovery from petroleum reservoirs and the remediation of 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 with 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 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 12 UNIX workstations and a number of microcomputers. All graduate student offices have a terminal on each 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 which 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 in integrating the skills developed in individual courses to address a significant design problem. In a two-quarter design 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>39-40</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</td>
<td>5</td>
</tr>
</tbody>
</table>

or

| Math. 42. Calculus and Analytical Geometry       | 5     |

| Math. 19. Calculus and Analytical Geometry       | 3     |

or

| Math. 20. Calculus and Analytical Geometry       | 3     |

and Math 21. Calculus and Analytical Geometry    | 4     |

| Math. 43. Calculus and Analytical Geometry       | 5     |
| Math. 44. Calculus                               | 3     |
| Math. 130. Ordinary Differential Equations       | 3     |

or

| Mech. Engr. 100. Differential Equations in Engineering | 3     |

| Total                                              | 21    |
SCIENCE
Chem. 31. Chemical Principles 4
Chem. 33. Structure and Reactivity 4
Chem. 171. Physical Chemistry 3
Geolog. & Envir. Sci. 1. Planet Earth 4-5
Physics 51. Mechanics 4
Physics 53. Electricity and Magnetism 4
Physics 54. Electricity and Magnetism Laboratory 1
Total .......................................................... 24-25

ENGINEERING FUNDAMENTALS
Comp. Sci. 106A. Programming Methodology 5
or Comp. Sci. 106X. Programming Methodology and Abstractions 5
Engr. 10A. Applied Mechanics 5
or Engr. 10. Applied Mechanics 3
and Engr. 11. Mechanics of Materials 4
Engr. 30. Engineering Thermodynamics 3
Mech. Engr. 33. Introductory Fluids Engineering 4
Pet. Engr. 167. Engineering Valuation of Oil and Gas Wells
or Engr. 60. Engineering Economics 3
Total .......................................................... 20-22

* 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:
Chem. Engr. 140. Fluid Mechanics 3
or Chem. Engr. 160. Chemical Engineering Plant Design 3
Chem. Engr. 180A. Chemical Engineering Laboratory 3
Chem. Engr. 180B. Chemical Engineering Laboratory 3
Geolog. & Envir. Sci. 111. Structural and Engineering Geology I. 3
Geolog. & Envir. Sci. 151. Sedimentary Geology and Petrography Depositional Systems 4
Pet. Engr. 120. Fundamentals of Petroleum Engineering 3
Pet. Engr. 130. Well Log Analysis I 3
Pet. Engr. 140. Drilling and Completion Technology 3
Pet. Engr. 170. Reservoir Engineering 3
Pet. Engr. 175. Well Test Analysis 3
Pet. Engr. 260. Groundwater Pollution and Oil Spills 3
Total .......................................................... 39-40

A list of suggested electives and sample course programs are available in the Department of Petroleum Engineering, room 63, 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. There is extensive use of computers in most petroleum engineering courses. Students must develop programming skills through appropriate course work and self study and are expected to achieve fluency in the use of Fortran by their junior year.

HONORS PROGRAM
A limited number of undergraduates may be admitted to the honors program at the beginning of the 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 petroleum engineering courses and complete 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 above 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 coterminus 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 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 de-
The bachelor's 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.

Usual 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>
<tr>
<td>Pet. Engr. 270A. Advanced Reservoir Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 270B. Advanced Reservoir Engineering</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></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:**
- Pet. Engr. 130. Well Log Analysis I 3
- Geolog. & Envir. Sci. 151. Sedimentary Geology and Petrography: Depositional Systems 3
- Geophy. 180. Geological Interpretation of Reflection Seismograms 3
| Total | 18 |

**Petroleum Geology:**
- Geolog. & Envir. Sci. 247. Oil Field Exploration and Development 3
- Geolog. & Envir. Sci. 251. Sedimentary Basins 3
- Geolog. & Envir. Sci. 253. Petroleum Geology and Exploration 3
- Pet. Engr. 251. Thermodynamics of Phase Equilibria 3
| Total | 12 |

**Reservoir Performance:**
- Pet. Engr. 190. Field Development Design 3-4
- Pet. Engr. 251. Thermodynamics of Phase Equilibrium 3
- Pet. Engr. 271. Advanced Reservoir Simulation 3
| Total | 13-15 |

**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
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 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, i.e., 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 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 through 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>
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 essentially a defense of the dissertation. The student must prepare a dissertation which is the result of independent research and which 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 15 units of selected graduate-level lecture courses in the department. These courses must include 270A and 270B. The remaining courses should be selected from 170, 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.

3 units, Aut, Spr (Woodward) MWF 9

120. Fundamentals of Petroleum Engineering — (Same as Engineering 120.) Basic engineering topics involved in petroleum recovery. Chemical, physical, and thermodynamic properties of oil and natural gas. Use of computers for design problems. Gas laws, physical behavior of fluids, multiphase flow through porous media, capillary pressure, relative permeability.

3 units, Aut (Horne) MWF 10

130. Well Log Analysis I — Interdisciplinary course for all earth scientists and engineers giving practical understanding of the interpretation of well logs by use of 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.

2 units, Win (Linblom) 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, Aut (Klotz) Th 2:15-5:05


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 (Kouri) S 9-12


3 units, Aut (Blunt) MWF 2:15


3 units, Aut (Ramey) MWF 8


3 units, Spr (Ramey) MWF 8

180. Field Development Design — All phases of the design of field development facilities, from reservoir description to the design of production facilities. Lectures are related to field development considerations: inflow performance relationships, reservoir simulation, selection of tubing size, development of tubing performance curves, pumping, gas lift, nodal analysis, field separation, gathering system design and related problems. Prerequisites: 120, 130, 140, 170, 172.

3-4 units, Win, Spr (Aziz) TTh 4:15-6:05

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, Spr (Horne) by arrangement

240. Geostatistics for Spatial Phenomena — (Same as Geological and Environmental Sciences 240.) Probabilistic modeling 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 extractive industry and environmental sciences. Prerequisite: introductory calculus and linear algebra, Statistics 116 or equivalent.

4-5 units, Win (Christakos) TTh 10-12

241. Practice of Geostatistics on Exhaustive Data Bases — (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 (Journal) not given 1993-94

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;
247. Oil Field Exploration and Development — (Same as Geological and Environmental Sciences 247.) Analyzes an actual oil 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, Win (Harbaugh, Kourt) W 2:15-4:40

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, Win (Harbaugh) TTh 10-12


3 units, Aut (Staff) TTh 8:30-9:50

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


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) S 9-12

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 (Staff) by arrangement


3 units, Win (Hewett) MWF 10

270B. Advanced Reservoir Engineering — Lectures, problems. Steady-state and pseudosteady-state flow of liquids and gases in porous media including the effects of gravity and corrections to Darcy's Law. Applications of Laplace Transforms to transient flow problems in reservoir engineering. Flow and pressures in multiwell systems. Prerequisites: 170, Chemical Engineering 140, and Math. 130; or consent of instructor.

3 units, Spr (Hewett) MWF 10


3-4 units, Win (Aziz) MWF 11

individual wells and fields. Selected advanced topics related to natural gas and gas-condensate reservoirs.

3 units, Aut (Ramey) MWF 8

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

3 units, Spr (Ramey) MWF 8

3 units, Aut (Fayers) MWF 1:15

3 units, Orr not given 1993-94

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

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

3 units (Staff) not given 1993-94

285A,B,C,D,E. Research Seminars — Special, 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 (Ramey, 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 (Ramey, 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

Acting Dean: Nel Noddings

Associate Deans: Myra Strober (Academic Affairs), Renda Johnson (External Relations)

Assistant Dean: Ralph Keller (Alumni Relations)


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

Assistant Professors: Patricia J. Gumport, Melanie Sperling


Lecturers: Margaret Azevedo, Raymond F. Bacchetti, Jean Fetter, John W. Gardner, Ronald B. Herring, Kenneth Hill, James Lyons, James P. Steyer, Lee Swenson, Ann Vosovic

The School of Education is organized into six Program Area Committees:

- Administration and Policy Analysis (APA)
- Curriculum and Teacher Education (CTE)
- International Development Education (IDE)
- Language, Literacy, and Culture (LLC)
- Psychological Studies in Education (PSE)
- Social Sciences in Education (SSE)

These committees function as administrative units which 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 brochure, 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: Doctor of Philosophy, Doctor of Education, Educational Specialist, Master of Arts, and Master of Arts in Teaching (Subject). While no undergraduate majors are offered, an undergraduate honors program and courses are available to undergraduates.

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 Program for Prospective Principals.

Students interested in credentials must contact the Credential Program 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 types 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, 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 the Undergraduate Program in the School of Education (UPSE) offers a variety of tutoring opportunities for undergraduates interested in developing educationally oriented skills. Undergraduates are also encouraged to explore admission to coterminous and master's degree programs such as the Master of Arts degree in Education described below.

**HONORS PROGRAM**

This program permits interested and able undergraduates at Stanford to build upon 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. Approved course work totaling 25 units must be taken, in addition to course work in the major field of study. No more than 6 units can be taken for work on the honors thesis; the thesis is based upon a supervised research or practicum project. At least one course must be taken from each of the following:

1. Educational policy and history in the U.S. Courses include American Education and Public Policy, History of Education in the United States, and History of School Reform.

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 2-unit honors seminar, taken in the Spring Quarter in either the junior or senior year.

Near the end of Spring Quarter, successful candidates for honors orally present brief reports of their work and findings at a mini-conference. All honors students in Education are expected to attend this conference.

**COTERMINAL BACHELOR'S AND MASTER'S DEGREE PROGRAM**

The School of Education admits students from undergraduate departments within the University into a coterminous 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 upon completion of 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 upon the program requirements within the School of Education; the minimum is 36 units.

Applicants may obtain coterminous degree application materials from the School of Education Admissions Office. Coterminous applicants may also consult with the University's Graduate Admissions Support Section of 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 "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 the Graduate Admissions Support Section of the Registrar's Office, Stanford University, Stanford, CA 94305-3052. The admissions packet includes: the brochure *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 and Degrees*, 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. Please note that some master's degree programs require more than the minimum 36 quarter units. No thesis is required to earn a master's degree. (Note: the International Development Education, and Language, Literacy, and Culture areas require a written project.) Additional detailed information regarding entrance requirements and degree requirements is available in the brochure School of Education Information.

The area committee programs with specializations available for Master of Arts degrees are as follows:

- Administration and Policy Analysis
  - Higher Education Administration
  - Policy Analysis
  - Joint Program with Graduate School of Business
- Prospective Principal’s Program
- Curriculum Studies and Teacher Education
  - Curriculum Areas (Art, Dance, English, Social Studies Education, Science)
  - General Curriculum Studies
- Teacher Education
- International Development Education
- International Educational Administration and Policy Analysis
- Language, Literacy, and Culture
  - Bilingual Education
  - Language Policy
  - Second Language Education
  - Writing, Reading, and Language — English
- Psychological Studies in Education
  - Health Psychology Education

Social Sciences in Education (Interdisciplinary)
  - Gender Studies

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 brochure 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 prepare prospective secondary teachers to be successful in multicultural classrooms, STEP helps them become aware of their values, more flexible in their teaching and learning styles, and more knowledgeable in their subject matter. Teachers will 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 brochure 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 1993-94, it is offered jointly by the School of Education and academic departments such as Art, Biology, English, 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 1993-94, M.A.T. programs will not be offered in Chemistry, 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 non-matriculated 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 these units must be completed at Stanford.

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

4. At least 12 units of the M.A.T. degree requirements of graduate courses 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 which 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, etc.—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.

7. Approved general background courses outside of the teaching field and professional education used to satisfy some of the unit requirements for the degree.

8. A program proposal for the degree submitted to the School of Education Degree Programs office by the end of the first quarter of residence.

9. Specific course requirements in both the teaching field and professional education are determined in part by the candidate's previous program of studies.

EDUCATIONAL SPECIALIST IN EVALUATION

The degree of Educational Specialist (Ed.S.) is offered in the field of Evaluation for those students admitted to the School of Education's Evaluation Training Program. Evaluation of educational and social programs helps society to find programmatic methods of solving pressing problems. Evaluators must be familiar with a variety of disciplines and have expertise in at least one. A broad understanding of the political, social, and organizational settings in which decisions are made and programs are carried out is essential. Students take courses examining evaluation problems from theoretical, technical, and practical perspectives.

This program is especially designed for, but not limited to, applicants who: (1) are taking another course of postgraduate study at Stanford and wish to obtain this degree concurrently; or (2) hold a doctoral degree but wish to specialize in Evaluation in a postdoctoral year.

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 infor-
mation about admission and program requirements is available in the brochure 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 Administration and Policy Analysis Program. 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 to completion 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) direction of 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 through the Administration and Policy Analysis (APA) program.

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 which is relevant and meaningful to their interests and professional objectives.

Upon admission, an adviser is assigned from the admitting area committee who will work 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 brochure School of Education Information. Complete guidelines may be obtained from the specific area committees.

The program areas for doctoral study are as follows:

- Administration and Policy Analysis
- Higher Education Administration
- Jewish Education
- Joint Program with Graduate School of Business
- Policy Analysis
- Curriculum Studies and Teacher Education:
  - Curriculum Areas (Art, English, Science, Social Studies)
  - General Curriculum Studies
  - Jewish Education
  - Symbolic Systems in Education
  - Teacher Education
- International Development Education
- Language, Literacy, and Culture
  - Bilingual Education
  - Language Policy
  - Second Language Education
  - Symbolic Systems in Education
  - Writing, Reading, and Language — English
- Psychological Studies in Education
- Child and Adolescent Development
- Counseling Psychology
- Educational Psychology
- Jewish Education
- Symbolic Systems in Education
- Social Sciences in Education
- Anthropology of Education
- Economics of Education
- History of Education
- Jewish Education
Philosophy of Education  
Sociology of Education  
Social Sciences in Education (interdisciplinary)

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 Associate Dean for Academic Affairs 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.

"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.

"S" suffix denotes a Special Course, given only once and usually taught by visiting faculty.

99S. Nonviolent Struggles for Justice as Moral Education — For sophomores only. Investigates historic nonviolent struggles for justice in the U.S., analyzing such campaigns as forms of public moral education. The nature of moral education and the philosophic foundations of nonviolence and pacifism. Premise: the efficacy of nonviolent campaigns depends on persuasion by moral appeal and depends on the evident moral quality of the coercive measures employed. By combining the results of the philosophic and historical inquiries, conceptions of moral education and citizenship enable a more just democratic society. (SSE)

2 units, Spr (Glass) MW 3:15-5:05

100A, B. Tutor Skills Training — For undergraduates who want to tutor or coach in local schools and educational programs. Opportunities for first-hand experience exist at all grade levels and in a wide variety of subjects. Students discuss experiences and learn relevant interpersonal, analytical, and instructional skills. Students must have concurrent tutoring placement. (Contact UPSE, Upward Bound or the Public Service Center, or attend the first class meeting.) (PSE)

100A. Skills Training for Elementary Level Tutors — (Same as Psychology 168A.)

2-3 units, Aut, Win (Takemoto) W 4:15-5:45

100B. Skills Training for Secondary Level Tutors — (Same as Psychology 168B.)

2-3 units, Aut, Win, Spr (Staff)

T 7-8:30 p.m.

102. Culture, Class, and Educational Opportunity — Upward Bound and EPASSA counselors who will 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

104. Psychosocial Aspects of Aging — (Same as Human Biology 104.) Survey of common stressors of middle age and later life, and coping strategies employed to address them. Depression 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 significant 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. (PSE)

4 units (Thompson) not given 1993-94

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 do schools 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
107X. Linguistic Foundations of Racial Strife in American Education — (Same as Linguistics 172.) Examines controversial topics regarding language, education, and racial integration in American schools. Basic linguistic concepts as they pertain to the evolution of linguistic and cultural diversity of school populations. Multicultural education, bilingualism, and language-related dimensions of affirmative action. Ethical issues as part of the American quest for racial harmony in schools and society. Educational reform topics are central theme. (LLC) DR:3
3 units (Baugh) not given 1994-95

108X. Ethnogerontology — (Same as Human Biology 105.) Enrollment limited to junior and above. 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. Prerequisite: Human Biology Core or consent of the instructor. (PSE)
4 units, Spr (Thompson, Yeo)

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 (Phillips) alternate years, given 1994-95

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, Aut (Greeno) MWThF 1:15

131. The Economics of Gender — (Same as Feminist Studies 129.) 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, Win (Strober) MW 3:15-5:05

141X. America’s Children and Public Policy: Strategies for Change — (Same as 241X.) For undergraduates. Topics: analysis of children and family policy issues in the U.S. and California; the role of various agencies and institutions in policy-making and service delivery for children, and the political and social consequences of decision-making in the areas of children’s and educational policy. Guest speakers. Field placement in children’s service required. Enrollment may be limited. Prerequisite: consent of instructor. (APA)
5 units, Spr (Steyer) M 7-9:30 p.m.

150X. Issues in the Study of Bilingualism — 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 (Valdes) alternate years, given 1994-95

155. Development of Measuring Instruments — For students planning to develop achievement tests, reasoning 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, Win (Haertel) 9-10:30

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 (Herring) by arrangement

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 1994-95

170. Gender and Education — (Same as Sociology 132, Feminist Studies 130.) Gender as a critical variable in educational institutions and labor markets. Interdisciplinary approach to the distribution of power in schools, the determinants of occupational choice, the relative payoff of schooling for women and men, the causes of differential behavior and treatment between the sexes in schools and in the work force, and the legal redress of inequalities.
The primary disciplines are economics and sociology, but historical, psychological, and legal materials are examined. Focuses on the U.S., but some work on other countries. (SSE)

4 units (Strober, E. Cohen)
alternate years, given 1994-95

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: 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. (AH Areas)

5 units, Spr (Dreikmeier, Bernstein, Ross, Moses, Holloway, Bland, Dornbusch, Noddings)
MTW 1:15 and by arrangement

175A,B. Experiential Curricula—Two-quarter sequence.

175A. The Case of Wilderness Education—Explores 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, Aut (Westheimer) T 7-9:30 p.m.

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, Win (Westheimer) T 7-9:30 p.m.

180. Directed Reading in Education—For undergraduates and master’s degree students. (All Areas)
any quarter (Staff) by arrangement
186S. Social Psychology of Social Problems: A Focus on Chicanos—(Same as Psychology 186, Chicano Studies 108.) Develops cultural sensitivity and familiarity with Chicano populations and their cultures, providing understanding of salient social problems affecting Chicanos and other populations, namely violence, delinquency, substance abuse, poor education, and health challenges. Social-psychological theoretical models and perspectives are used to explain the development of these dominant social problems. Critiques existing prevention and intervention models and programs developed to address these social problems. Required participation in community service. Limited enrollment. (PSE)

3-4 units, Aut (Soriano) TTh 3:15-4:30

187S. Gangs and Violence: Application to Chicanos—(Same as Psychology 187, Chicano Studies 107.) Chico populations, their cultures and their violence and gangs. Social-psychological theoretical approaches and perspectives, focusing on prevention, intervention models, and efforts addressing gangs and violence. Required participation in community service. Limited enrollment. (PSE)

3-4 units, Win (Soriano) MW 1:15-2:30

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. (IDE, SSE) DR:9f(4 or 5)

4-5 units, Win (Ramirez) MWF 11 and by arrangement

199. Undergraduate Honors Seminar—Required for all seniors enrolled in the honors program in the School of Education. Focuses on research in education. Participants are expected to share ongoing work on their honors thesis. (All Areas)

2 units, Win (McDermott) W 7-9 p.m.

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. (SSE)

3 units, Aut (Tyack) TTh 11
and by arrangement

204. Introduction to Philosophy of Education — Introduces current approaches and techniques in philosophy of education, but material has also 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 (Glass) MW 11-12:50

205. Ideology and Education — Philosophical analysis of concept of “ideology” from Marx to the present. Focusing on claim that all education is ideological, asks if there is any non-ideological way of setting and evaluating educational goals, methods, and curricula. Emphasis is on analyzing and critiquing manifestations of racism and sexism in educational domains. (SSE)

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

206A. Introduction to the Study of International Development Education — Required for all first-year students in SIDEC; others by consent of instructor. Theoretical orientations and the research agenda in international development education, and resources for study and research at Stanford. (IDE)

1 unit, Aut (Weiler) M 12 and by arrangement

206B. Project Workshop in International Development Education — The conclusion of the four-quarter A.M. program in SIDEC, required of all A.M. students. It is 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 (Ramirez) M 2:15-4:05

206X. Applied Research Methods in International Development 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 (Weiler) TTh 4:15-6:05

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, Aut (Sutton) MW 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 (Goldstein) TTh 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, Sum (Walker) MTWTh 9-11:30

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. (SSE)

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

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, Aut (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 (Eisner) alternate years, given 1994-95

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
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)
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, Aut (Cashion, Ross) TTh 1:15-3:05

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 1994-95

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 (Strober) MW 9-10:50

220B. Introduction to the Politics of Education — (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)
4 units, Win (Kirst) MW 9-10:50 and by arrangement

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)
5 units, Spr (Meyer) TTh 10-11:50

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

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, Aut (Strober) M 1:15-3:05

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)
4 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 (Staff) TTh 2:15-4:05

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, alternate years, given 1994-95

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, Win, Spr (Walker) TTh 4:15-5:45

225X. Higher Education Economics, Finance, and Management — Required of 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, Aut (Haertel) MW 1:30-3:05

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, given 1994-95

228. Psychology of Literacy — For doctoral and master’s students in LLC, PSE, CTE, and SSE. 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) given 1994-95

232. Science and Research in Counseling/Health Psychology — (Same as Psychology 232.) What constitutes scientific research in theory and in practice. Disconfirmatory logic, social constructivist theory, limits of statistical significance testing, meta analysis, qualitative perspectives in research. Emphasis on improving writing skills. (PSE)
4 units (Thoresen)
alternate years, given 1994-95

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 (LaFromboise)
alternate years, given 1994-95

234. Career and Personal Counseling in Culturally Diverse Settings — (Same as Psychology 237.) 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. (PSE)
3 units, Aut (Krumbltz) M 3:15-5:05
and by arrangement

235X. Graduate Proseminar in Educational Policy — Enrollment limited to master’s students in Administration and Policy Analysis. (APA)
1 unit, Aut (Fetterman) Th 1:15
Win (Fetterman) Th 12
Spr (Fetterman) T 9
236. The Social Context of Cognitive Development — The development of children (birth to school age) from the perspective of Vygotsky’s theory and the sociocultural approach in psychology which affirms that, in development, cognitive functions appear first on the social (inter-psychological) plane and then are transferred or internalized to the individual (intra-psychological) plane. The origins of cognitive functions are explored within the child’s social caregiving environment. Topics: the contribution of infant temperament to mother-child interactions, the development of dyadic synchrony and intersubjectivity in the first few months of life, the language acquisition support system (LASS), and joint problem-solving within the zone of proximal development. (PSE)

4 units (Diaz) not given 1993-94

237. Psychological Assessment — (Same as Psychology 229.) Administration and interpretation of commonly used measures of interest, aptitude, achievement, intelligence, and personality for purposes of individual diagnosis and treatment. (PSE)

1 unit (Staff) alternate years, given 1994-95

238A. Orientation to Counseling Psychology — For first-year counseling psychology students. Overview of counseling psychology profession including counseling theories, techniques, and assessment. Topics: relationship enhancement, problem conceptualization, goal setting, intervention techniques, and monitoring outcomes. Review of training tapes, role-playing, and supervision of initial counseling experiences. Prerequisite: consent of instructor. (PSE)

3 units, Aut (Krumboltz, Thoresen) by arrangement

238B. Counseling and Health Psychology: Supervised Applications — For first-year counseling psychology students. Integration of counseling practice with research findings. Continuing review of training tapes, role-playing, and supervision of counseling experiences. Prerequisite: consent of instructor. (PSE)

3 units, Win (Krumboltz, Thoresen) 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) 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 (Padilla) given 1994-95

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, Spr (Fleisher, Franklin) M 3:15-5:05

241X. America’s Children and Public Policy: Strategies for Change — (Same as 141X.) For graduate students. See 141X.

4 units, Spr (Steyer) M 7-9:30 p.m.

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 (Sperling) MW 11-1:05

Win (Padilla) MW 3:15-5:05

Spr (Hakuta) MW 3:15-5:05

243X. Research in Writing and Writing Instruction: The Social, Cognitive, and Linguistic Dimensions of Written Language — Tradition and change in writing research, emphasizing theoretical and pedagogical implications. Topics: writing and learning, writing/reading connections, writing-speaking connections, the composing process, writing pedagogy. (LLC)

4 units (Sperling) given 1994-95

246A,B,C,D. Secondary Teaching and Multicultural Education Practicum — Preparation and practice in issues and strategies for multicultural teaching. Topics: instruction, curricular planning, classroom interaction processes, portfolio development, middle schools, and teacher professionalism. Weekly seminars during each quarter of STEP year. 16 units required for completion of the program. Prerequisite: STEP student. (STEP)

246A. 1-13 units, Sum (Staff) F 9-12 and by arrangement

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

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

246D. 1-13 units, Spr (Staff) 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 (Staff) MW 1:15-3:05

248X. Theory and Issues in Writing and Literacy — (Same as Linguistics 254.) 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) MW 1:15-3:05

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) given 1993-94


4 units (Olkin) given 1994-95

252. Introduction to Test Theory — (Same as Psychology 248.) Concepts of reliability and validity; derivation and use of test scales and norms; mathematical models and procedures for test validation, scoring, and interpretation. Prerequisite: Statistics 190 or equivalent. (PSE)

3-4 units, Spr (Haertel) MW 9-10:50

253X. Health Psychology Education Proseminar — Primarily for students in Health Psychology Education program. Contemporary topics in promoting health and preventing disease with 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 units, Aut, Win, Spr (Thoresen) T 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. Prerequisites: 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

256X. 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) Spr (Thoresen) TH 2:15-4:05

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, Win (Brenner, Lyubomirsky) MWF 11-12:30 plus section by arrangement

259X. Seminar in Higher Education — 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 value 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

262A,B. Curriculum and Instruction in English — Approaches to teaching English in the secondary school, including goals for instruction, teaching...
techniques, and methods of evaluation. Prerequisite: STEP student or consent of instructor. (STEP)

262A. 3 units, Sum (Vosovic) MW 1:15-3:05
262B. 2 units, Aut (Sperling) M 4:15-6:05

263A,B. Curriculum and Instruction in Mathematics — Purposes and programs of mathematics in the secondary curriculum; teaching materials, methods. Prerequisite: STEP student or consent of instructor. (STEP)

263A. 3 units, Sum (Lieberman, Webber) TTh 3:15-5:05
263B. 2 units, Aut (Greeno, Kelley) W 4:15-6:05

264A,B. Curriculum and Instruction in Foreign Languages — Approaches to teaching foreign languages in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. Prerequisite: STEP student or consent of instructor. (STEP)

264A. 3 units, Sum (Azevedo) TTh 5:15-7:05
264B. 2 units, Aut (Azevedo) Th 4:15-6:05

267A,B. Curriculum and Instruction in Science — Examination of possible objectives of secondary science teaching and related methods; selection and organization of content and instructional materials; lab and demonstration techniques; evaluation, tests; curricular changes; ties with other subject areas. Prerequisite: STEP student or consent of instructor. (STEP)

267A. 3 units, Sum (Atkin) MW 1:15-3:05
267B. 2 units, Win (Rowe, Helms) T 4:15-6:05

268A,B. Curriculum and Instruction in Social Studies — Emphasis is on the methodology of social studies instruction: review of curriculum trends, survey of teaching materials, opportunities to develop teaching and resource units. Prerequisite: STEP student or consent of instructor. (STEP)

268A. 3 units, Sum (Cuban, Swenson) TTh 3:15-5:05
268B. 2 units, Aut (Cuban, Swenson) 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 — (Same as Linguistics 173.) 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 stud-
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. (SSE)
5 units, Aut (G. & L. Spindler, McDermott)
T 7-10 p.m.

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, Aut (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, Aut (Padilla) MWF 3:15-4:05

284X. 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; 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)
3 units, Aut (Valdes) T 6-9 p.m.

3 units, Spr (Greeno) MW 1:15-2:40

287X. Culture and Learning — (Same as Anthropology 136.) 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)
4 units, Spr (McDermott) Th 7-10 p.m.

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)
3 units, Sum (Tyack) TTh 1:15-3:05

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 covering over a century of schooling are introduced and discussed. (APA)
3-4 units (Cuban) alternate years, given 1994-95

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)
2 units, Aut (Petig)

292. Methods of Teaching Spanish — (Same as Spanish 301.) A practical guide to the teaching of language. Analysis and discussion of classroom practices and instructional material. (LLC)
3-5 units, Spr (Haro) Th 11

293. Methods of Teaching French — (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, Spr (Greeno) MW 1:15-2:40
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 inpatient 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, Win (Staff) T 4:15-6:05

302X. The Role of Knowledge and Learning in Teaching — Focuses on current literature relevant to the structure of subject matter 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, Sum (Shulman, Phillips) MTWTh 9-10:30

303. Qualitative Inquiry in Education — The ways in which artistically and humanistically based approaches to study of teaching, classroom life, and schooling can improve 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 9-11

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. (SSE)

4 units (Noddings, Phillips) not given 1993-94


5 units, Aut (Carnoy) TTh 2:15-4:05

and by arrangement

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

and by arrangement

306C. Cultural Approaches to Education and Development — (Same as Anthropology 239.) Education in the context of specific cultural and social environments. 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, are examined from an anthropological perspective. 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, Win (McDermott) MW 9-10:50

306D. Sociology of Development and Education — (Same as Sociology 332.) The 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, Spr (Ramirez) TTh 2:15-4:05

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 1993-94

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. (SSE)

4 units, Aut (Cohen) MW 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 (Cohen) given 1994-95

315. Cultural Transmission: Education in Cross-Cultural Perspective — (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 sensitization. Attention to education in the U.S. and other complex societies, and in non-literate cultures. (SSE) 3-5 units, Win (G. & L. Spindler) T Th 7-10 p.m.

317. Research on Teaching — Introduction to theory, methodology, and substantive findings of research on teaching and teacher education. (PSE) 4 units (Shulman) alternate years, given 1994-95

319. The Development of Self-Regulation — The origins and development of children’s capacity to plan, guide, and monitor their own behavior. Seen as a movement from other (external) to self (internal) regulation, it is accomplished in three phases: dyadic regulation, when the child’s attention, security, and goal-oriented activity is socially regulated within caregiver-child interaction; during the caregiver’s withdrawal and the child’s takeover of the regulatory role; with self-regulation proper, when the child plans, guides, and monitors its own activity through private speech. Also, self-regulation as a level of behavioral organization constituting a major component of school readiness and which sets a basis for metacognitive development. (PSE) 3 units (Diaz) not given 1993-94

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 on student-produced texts. Individual projects utilizing discourse analytic techniques. Prerequisite: graduate status or consent of instructor. (LLC) 4 units, Spr (Sperling) MW 1:15-3:05

323A. Federal and State Policy: Education and Children — The formulation and implementation of federal and state education policy. Key current policy issues and trends in past policies. Prerequisite: senior honors student, co-term, APA student, or consent of instructor. (APA) 4 units, Spr (Kirst) MW 9-10:30 and by arrangement

331A,B,C. 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, Aut, Win (Bridges) W 12-1 Spr (Staff) W 12-1

335X. Language Policy and Planning: National and International Perspectives — For graduate students and undergraduates with consent of instructor. International study of social, political, and edu-
cational 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, Spr (Valdes) TTh 3:15-5:05

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 (Krbmboltz, Thoresen) by arrangement
338B. 1-6 units, Win (Krbmboltz, Thoresen) by arrangement
338C. 1-6 units, Spr (Krbmboltz, Thoresen) by arrangement

339X. Family Therapy: A Systematic Approach to Assessment and Treatment — Doctoral seminar examines the assumptions underlying the family-systems paradigm, viewed as an expansion of an 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) T 4:15-6:05

341X. Educational Applications of Sociolinguistics — (Same as Linguistics 258.) For students interested in the broad applications of linguistic research in educational contexts. Formal integration of sociolinguistics and applied linguistic research is examined in relation to a broad range of international case studies among students and teachers in socially stratified speech communities worldwide. Theoretical concepts from linguistics are introduced as they relate to practical educational problems in socially stratified speech communities. Recommended: background in linguistic science for students who seek to use course as an introduction to applied linguistic research. (LLC)

3 units (Baugh) given 1994-95

343. Motivational Processes in Education — Theory and research from the psychology and education literatures on three basic sets of motivational processes: goals, emotions, and personal agency beliefs. Introduces a conceptual framework for integrating these processes into a comprehensive understanding of motivated behavior, and emphasizes the crucial role of these processes in the development and maintenance of effective patterns of academic and social functioning. Implications for classroom instruction, curriculum development, and educational policy. (PSE)

4 units (Staff) given 1994-95

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, Aut (Gumport) T 4:15-7:05 and by arrangement

347. Problems of Teacher Education — Enables students to 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, Spr (Shulman) MW 3:15-5:05 alternate years, not given 1994-95

350A. Psychological Studies in Education — Required of first-year doctoral students in Psychological Studies; others by consent of instructor. Introduction to psychological studies in education. (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 (Krbmboltz) Th 10-11:50 and by arrangement
350C. 3 units, Spr (Snow) Th 10-11:50 and by arrangement
350D. 1 unit, Aut, Win, Spr (Snow) T 10-11:50 and by arrangement

351. Design and Analysis of Longitudinal Research — The analysis of longitudinal data is central to much empirical research on learning and development. Growth models, measurements of change, repeated measures designs, analysis of quasi-experiments, structural regression models, analysis of reciprocal effects. Prerequisite: 257/Psychology 252, or equivalent. (PSE)

3 units (Rogosa) not given 1993-94
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: 257 and 252 or Psychology 252 and 248, or equivalent. (PSE)

3 units (Haertel) 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, Sum (Levin) MTWTh 9-11:30

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, Aut (Atkin, Rowe) M 3:15-5:05 alternate years, not given 1994-95

359B. Instruction
2 units, Spr (Rowe) M 5:15-7:05 alternate years, not given 1994-95

359C. Curriculum
2 units (Atkin, Rowe) alternate years, given 1994-95

359D. Teacher Education
2 units (Rowe) alternate years, given 1994-95

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 1994-95

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 1993-94

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 1994-95

379X. Public Policy Toward Abused and Neglected Children — (Same as Law 337.) 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) given 1994-95

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, Spr (Gumport) T 4:15-7:05

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. (LLC)
3 units, Win (Hakuta) T 6-9 p.m.

397X. Controversies in Classroom Research — Seminar on improving understanding of 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, Bourdieu). (IDE)
2-3 units (Ramirez) not given 1993-94

408. Research Workshop in International Development Education — Limited to advanced doctoral students in SIDEc 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 (Carnoy) MW 11-12:50

410X. 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 (Greeno, Baugh) M 3:15-5:05
Win, Spr (Greeno, Walker, Baugh) M 3:15-5:05

414X. 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) M 1:15-4:05

415. Seminar in Educational Psychology — Topical seminar for advanced students. Prerequisite: consent of instructor. (PSE) not given 1993-94

416. Seminar on Aptitude — Limited to advanced doctoral students in education and psychology. Study of individual differences in learning, cognitive, conative, and affective processes related to education. Prerequisites: 255 or equivalent, and consent of instructor. (PSE)
3 units (Snow) alternate years, given 1994-95

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, SSE)
3-5 units, Spr (Gumport) Th 4:15-7:05

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. (SSE) 1-3 units (Noddings) not given 1993-94

421. Internship in Educational Administration — Field experience for students in the educational administration program. Supervised by staff; project centered. (APA)
1-3 units, Aut, Win, Spr, Sum (Staff) by arrangement

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 — Focuses on the key issues in conceptualizing and designing research in the social sciences. Prerequisite: APA student. (APA)
3-5 units, Win (McLaughlin) 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 (Krumboltz)
T 4:15-6:05, biweekly

451. Research in Mathematical Education — Overview of the major problems, controversies, and findings in current research in mathematics education. (PSE)
2-4 units, Win (Greeno) Th 7-9 p.m.

453. Doctoral Dissertation — (All Areas)
any quarter (Staff) by arrangement

466. Doctoral Seminar in Curriculum — Required of all doctoral students in C&TE to provide the opportunity to become acquainted with research in this field. Students learn about research activities in which they 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. Seminar is on the major problems in this field and ways these are addressed by current investigators. (CTE)
2-5 units, Win (Walker) 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. Methodology Seminar: Meta-Analysis — Statistical Methods for Combining Information — (Same as Health Research and Policy 206, Statistics 211.) 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. (All Areas)
3 units, Win (Olkin) MWF 11-12:30

ADMINISTRATION AND POLICY ANALYSIS (APA)

105. American Education and Public Policy — (Same as History 158B, Political Science 186K.)
141X. America’s Children and Public Policy: Strategies for Change — (Same as 241X.)
207. Seminar: The Politics of International Cooperation in Education
215. American Education and Public Policy — (Same as 105, History 158B, Political Science 168K.)
220A. The Social Sciences and Educational Analysis: Introduction to the Economics of Education
220B. The Social Sciences and Educational Analysis: 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
220Y. Introduction to the Economics of Education: Economics Section
221. Issues in Policy Analysis — (Same as Public Policy 221.)
222. Resource Allocation in Education
223. Effective Schools: Research, Policy, and Practice
225X. Higher Education Economics, Finance, and Management
235X. Graduate Proseminar in Educational Policy
241X. America’s Children and Public Policy: Strategies for Change — (Same as 141X.)
258. Organizations: Principles and Emerging Ideas — (Same as Sociology 164.)
259X. Seminar in Higher Education
271X. Seminar in Higher Education: Curricular and Instructional Issues
290. Leadership in Education Research and Practice
302X. The Role of Knowledge and Learning in Teaching
320X. Instruction of Heterogenous Populations
323A. Federal and State Policy: Education and Children
331A,B,C. Administration and Policy Analysis Research Seminar
346. Research Seminar in Higher Education
354X. School-Based Decision Making
368. Student Affairs: Administration, Practices, and Issues
369. Personnel Administration
375X. Organizational Development: Theory and Practice — (Same as Business 375.)
379X. Public Policy Toward Abused and Neglected Children — (Same as Law 337.)
384X. Advanced Topics in Higher Education
414X. Topics in Higher Education Research
418X. Foundations of Field Research in Higher Education — (Same as Sociology 373.)
421. Internship in Educational Administration
422A,B,C. Practicum for Principals
423A. Introduction to Research Design: Educational Administration and Policy Analysis

CURRICULUM AND TEACHER EDUCATION (CTE)
175A,B. Experiential Curricula
175A. The Case of Wilderness Education
175B. Issues in Implementation
208A,B,C. Introduction to Curriculum
213. Aesthetic Foundations of Education
218. Society, Education, and Dance — (Same as Dance 268.)
219. Artistic Development of the Child
223. Effective Schools: Research, Policy, and Practice
224. Information Technology in the Classroom
271X. Seminar in Higher Education: Curricular and Instructional Issues
303. Qualitative Inquiry in Education
308X. The Analysis of Teaching
347. Problems of Teacher Education
359. Research in Science and Mathematics Education
359A. Assessment and Evaluation
359B. Instruction
359C. Curriculum
359D. Teacher Education
397X. Controversies in Classroom Research
466. Doctoral Seminar in Curriculum

INTERNATIONAL DEVELOPMENT EDUCATION (IDE) (SIDEC)
161. Introduction to Teaching and Learning in Asia
163X. Technology Policy, Knowledge Formation, and Economic Development
197. Education and the Status of Women: A Comparative Perspective — (Same as Sociology 134.)
206A. Introduction to the Study of International Development Education
206B. Project Workshop in International Development Education
206X. Applied Research Methods in International Development Education
207. Seminar: The Politics of International Cooperation in Education — (Same as Political Science 248.)
274. Learning, Teaching, and Schooling in Japanese Society
306A. Education and Economic Development
306B. Education and Political Change — (Same as Political Science 221.)
306C. Cultural Approaches to Education and Development — (Same as Anthropology 136.)
306D. Sociology of Development and Education — (Same as Sociology 332.)
307. Knowledge and Legitimation: The Politics of Educational Research — (Same as Political Science 328.)
321A,B. Qualitative Methods of Educational Research: Concepts, Data Collection, and Analysis
376. Education and Theories of the State
387A,B,C. Workshop: Comparative Systems — (Same as Sociology 311A,B,C.)
406X. Topics in Comparative Educational Research
408. Research Workshop in International Development Education

LANGUAGE, LITERACY, AND CULTURE (LLC)
102. Culture, Class, and Educational Opportunity
107X. Linguistic Foundations of Racial Strife in American Education — (Same as Linguistics 172.)
150X. Issues in the Study of Bilingualism
216X. Survey of Educational Research Methods
228. Psychology of Literacy
242. First-Year Proseminar in Language, Literacy, and Culture
243X. Research in Writing and Writing Instruction: The Social, Cognitive, and Linguistic Dimensions of Written Language
248X. Theory and Issues in Writing and Literacy — (Same as Linguistics 252.)
270. African-American English in Educational Context — (Same as Linguistics 173.)
282. Linguistics and the Teaching of English as a Foreign/Second Language — (Same as Linguistics 189/289.)
283. Attitudes Toward Languages and Language Study
284X. English Language and Content Instruction Methodology
286. Second Language Acquisition
291. Methods of Teaching German — (Same as German Studies 302.)
292. Methods of Teaching Spanish — (Same as Spanish 301.)
293. Methods of Teaching French — (Same as French 260.)
322X. Discourse Analysis in Educational Research
335X. Language Policy and Planning: National and International Perspectives
341X. Educational Applications of Sociolinguistics — (Same as Linguistics 258.)
388. Bilingual Education

PSYCHOLOGICAL STUDIES IN EDUCATION (PSE)
100A. Tutor Skills Training for Elementary Level Tutors — (Same as Psychology 168A.)
100B. Tutor Skills Training for Secondary Level Tutors — (Same as Psychology 168B.)
104. Psychological Aspects of Aging — (Same as Human Biology 104.)
108X. Ethnogerontology — (Same as Human Biology 105.)
120. Problems of Intelligence, Information, and Learning

155. Development of Measuring Instruments

186S. Psychology of Social Problems: A Focus on Chicanos — (Same as Psychology 186, Chicano Studies 108.)

187S. Gangs and Violence: Application to Chicanos — (Same as Psychology 187, Chicano Studies 107.)

191X. Introduction to Educational Statistics in Research

226X. Classroom Testing

227. Individual Counseling Psychology Methods — (Same as Psychology 229.)

229. The Development of Human Competence: Theory, Research, and Practice

232. Science and Research in Counseling and Health Psychology — (Same as Psychology 232.)

233. Seminar in Multicultural Counseling — (Same as Psychology 235.)

234. Career and Personal Counseling in Culturally Diverse Settings — (Same as Psychology 237.)

236. The Social Context of Cognitive Development

237. Psychological Assessment — (Same as Psychology 229.)

238A. Orientation to Counseling Psychology

238B.C. Counseling and Health Psychology: Supervised Applications

239. Contemporary Social Issues in Child and Adolescent Development

252. Introduction to Test Theory — (Same as Psychology 248.)

253X. Health Psychology Education Proseminar

255. Human Abilities — (Same as Psychology 155.)

256A. Human Abilities Research Topics

256X. Health Psychology Education: Supervised Practicum

257. Statistical Methods for Behavioral and Social Sciences — (Same as Psychology 152/252.)

295. Psychology of Problem Solving and Reasoning — (Same as Psychology 261.)

296. Substance Dependence: Assessment, Treatment, and Prevention

317. Psychological Research on Teaching

319. The Development of Self-Regulation

338A,B,C. Practicum in Counseling and Health Psychology

339X. Family Therapy: A Systematic Approach to Assessment and Treatment

343. Motivational Processes in Education

350A. Psychological Studies in Education

350B,C,D. Research Practicum in Psychological Studies in Education

351. Design and Analysis of Longitudinal Research

353A. Problems in Measurement: Item Response Theory — (Same as Psychology 249A.)

401X. Topics in Symbolic Systems in Education

415. Seminar in Educational Psychology

416. Seminar on Aptitude

431. Doctoral Seminar: Counseling and Health Psychology

451. Research in Mathematical Education

SOCIAL SCIENCES IN EDUCATION (SSE)

99S. Nonviolent Struggles for Justice as Moral Education

105. American Education and Public Policy — (Same as History 158B, Political Science 186K.)

111. Introduction to Philosophy of Social Science — (Same as Philosophy 61.)

131. Economics of Gender — (Same as Feminist Studies 129.)

163X. Technology Policy, Knowledge Formation, and Economic Development

170. Gender and Education — (Same as Feminist Studies 130, Sociology 132.)

197. Education and the Status of Women: A Comparative Perspective — (Same as Sociology 117.)

201. History of Education in the United States — (Same as History 158.)

204. Introduction to the Philosophy of Education

205. Ideology and Education

207. Seminar: The Politics of International Cooperation in Education

210. Problems in Sociology of Education — (Same as Sociology 232/330.)

214X. Popper, Kuhn, and Lakatos — (Same as Philosophy 156.)

220A. The Social Sciences and Educational Analysis: Introduction to the Economics of Education

220B. The Social Sciences and Educational Analysis: Introduction to the Politics of Education — (Same as Political Science 187.)

220C. Education and Society — (Same as Sociology 130.)

220D. History of School Reform: Origins, Policies, and Outcomes

220Y. Introduction to the Economics of Education: Economics Section

247. Moral Education

258. Organizations: Principles and Emerging Ideas — (Same as Sociology 164.)

273. Education as a Social Science

274. Learning, Teaching, and Schooling in Japanese Society

276. Women and Moral Theory — (Same as Feminist Studies 127.)

278. Introduction to Issues in Evaluation

280. Ethnographic Approaches to Cultural Diversity in Schooling — (Same as Anthropology 280.)

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

304. The Philosophical and Educational Thought of John Dewey — (Same as Philosophy 304.)

306A. Education and Economic Development

306B. Education and Political Change — (Same as Political Science 221.)

306C. Cultural Approaches to Education and Development — (Same as Anthropology 136.)
306D. Sociology of Development and Education — 
(Same as Sociology 306.)
307. Knowledge and Legitimation: The Politics of 
Educational Research — (Same as Political Science 328.)
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.)
321A,B. Qualitative Methods of Educational Research: 
Concepts, Data Collection, and Analysis
376. Education and Theories of the State
408. Research Workshop in International Development 
Education
418X. Foundations of Field Research in Higher Edu-
cation — (Same as Sociology 373.)
420A,B. Advanced Seminar in Philosophy of Educa-
tion

STANFORD TEACHER EDUCATION 
PROGRAM (STEP)
212X. Designing Groupwork for Heterogeneous Class-
rrooms
224. Information Technology in the Classroom
240. Adolescence: Health and Special Needs
246A,B,C,D. Secondary Teaching and Multicultural 
Education Practicum
262A,B. Curriculum and Instruction in English
263A,B. Curriculum and Instruction in Mathemat-
ics
264A,B. Curriculum and Instruction in Foreign Lan-
guages
267A,B. Curriculum and Instruction in Science
268A,B. Curriculum and Instruction in Social Stud-
ies
269. Foundations of Learning for Teaching
288. Social Diversity, the Constitution, and Educa-
tional Reform
300X. Designing Research in Teacher Education

DIRECTED READING AND RESEARCH, 
DISSERTATION, AND PRACTICA (ALL 
AREA COURSES)
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 de-
gree students.
199. Undergraduate Honors Seminar
250B. Statistical Analysis in Education Research: 
Regression Analysis
250C. Statistical Analysis in Education Research: 
Multivariate Analysis
453. Doctoral Dissertation
470. Practicum — For advanced graduate students. Not 
for STEP students.
470E. Practicum in Evaluation — For Evaluation Con-
sortium members.
480. Directed Reading — For advanced graduate stu-
ents.
490. Directed Research — For advanced graduate stu-
ents.
493B. Methodology Seminar: Meta-Analysis — Sta-
tistical Methods for Combining Information — (Same 
as Health Research and Policy 206, Statistics 211.)
SCHOOL OF ENGINEERING

Dean: James F. Gibbons
Associate Deans: John C. Bravman (Student Affairs), Ann R. Gaddy (Administration), Dwain N. Fullerton (External Relations), Noé P. Lozano (Minority and Affirmative Action Programs), James D. Plummer (Faculty Affairs)
Assistant Deans: Rene Cortinaz (Human Resources), Anthony J. DiPaolo (SITN), Cheryll Hawthorne-Searight (Undergraduate Minority Programs), James V. Jucker (Student Affairs)

Faculty Teaching General Engineering Courses
Associate Professors: John C. Bravman, Alice P. Gast, Bruce B. Lusignan, Reginold E. Mitchell, Stephen Rock
Assistant Professor: Sheri D. Sheppard
Lecturers: Robert L. Adams, David Lougee

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, Robert Sinclair
Associate Professors: John C. Bravman, Alice P. Gast, Bruce B. Lusignan, Reginold E. Mitchell, Stephen Rock
Assistant Professor: Sheri D. Sheppard
Lecturers: Robert L. Adams, David Lougee

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 10 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 not only numerous programs within the school but also several inter-school 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, program in Product Design, Radio Astronomy Institute, and 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 few 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; there are no additional course requirements or examinations for admission to the school.

PREPARATION RECOMMENDED FOR FRESHMEN

Students who plan to enter Stanford as freshmen and intend to major in engineering should take mathematics in high school to as high a level as is offered. (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.

PREPARATION RECOMMENDED FOR 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, i.e., courses comparable to those described below under “Undergraduate Programs.” In addition, students should work toward completing the equivalent of Stanford’s foreign language requirement and as many of the University’s distri-
bution 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 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 which 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 which “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 which 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 a well-defined educational goal, 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 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 extra-curricular programs and services. Because the handbook is published in the summer, it reflects the most up-to-date information for the academic year.

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. in Engineering.

ACCREDITATION

The Accreditation Board for Engineering and Technology (ABET) accredits college engineering programs on a nationwide basis using criteria and standards developed and accepted by U.S. engineering communities. At Stanford, the follow-
ing undergraduate curricula are accredited: Chemical Engineering, Civil Engineering, Electrical Engineering, Industrial Engineering, Mechanical Engineering, and Petroleum Engineering in the School of Earth Sciences. The Department of Aeronautics and Astronautics offers an accredited program at the master's degree level.

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 Associate Dean for Student Affairs, 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 units for Engineering Fundamentals and Engineering Depth is between 60 and 70). 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 1993-1994 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

Mathematics:
- Math 41, 42, 43. Calculus and Analytic Geometry 15
- Math 44. Calculus 3
- Math 130. Ordinary Differential Equations 3

Science:
- Phys. 51. Mechanics 4
- Phys. 53 Electricity and Magnetism 4
- Chem. 33. Structure and Reactivity 4
- Chem. 35. Organic Monofunctional Compounds 4
- Chem. 36. Chemical Separations 3
- Chem. 131. Organic Polyfunctional Compounds 3

Engineering Fundamentals:
- Engr. 20. Introduction to Chemical Engineering 3
- Engr. 40. Basic Electronics 5
- Three courses from a list of five* 9

Technology in Society: 1 course (see Note 4)

Chemical Engineering Depth:
- Chem. 130. Theory and Practice of Identification 4
- Chem. 171. Physical Chemistry: Chemical Thermodynamics 3
- Chem 175. Physical Chemistry: Kinetics and Statistical Mechanics 3
- Chem. Engr. 100. Chemical Process Modeling, Dynamics, and Control 3
- Chem. Engr. 110. Equilibrium Thermodynamics 3
- Chem. Engr. 130. Kinetics and Reactor Design 3
- Chem. Engr. 140. Fluid Mechanics 4
- Chem. Engr. 170. Introduction to Polymeric Materials 3
<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. Engr. 180A.B. Chemical Engineering Laboratory</td>
<td>6</td>
</tr>
<tr>
<td>Mech. Engr. 33. Introductory Fluids Engineering</td>
<td>4</td>
</tr>
<tr>
<td>Restricted Electives†</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>49</td>
</tr>
</tbody>
</table>

* Students must choose three courses from Engr. 14, 30, 50, 60, 70X.

### CIVIL ENGINEERING (CE)

**Mathematics and Science:**
45 units minimum* (see Notes 1 and 2)

**Technology in Society:** 1 course: (see Note 4)

**Engineering Fundamentals:**
5 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, plus at least one course from CE 145, 146, 181, 182.
*** Structures and Construction: CE 180A plus at least one course in Structural Design (CE 181, 182), one course in Construction (CE 145, 146), 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 and Analytic Geometry 15
- Math. 103 or 113. Linear Algebra 3
- CS 157. Logic and Automated Reasoning and/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)
1 course** (see Note 4)

**Computer Science Courses:** (48 units)
- CS 107. Programming Paradigms 5
- CS 109A, B. Introduction to Computer Science and Assembly Language Programming 8
- CS 110. Introduction to Computer Systems 3
- CS 140. Concurrent Programming 3
- 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 3
- Project courses† 6

* 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.
†† The following project courses are acceptable (a total of 6 units must be taken): CS 191 (3-6 units), 193E (3 units), 194A,B (6 units), 247A,B (10 units). 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:**
5 courses*** (See Note 3)

**Technology in Society:** 1 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
SCHOOL OF ENGINEERING

Specialty courses†† 9
One course in Design† 3
Electrical Engineering electives 7
Total .......................................................... 52

* Mathematics must include 130.
† 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.
†† 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: EE 181, 182, (183 or 281)
Computer Software: EE 181, 287, 288
Controls: Engr. 105B, 206, 207A, B
Electronics: EE 133, 139, 212, 214, 216
Fields and Waves: EE 142, 241, 242, 252
Signal Processing: EE 104, 261, 264
*** Engineering Fundamentals should include Engr. 40 and 70X.

INDUSTRIAL ENGINEERING (IE)
Mathematics: 21 units minimum* (See Note 1)
Science: 20 units minimum (See Note 2)
Engineering Fundamentals:
5 courses** (See Note 3)
Technology in Society: 1 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 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:
5 courses (See Note 3)
Technology in Society: 1 course (See Note 4)
Engineering Depth:
MSE 151. Structural Materials Engineering 3
MSE 152. Electronic Materials Engineering 3
MSE 161. Materials Science Labs I 2
MSE 162. Materials Science Labs II 2
MSE 163. Materials Science Labs 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:
5 courses (See Note 3)
Technology in Society: 1 course (See Note 4)
Engineering Depth:
ME 33. Introductory Fluids Engineering 4
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
ME 161. Mechanical Vibrations 4
Total .......................................................... 43

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 which have been proposed by cognizant faculty groups and have been pre-approved by the council, and Individually Designed Majors. At present, there are three pre-
approved 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: 5 courses (See Note 3)
Technology and Society: 1 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 Compressive Flow 3
- Civ. Engr. 180B. Structural Analysis 4
- Engr. 15. Dynamics 5
- Engr. 104. Dynamic Response 3
- Mech. Engr. 33. Introduction to Fluids Engineering 3
- Restricted Electives* 6

Total 45

* Restricted electives are to be approved by adviser. They might include: AA 135, 138, 201A, 210B, 240A, 240B, 280, 283; AA 214A, 214B or Engr. 235A; Engr. 105, 206 or 207 or 209; Mech. Engr. 161, 281.

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)
- 1 course* (see Note 4)

See list of approved courses in the Undergraduate Handbook for Engineering Programs

Depth: (51 units)
- Comp. Sci. 107. Programming Paradigms 5
- Comp. Sci. 109A,B. Introduction to Computer Science 8
- Comp. Sci. 110. Introduction to Computer Systems and Assembly Language 4
- Comp. Sci. 140. Concurrent Programming 3
- Comp. Sci. 143. Compilers or Comp. Sci. 240A. Operating Systems 4
- Elect. Engr. 101. Circuits 3

Elect. Engr. 111, 112. Electronics 6
Elect. Engr. 121. Digital Laboratory 3
- Comp. Sci. 182. Computer Organization 3
- Elect. Engr. 183. Advanced Logic Laboratory 3
- Elect. Engr. 271. Introduction to VLSI Systems 3
- Senior Project** 6*

Total 97-99

* Comp. Sci. 201 also fulfills this requirement.
** Senior projects can be either course-based or independent study. Elect. Engr. 272A,B or Comp. Sci.194A,B satisfy the requirement. Independent study projects require faculty sponsorship and must be approved in advance by the adviser, faculty sponsor, and the CSE program advisers (Giovanni De Micheli or Eric 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: 1 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

Total 46

* From the approved list for departmental majors (see Note 2) plus up to 3 units of behavioral science.
** Engineering Fundamentals courses (see Note 3) plus Indust. Engr. 100, 133, and Mech. Engr. 102.

INDIVIDUALLY DESIGNED MAJORS (IDM)

IDMs are intended for undergraduates interested in pursuing engineering programs that fall outside the purview of departmental majors or the pre-approved School of Engineering majors. Programs are designed by students, with the assistance of two faculty advisers of their choice, and 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 require-
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, i.e., 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 departmental 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, physics, geology, or mathematics.

THE HONORS COOPERATIVE PROGRAM

A number of industrial firms, government laboratories, and other organizations participate in the Honors Cooperative Program (HCP), a program which 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 via a telephone talkback system from their corporate location. Students outside the local broadcast range may pursue their graduate degree by participating in SITN's Tutored Videotape Instruction (TVI) Program. SITN offers additional programs to member companies such as Non-Credit Option (NCO), Audit Option, several Certificate Programs, short courses, and course licensing. For additional information please contact SITN at (415) 725-3000, or write to 401 Durand, Stanford, CA 94305-4036.

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
Aeroelasticity
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 Mechanics
Flight Mechanics
Gaskinetics
Guidance and Control
Hypersonic and Physical Gas Dynamics
Modern Optical Diagnostics in Fluids
Mechanics
Physical Gasdynamics
Propulsion
Robotics
Waves and Vibrations

CHEMICAL ENGINEERING

Applied Statistical Mechanics
Biocatalysis
Biochemical Engineering
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
Digital Communication
Electronic Circuits
Electronic Devices and Technology
Fields and Waves
Information Theory and Coding
Lasers and Quantum Electronics
Network Systems
Optics, Imaging, and Communications
Radioscience
Signal Processing
Solid State Materials and Devices
VLSI Design

ENGINEERING

Interdepartmental Programs
Interdisciplinary Programs

ENGINEERING IN BIOLOGY AND MEDICINE

Biostatistics
Design for Medical Applications
Information Processing in and for Biomedical Systems
Mechanics of Hearing
Medical Imaging
Neuromuscular Biomechanics
Orthopedic Biomechanics
Rehabilitation Engineering
Transport Phenomena in Biological Systems

ENGINEERING-ECONOMIC SYSTEMS

Business Systems
Decision Analysis
Economic Analysis
Energy Modeling and Analysis
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
Energy Storage
Fracture
Imperfections in Crystals
Kinetics
Magnetic Behavior of Solids
Magnetic Storage Materials
Phase Transformations
Photovoltaic Materials
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
Inventory Theory
Mathematical Programming
Networks
Queueing 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 approximately 10 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 individually designed B.S. majors in bioengineering can be arranged, the study of bioengineering at Stanford is most appropriate at the graduate level. The faculty working in bioengineering are in various departments of the School of Engineering, and a list of their names, together with a summary of their research interests, is available from the committee chair.

Students interested in pursuing graduate study in bioengineering apply for admission and financial aid to the appropriate department on the grounds of their prior training and future interests. Their applications are judged on substantially the same ground as other applicants to the department.

In addition to the standard engineering department degrees, the degree of MSE: Biomechanical Engineering is offered. Details on this program and subsequent Ph.D. studies can be obtained from the 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/poly-
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 a 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 “Degrees” section in this bulletin, and further information is found in the department sections following.

For detailed information about the master’s and Ph.D. programs, see the sections in this bulletin pertaining to industrial, mechanical, and civil engineering. Also, a separate pamphlet, Manufacturing Programs at Stanford, is available in Terman 202.

GRADUATE PROGRAMS
MASTER OF SCIENCE

The M.S. degree is conferred on graduate students in engineering according to the University regulations stated in the “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 a program of study of an interdisciplinary nature 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 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 to the program 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 departmental 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 a 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 “Degrees” section in this bulletin, and further information is found in the department sections following.
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 (e.g., Bioengineering), can be arranged. See the "Graduate Special Programs" section in this bulletin. University regulations for the Ph.D. are given in the "Degrees" section in 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 which 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 non-engineering 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, writing assignments, field trips, and a design project. DR:6(8)

3 units, Aut (Adams) MWF 2:15-4:05

6. Introduction to Engineering — Pertinent lectures from Engineering 1. Readings, final paper. 1 unit, Aut (Adams) M 2:15-4:05

7. Professional Development for Minority Engineers — (Same as African and African American Studies 127.) Assists students in understanding the basic benefits and opportunities available to Blacks in the various fields of engineering, emphasizing diversity. Experts from various fields lecture on pre-college needs, the social obligations of students and engineers; problems faced by black engineers, Black women in engineering; M.B.A., J.D., M.D., and sales options for engineers; small vs. large companies, graduate vs. industrial opportunities; consulting and starting one's own business; opportunities for Black engineers and business in Third World countries; trips to industrial and academic labs. Weekly reading assignments with a short paper due each week and a final term paper.

2 units, Spr (Bates) T 7-9 p.m.

Note — Engr. 10 (Applied Mechanics: Statics), Engr. 11 (Mechanics of Materials I), and Engr. 12 (Intermediate Dynamics), are no longer offered.

14. Applied Mechanics: Statics and Deformables — Introduction to engineering mechanics (freebody diagrams, equilibriums, trusses, frames, cables, internal forces, shear and bending moment, stress and strain, Hooke's law, Mohr's circle, Poisson's ration, 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 (Barnett) MTWTHF 9
Win (Shah) MWF 9
Spr (Sheppard) 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 (Powell) 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 material and energy balance, concepts of rate processes, heat and mass transport, and kinetics of chemical reactions. Applications of these concepts to areas of current technological importance: control, biotechnology, large scale production of chemicals, and materials processing. 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, Win (Staff) 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 (Powell) MWF 11

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, and elementary competence on personal computers. DR:6(8)
  3 units, Aut, Spr (Khuri-Yakub) MWF 11-12:15
  Win (Masters) 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, Win (Staff) MWF 11

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.) DR:6(8)

70X. Programming Methodology and Abstractions (Accelerated) — (Enroll in Computer Science 106X.) DR:6(8)

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.
  3 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. Examines 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 (Lougee) 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 (Lougee) TTh 11
works, simulation. Applications to production and quality control, materials requirement planning, scheduling, just-in-time inventory management, competitiveness. Topics: introduction to basic probability and statistics, Markov chains, queueing networks, sampling. Prerequisites: 105A, Math. 103.


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. Prerequisite: 104 or Electrical Engineering 102.

3 units, Aut (Franklin) MWF 9
Win (Cannon) MW 11-12:15

plus lab weekly by arrangement


3 units, Spr (Emami-Naeini) TTh 8-9:15

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) not given 1993-94

120. Fundamentals of Petroleum Engineering — (Same as Petroleum Engineering 120.) Basic engineering topics involved in petroleum recovery. Chemical, physical, and thermodynamic properties of oil and natural gas. Use of computers for design problems. Gas laws, physical behavior of fluids, multiphase flow through porous media, capillary pressure, relative permeability.

3 units, Aut (Horne) MWF 10

130. Science, Technology, and Contemporary Society — (Same as Science, Technology, and Society 115.) Analysis of the interplay of science, technology, and society in contemporary U.S. Topics: key social, cultural, and values issues raised by contemporary scientific and technological developments; distinctive features of science and engineering as complex 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, technology, and public policy.

4 units, Aut (Horne) 4-5 units, Spr (McGinn) TTh 2:15-3:45
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 whistleblowing; ethical conflicts of engineers as expert witnesses and managers; ethical issues in engineering design, manufacturing, and operations; ethical issues that arise 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.

4-5 units, Spr (McGinn) TTh 2:15-3:45

165. Technology and Musical Aesthetics — (Same as Music 156.) Interrelations between technologies used in the creation of music and music itself. Impact of technological developments on aesthetic expectations of society. Topics: physics of music, hearing and perception; traditional acoustic instruments; sophistication and abstraction; acoustics; digital audio; synthesis; computer music.

Limited enrollment.

4 units, Spr (R. Adams) MW 2:15-4:05
190. Creative Problem Solving — (Same as Industrial Engineering 201, Mechanical Engineering 223.) Problem solving emphasizing problem definition, creativity, and innovation, and the interpersonal and organizational factors that influence thinking and the implementation of ideas. Common blocks to problem solving and methods of dealing with them. Readings, problems and projects, papers and lectures.

3 units (Adams) given 1994-95

199. Special Studies in Engineering — Special studies, lab work, or reading under the direction of a faculty member. Often research experience opportunities exist in ongoing research projects. Students make arrangements with individual faculty and enroll in the section number corresponding to the particular faculty member. Prerequisite: consent of instructor.

1 or more units, any quarter (Staff) 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 (Rock) TTh 1:15-2:30

Spr (DeBra) 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 (Staff) MWF 9


3 units, Spr (Powell) TTh 11-12:15


3 units, Spr (Rock) TTh 9:30-10:45


220A. 3 units, Aut (T. P. Liu) TTh 9:30-10:45

220B. 3 units, Win (Papanicolaou)

TTh 9:30-10:45

220C. 3 units, Spr (Papanicolaou)

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

280. Biomechanical Engineering Seminar — (Same as Mechanical Engineering 280.) Invited speakers present research topics at the interfaces of biology, medicine, physics, and engineering.

1 unit, Aut, Spr (Carter, Vanden Meulen)

M 4:15

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 (Mitchell, Lozano) 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 are from Stanford and other institutions and are experts who directly deal with world policy makers through research and advisory activities.

1-4 units, Aut, Win, Spr (Lusignan, Packenham) 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, Win, Spr (Staff) 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

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; and inventory, activity-based-costing, and tax considerations. Physical measurement topics: control charts, yield measurement, Taguchi and other experimental design methods, and environmental audits.

4 units, Win (Lee, Patell) TTh 10-11:45 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, Win (Whang) MW 3:20-5:05

AERONAUTICS AND ASTRONAUTICS

Emeriti: (Professors) Holt Ashley (on active duty), Daniel Bershadner (on active duty), Arthur E. Bryson (on active duty), 1-Dee Chang, Chi-Chang Chao, Nicholas J. Hoff, Krishnamurthy Karamcheti, Erastus H. Lee, Jean Mayers, Richard S. Shevell, John R. Spreiter, Milton D. Van Dyke, Walter G. Vincenti; Professors (Research): Dean R. Chapman (on active duty), Leonard Roberts (on active duty)

Chair: George S. Springer
Associate Chair: J. David Powell


Professor (Research): Steven W. Tsai

Associate Professors: Fu-Kuo Chang, Ilan Kroo, Stephen Rock

Assistant Professor: Sanjiva Lele


Courtesy Professor: William C. Reynolds

Visiting Professor: Nicholas Rott

Lecturers: Jack Franklin, Terry Holst, John Howe, Victor Lebacqz, Robert Warming

This department prepares students for professional careers in aeronautics and astronautics by offering a comprehensive program of graduate teaching and research. Particular emphasis is given to structural, aerodynamic, guidance and control, and propulsion problems of aircraft, missiles, 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
AERONAUTICS AND ASTRONAUTICS

Aerophysics and Experimental Space Science
Aerospace Robotics
Aerospace Structures
Aerospace Systems Synthesis and Design
Analytical and Experimental Methods in Solid and Fluid Mechanics
Biomedical Solid and Fluid Mechanics
Composite Materials
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
Experimental Space Sciences
Geophysics
Hypersonic Aerophysics and Trans-Atmospheric Flight
Hypersonic Flight
Inertial Instruments
Laser Methodology for Fluid Flow Studies
Multiphase Flows
Nonequilibrium Flow
Nonlinear Structural Mechanics
Optical Diagnostics in Fluid Dynamics
Optimal Control and Estimation
Plasticity and Viscoelasticity
Propulsion
Shock Tube Studies of Vortex Interactions
Structural Aeroacoustics
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); low-level accelerometer evaluation chamber (10° to 10° g); spacecraft thruster evaluation chamber for force measurement down to a dyne; spherical gyro rotor alignment facility (optical-to-principal-axis alignment less than 1 arc sec); air cushion vehicle to simulate the Stanford Drag-Free Satellite in an orbital dynamic environment to 275 km altitude; air-bearing simulator for tethered satellite simulation and for spinning-spacecraft attitude control to a few arc-sec; plus facilities for a number of inertial instrument test stands on an isolated test pad having visual access to Polaris. Clean facilities, ultra-precision machining, and advanced electronics design and fabrication capability support the guidance, control, and instrumentation experiments using these facilities. A new facility provides for testing systems for controlling flexible spacecraft on laboratory models. Dedicated high-capacity digital-control computers are part of this facility. 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 0.5m x 0.5m 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 via the lab-wide 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 the partners in Stanford’s Center for Automation and Manufacturing Science (CAMS). An ultra-precision machining laboratory is also part of the center.

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 which 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.

Diagnostics of shock-wave phenomena emphasize modern optical methods, including resonant interferometry and holography. Other recently outfitted laboratories deal with holography, 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 several of the extensive collection of fluid- and aero-dynamic 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 work stations, and two Silicon Graphics Iris machines.

The Experimental Fluid Dynamics group has developed an extensive capability in modern, state-of-the-art optical diagnostics methods 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 composite material structural elements made by autoclave curing and by filament winding.

Service facilities in the building include a full machine shop, chemistry laboratory, and several conference rooms. Attached to the building is a modern classroom building which is equipped for televising lectures and which 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 super-computers.

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 which 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. At this level, students interested in a still greater
emphasis on CFD may register for the M.S. in Engineering (see below) and design a program to suit their specialized needs. 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 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), co-sponsored 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 interface 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 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. (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

All students who receive instructor-approved 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 should have such action documented in their record folders. A format memo (signed by the course instructor and adviser) should be submitted to the Candidacy Committee via 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. Compliance with this procedure accelerates the approval of degree program plans.

A similar procedure should be followed with regard to 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. degree 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 which do not offer a letter grade option and those which fall into the categories of colloquia and seminars (e.g., AA129, 295, 297, and 298). Insufficient grade points upon 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)

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 insure that all prerequisites have been satisfied. A course which 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 methods pertinent to his or her major field. This requirement can be met through matriculation in either (1) a minimum of 6 units in applied mathematics (e.g., linear algebra, partial differential equations, complex variables, probability) or (2) a minimum of 6 units of technical electives which strongly emphasize methods of 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 from either the major or peripheral fields) for each basic course which is waived. Technical electives which are 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.
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, how it 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.

ACCREDITATION

The ABET-accredited degree of “Master of Science in Aeronautics and Astronautics: Aeronautical and Astronautical Engineering” is available to those students who enter the department’s M.S. program with an ABET-accredited B.S. If the ABET-accredited B.S. is not in Aeronautics and Astronautics, the M.S. program must include 6 units of AA design courses.

ENGINEER

The University’s basic requirements for the Engineer degree are outlined in the “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 and the remainder usually selected from one of the following fields: (a) acoustics, (b) aerelasticity, (c) aeroelasticity, (d) aerospace structures, (e) aerospace systems synthesis and design, (f) analytical and experimental methods in solid and fluid mechanics, (g) biomedical solid and fluid mechanics, (h) computational fluid mechanics, (i) flight mechanics, (j) gas kinetics, (k) guidance and control, (l) physical gas dynamics, (m) propulsion, and (n) 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 “Degrees” section of this bulletin. Departmental 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. Completion of 3 units of a directed research problem (AA 290).
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 prior to passing this examination.

Beyond the master’s degree, a total of 90 additional units of work is required, including a minimum of 45 units of courses. At least 12 units of courses must be 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 departmental 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 seminar 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 a department not represented on the examining committee). 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 approved for the oral by the student’s adviser.

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 advisor. 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 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 semi-monthly 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 above cited half-time rate. They may use their work as the basis for a dissertation.

Further information and application forms may be obtained upon request to the Graduate Admissions Section of 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 (Krho) TTh 11-12:15

104. Dynamic Response — (Enroll in Engineering 104.)

105A. Feedback Control Design — (Enroll in Engineering 105A.)

129. Life in Space — Sequential lectures describing chemical evolution, the origin and evolution of life, the search for extraterrestrial intelligence; physiological changes in animals, plants, and man in space; life support systems; biological experimentation in space; and life sciences aspects of future space settlements. Given by investigators from the NASA-Ames Research Center. 3 units (Staff) not given 1993-94

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 Tor Th 1:15-4:05


138. Noise Pollution — Open to graduate students. Interdisciplinary treatment of noise pollution. Physical description of sound, human perception and response, technology of noise control, legal and economic aspects of noise abatement. Recommended: freshman physics and mathematics. 3 units, Aut (Staff) TTh 2:15-3:30

192. Vector and Tensor Analysis — Vector algebra. Differentiation and integration of scalar and vector fields. Gradient divergence and curl. Theorems of Gauss, Stokes, and Green. Cartesian tensors, Dyadics. General tensor calculus. Christoffel's symbols. Covariant derivatives. Riemann-Christoffel curvature tensor. Tensor forms of gradients, divergence, and curl. Selected applications. (Students taking graduate courses in Aero/Astro are expected to be familiar with the basic subject matter covered in 192.) Prerequisite: Math. 44. 3 units, Aut (Staff) TTh 9:30-10:45

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 (Staff) MWF 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; Kirchhoff 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 1994-95

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, Ffowcs Williams and Hawking; noise radiated by subsonic and supersonic jets; Lilley's equation. Prerequisite: consent of instructor.

3 units, Spr (Lele) MWF 9 alternate years, not given 1994-95

204. Classical Aerodynamics — Selected topics emphasizing important results of classical wing theory. Early theories of Lancaster, 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) T3:15-4:15

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, not given 1993-94


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

211. 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 viscous, 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 aero-
space 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

3 units, Win (MacCormack) MWF 11

3 units, Spr (MacCormack) MWF 11

3 units (Warming) alternate years, given 1994-95

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 1993-94

218. Similitude in Engineering Mechanics — (Enroll in Mechanical Engineering 206.)


220. Optical Methods in Engineering Science — (Enroll in Electrical Engineering 347.)

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 1993-94

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 provides the common thread connecting the various topics. The 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 to the statistical theory of turbulence. Stochastic models on microcomputers are part of homework assignments.
3 units, Spr (Baganoff) MWF 1:15
227. Atmospheric and Space Physics — Introduction to geophysics and astronomy emphasizing conditions in the solar and planetary atmospheres, interplanetary space, and solar-terrestrial relations. Elements of gravitational theory and orbital mechanics with application to determination of density of the upper atmosphere and the shape and internal structure of the Earth. Properties, time variations, and theoretical representation and interpretation of the upper atmosphere, ionosphere, magnetic field, and magnetosphere of the Earth, the photosphere, chromosphere, the corona of the Sun, and the solar wind in interplanetary space. Theory of Motion of a charged particle in electric and magnetic fields with application to Van Allen particles and cosmic rays. The principal features of the interaction of the solar wind with the Earth and other objects in the solar system.

3 units (Staff) not given 1993-94

230. Basic Aerodynamics of Rotary Wing Aircraft and Power Generators — Recent advances in rotary wing technology as applied to helicopter and VTOL 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 VTOL aircraft using simple preliminary design methods.

3 units, Aut (Schmitz) MWF 3:15 alternate years, not given 1994-95

231. Dynamics and Control of Rotary Wing Aircraft — Known methods of controlling the modern helicopter and other VTOL aircraft (tilt-rotor, tilt-wing, jet) and questions of control uniqueness and redundancy. Equations governing flapping and feathering of "rigid" and "soft" rotor systems including rigid blade response to control and body motion inputs. The VTOL aircraft as a dynamic body using linearization techniques. Laplace transform-root locus techniques deduce the vehicle's dynamic stability and open loop response characteristics. These are related to ease of control by a human operator with and without feedback compensation. Emphasis on basic understanding of principles involved. Prerequisite: 230 or equivalent.

3 units, Win (Schmitz, Lebacqz) MWF 3:15 alternate years, not given 1994-95

232. Structural Dynamics and Aeroelasticity of Rotary Wing Aircraft — Handling the aeroelastic problems of rotating blades. The kinematics of finite rotation describe nonlinear deflections in the blade. The principle of virtual work obtains equations of motion including the contributions of simple aerodynamic models. Model and finite element solution techniques compared. Effects of aeroelastic couplings on the stability of rotating blades. Ground and air resonance problems of the helicopter. Emphasis on a basic understanding of the principles involved. Prerequisites: 230, 231. Recommended: 244A, and either 242 or Mechanical Engineering 231A.

3 units (Staff) not given 1993-94

234. Dynamics, Control, and Flying Qualities of V/STOL Aircraft — The effects of airframe and propulsion system design on manual control of V/STOL aircraft. Topics: influence of mission requirements on pilot control strategy; examples of analytical models of the pilot for use in closed-loop analysis and synthesis; decoupled longitudinal and lateral-directional control during hover and forward flight as an extension of conventional aircraft stability and control, emphasizing the unique features of V/STOL configurations; and coupled six-degree-of-freedom control situations pertinent to specific mission applications of the helicopter. Examples of the influence of coupled airframe-rotor system dynamics for these aircraft. Improvement of control characteristics of the basic aircraft through use of control augmentation systems and the influence of digital systems on the design of these control augmentation modes. Prerequisites: 230, 231. Recommended: 232.

3 units (Franklin) not given 1993-94

235A,B. Space Systems Engineering — (Enroll in Engineering 235A,B)

236A,B,C. 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.

1-3 units, Aut, Win, Spr (Staff) TTh 3:15-5:05


3 units (Schmitz, Yu) not given 1993-94

239. Discrete Methods for Nonlinear PDEs with Applications to Fluid Dynamics — (Enroll in Scientific Computing and Computational Mathematics 239.)

240A. Analysis of Structures — Elements of one- and two-dimensional elasticity theory. Boundary value problems; energy methods; analyses of solid
and thin walled section beams, trusses, frames, rings, semimonocoque structures. Prerequisite: Civil Engineering 114 or equivalent.

3 units, Aut (Springer) MWF 9

240B. Analysis of Structures — Introduction of finite element analysis. Material behavior. Failure theorems; buckling; plastic behavior of solids; thermal effects; thin plate analysis. Prerequisite: 240A or consent of instructor.

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.

241A. 3 units, Win (Kroo) MWF 2:15
241B. 3 units, Spr (Kroo) MWF 2:15


3 units, Aut (Parkinson) TTh 8-9:15

243A. Spacecraft Attitude Dynamics I — (Enroll in Mechanical Engineering 232A.)
243B. Spacecraft Attitude Dynamics II — (Enroll in Mechanical Engineering 232B.)


3 units, Aut (Ashley) MWF 9

244B. Structural Dynamics and Aeroelasticity — Continuation of the 244A treatments of finite-element methods and vibration of continuous, two-dimensional structures. Introduction to aeroelasticity from a unified viewpoint applicable to flight vehicles, rotating machinery and other elastic systems. Aeroelastic operators and unsteady aerodynamics in two dimensions. Forced response, static and dynamic eigenvalues of a simplified system. Aeroelastic analysis of representative one- and two-dimensional systems. Prerequisite: 244A or equivalent.

3 units, (Ashley) not given 1993-94

244C. Aeroelasticity — Continuation of 244B. The unrestrained elastic flight vehicle. Modern unsteady aerodynamic theory, including transonic flow and numerical methods for three-dimensional surfaces. Review of experimental methods. Topics: optimization, coupling between aerelastic phenomena and automatic controls systems, and problems of power machinery, windmills, etc. Prerequisite: 244B.

3 units, (Ashley) not given 1993-94

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.)
246D. Vibration and Stability of Plates and Shells — (Enroll in Mechanical Engineering 241D.)

249A,B. Nonlinear Continuum Mechanics — (Enroll in Mechanical Engineering 242A,B.)


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 analyses; failure prevention; engineering ethics; and the engineer as expert witness.

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

253. Wave Propagation — (Enroll in Mechanical Engineering 236, Math. 274.)


   3 units, Win (Springer) MWF 9


   3 units, Spr (F. Chang) MWF 8

261A. Introduction to Turbulence — (Enroll in Mechanical Engineering 261A.)

268. Digital Image Processing — (Enroll in Electrical Engineering 368.)

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 gyro. 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 1993-94


   3 units, Win (DeBra) MWF 9 alternate years, not given 1994-95


   3 units, Spr (Powell, Parkinson) TTh 8-9:15 alternate years, not given 1994-95

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 variations). Optimal feedback control (dynamic programming). Feedback control for linear systems with quadratic cost; regulator synthesis. Neighbor-
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 (Parkinson) 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 turboprops; 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)

297. Seminar in Mechanics and Control of Flight—Problems in all branches of vehicle control, guidance, and instrumentation presented by researchers on and off campus. Graduate students with an interest in automatic control applications in flight mechanics, guidance, navigation, and mechanical design of control systems normally attend. Others are invited. Registration for a unit of credit, without letter grade, is optional; a letter grade is given for students who make presentations.
1 unit, Aut (Powell) W 4:15
Win, Spr (DeBra) W 4:15

298. Seminar in Fluid Mechanics—(Enroll in Engineering 298.)

2-15 units, any quarter (Staff) by arrangement

2-15 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.)
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. Departures must be approved by petition of the student to the chair of the Department of Chemical Engineering. Credit toward the M.S. degree is not given for Chemical Engineering Special Topics courses numbered 270-279, or for the colloquium, 300. Note, however, that the student must register for 300 and attend the colloquia. Students wishing to obtain research experience should choose a research adviser and enroll in Chemical Engineering Research 290, for which 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 completion of 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 quarters 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 completion of 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 consult-
tion 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 as the basis for deciding whether or not these students will be allowed to choose research advisers and begin thesis research in the Spring Quarter of their first year. Failure of 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 the examination described above 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, and the student enrolls in Chemical Engineering 290 during the course of this research. It is expected that in four calendar years after enrolling in the department the student will have fulfilled all the requirements for the Ph.D. including submission of a completed dissertation, which has already been approved by his or her research advisor, 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 upon request to 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

PRIMARY FOR UNDERGRADUATE STUDENTS

20. Introduction to Chemical Engineering — (Enroll in Engineering 20.)
3 units, Spr (Gast, Robertson) MWF 9

3 units, Aut (Goochee) MWF 9

110. Equilibrium Thermodynamics — Thermodynamic properties, equations of state, properties of non-ideal systems including mixtures, phase equilibria and chemical equilibria. Prerequisite: Chemistry 171.
3 units, Win (Schlatter) MWF 8

130. Kinetics and Reactor Design — Chemical kinetics, elementary steps, mechanisms, rate-limiting steps and the quasi-steady state approximations. Ideal isothermal and non-isothermal reactors; design principles. Multiplicity, ignition, and extinction in stirred tank reactors; limitations of thermodynamic equilibrium. Departures from ideality; residence time distributions, dispersion in fixed beds, mass transfer limitations. Prerequisites: 110, 140, 150; Chemistry 171, 173.
3 units, Win (Homsy) MWF 9

114 SCHOOL OF ENGINEERING
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 section 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

170. Polymer Science and Engineering — Overview of polymer materials science: preparation, characterization, physical and mechanical properties and structure-property relations for the major classes of commercial homopolymers, and copolymers. Emphasis is on polymer applications in the microelectronics industry.

3 units, Spr (Frank) MWF 1:15-2:30

180A,B. Chemical Engineering Laboratory — Investigation of experimental aspects of chemical engineering science emphasizing development of communications skills. Experiments illustrating lecture subjects conducted by groups of students.

MThF 12-1 plus lab by arrangement

180A. 3 units, Aut (Khosla)

180B. 3 units, Win (Goochee)

190. Undergraduate Research in Chemical Engineering — Lab or theoretical work for undergraduate students under the direct supervision of a faculty member. Research in one of the graduate research groups or other special projects in the undergradu-

3 units (Fuller) not given 1993-94


3 units, Aut (Gast) TTh 2:15-3:30


3 units, Win (Boudart) MWF 2:30-3:45

232. Protein Science and Engineering — Emphasis on physico-chemical interactions that govern structure and function of proteins. Topics: protein function, protein 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 9-10:15


3 units, Win (Frank) MWF 1-2:15

234. Polymer Chemistry — Emphasizes the statistical and kinetic aspects of polymer synthesis. Condensation, addition, anionic, cationic and heterogeneous polymerization processes examined, 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. Polymer applications in microelectronics described. Recommended: one course in introductory organic chemistry.

3 units (Fuller) alternate years, 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 1993-94

237. Introduction to Biotechnology — (Same as Biology 237, Biophysics 237, Cell Biology 237, Chemistry 237.) Faculty from the Departments of Biological Sciences, Cell Biology, Chemical Engineering, and 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 biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences and engineering.

3 units (Boxer, Goochee, Kornberg, Yanofsky) alternate years, given 1994-95

270-279. Special Topics in Chemical Engineering — Discussion of recent developments and current research in specialized fields. Units by arrangement. Prerequisite: consent of instructor.

270A,B,C. Biocatalysis (Khosla)
271A,B,C. Adsorption and Catalysis (Boudart)
272A,B,C. Biochemical Engineering (Goochee)
273A,B,C. Bioengineering (Robertson)
274A,B,C. Microrheology (Fuller)
275A,B,C. Surface and Interface Science (Madix)
276A,B,C. Polymer Physics (Frank)
277A,B,C. Stability of Fluid Motions (Homsy)
278A,B,C. Statistical Mechanics of Dispersed Systems (Gast)
279A,B,C. Transport Mechanics (Shaqfeh)

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


Chair: Haresh C. Shah
Associate Chairs: Gilbert M. Masters, Clyde B. Tatum


Associate Professors: David L. Freyberg (on leave Winter, Spring), Dunja Grbic'-Galic' (on leave), Jeffrey R. Koseff, Kincho H. Law, Steven G. Monismith, Peter M. Pinsky (on leave Winter, Spring)

Assistant Professors: Ronaldo I. Borja, Martin Fischer, Lynn M. Hildemann, H. Craig Howard, H. Allison Smith

Professors (Research): C. Allin Cornell, Martin Reinhard, Paul M. Teicholz

Professor (Teaching): Gilbert M. Masters

Courtesy Professors: Joel H. Ferziger, George S. Springer

Acting Associate Professor: Mark N. Goltz

Acting Assistant Professor: James P. Black


Consulting Assistant Professors: Viorica Lopez-Avila, James Michael Williams

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 general civil engineering education, and 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 the professional practice of civil engineering. 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 desiring an integrated five-year program. Potential coterm 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: the building energy laboratory, the concrete laboratory, the Environmental Fluid Mechanics Laboratory (EFML), the Stanford Construction Research Laboratory (SCRL), the structural engineering laboratory, and the water quality control research and teaching laboratories. Research in earthquake engineering is conducted in the John A. Blume Earthquake Engineering Center, and the 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 stimu-
lating 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 which focus on engineering aspects of heavy industrial and building construction. By appropriate choice of elective subjects, students wishing to work for a contractor, designer firm, construction management consultant, or the construction department of an owner’s organization can design a program for their needs.

Subjects offered include: estimating, equipment and methods, planning and control techniques, planning and control applications, managing human resources, project and company organizations, concrete construction, building systems, construction finance and accounting, 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, or petroleum engineering, 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 graduate students are supported each year through the sponsored research activities.

The Construction Program faculty and students are active participants in the Center for Integrated Facilities Engineering (CIFE). Several current post-M.S. students are working on problems involving design-construction interface issues and are obtaining second M.S. degrees in Computer Science or Artificial Intelligence.

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 the solution of environmental and water problems are welcome. Comprehensive introductory courses in each major area of study are given to provide a common basis of 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 places major emphasis on 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 ground waters, 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. 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. 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 the concept of 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 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 structural 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. 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. The computer facility includes clusters of workstations and micro-computers which are available for instruction and research work by students and faculty. 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.

The Reliability and Risk Analysis Program focuses on instruction and research in advanced methods for structural safety evaluation and design, and methods for loss estimation from damage and failures of structures. Course work combines a strong background in structural analysis and design with probability theory and statistics. An integral part of research in this program is seismic risk and reliability of large structural systems.

The Structural Analysis and Design Program focuses on conceptual and detailed design of structural systems and on computational methods for predicting the static and dynamic response of structures. Included are courses that emphasize earthquake resistant design and computer-aided design. Related course work is available from other departments such as mechanical engineering, materials science and engineering, and computer science.

The Computational Mechanics Program 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 geometrical analysis, including finite element analysis.

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 course offerings, related courses are available in earth sciences, construction engineering, structural engineering, and water resources.

Structural Engineering and Geomechanics faculty and students also work at the Center for Integrated Facility Engineering utilizing modern CAD and CAE facilities.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

Students who major in Civil Engineering must complete the requirements for the B.S. degree listed under Undergraduate Programs in the "School of Engineering" section of this bulletin. Elective units may be used in any way the student desires, including additional studies in civil engineering. Because the undergraduate engineering curriculum is designed to insure breadth of study, students who intend to enter the professional practice of civil engineering should plan to obtain their professional education at the graduate level.
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 via Engineering 102S or 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 for transfer must be filed with the department, and they will be advised if the transfer is possible.

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 that are 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 "Degrees" section in 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. Following essential completion of 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 upon 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 (i.e., 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 as teaching aides during the academic year. Research assistantships also are available. Engineer and Ph.D. candidates may be able to use research results as a basis for the thesis or dissertation. Assistantships and other basic support may be supplemented by fellowship and scholarship awards or loans. Continued support is generally provided for further study toward the Engineer or Ph.D. degree subject to performance of the student, 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) TTh 8:30-9:45

104. Engineering and Management of the Construction Process—Techniques for planning, organizing, and executing complex facility engineering projects starting from the design input. Basic trade-offs for scope, quality, cost, and time. Time and cost planning for projects including scheduling and basic estimating. Managing facility projects, including measuring and recording progress, optimizing work operations, identifying and resolving change orders, and using construction information systems.

3 units, Aut (Fischer) MWF 9

plus additional hours by arrangement


4 units, Win (Koseff) 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 10A, 11, or 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 (Parker) F 10, lab F 1-5
145. Construction Equipment and Methods — Construction engineering fundamentals; equipment economics; selection and efficient application of equipment; analysis of production output and costs. Prerequisites: Engineering 10A or 14, and 60.
3 units, Spr (Paulson) MWF 9
one or more field trips by arrangement
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 a technical analysis of selected topics.
4 units, Win (Tatum) MWF 10-11:50
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
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
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: 170, Math. 42.
3 units, Win (Hildemann) MWF 10
4 units, Spr (Leckie, McCarty) MWF 10 section T 1:15-3:05
176. Small Scale Energy Systems — Analysis and design of energy conservation and renewable energy systems with emphasis on buildings. Building envelope, lighting, passive solar heating, space conditioning. Consideration of photovoltaic, wind-electric, and solar water heating systems. Prerequisite: Petroleum Engineering 103. DR:6(8)
3 units, Spr (Masters) MWF 11
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, Spr (Masters) F 1:15-2:30 three-hour lab weekly by arrangement
180A. Introduction to Structural Analysis — (Formerly 114; continuation of Engineering 10A or 11.) Analysis of indeterminate beams; strain and complementary energy; columns; deflection by moment-area; deflections by energy methods; virtual work;
advanced topics in stress and strain including plane stress, plane strain, and principal stresses; analysis of inelastic and nonlinear beams; elementary structural analysis. Prerequisites: 108; Engineering 10A, 11, or 14.

3 units, Aut (Howard) TTh 10-11:50

180B. Structural Analysis — (Formerly 180.) Analysis of beams, trusses, frames; deflections by virtual work, moment area, elastic loads; indeterminate analysis by superposition equations, moment distribution. Introduction to matrix methods and computer methods of structural analysis. Prerequisite: 108A.

4 units, Win (Kiremidjian) TTh 10-11:50

181. Design of Steel Structures — Concepts of design of steel structures with load and resistance factor design (LRFD) approach; types of loading; structural systems; design of tension members, compression members, beams, beam-columns, and connections; and design of trusses and frames. Comprehensive project on the structural design of an industrial building. Prerequisite: 180A.

3 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.

3 units, Spr (Krawinkler) TTh 11, W2:15-4:05

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 (Staff) MWF 11

197A,B,C. Professional Development Seminar — Normally taken by juniors and seniors. Weekly presentations by practicing engineers on topics relevant to students planning to enter the civil engineering profession. 197B puts students in the role of project managers, designing and building a concrete canoe for national competition; material dependent on student interest.

197A. 1 unit, Aut (Staff) F 5:15
197B. 1 unit, Win (Staff) F 5:15
197C. 1 unit, Spr (Staff) F 5:15

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 (Kiremidjian) 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 (Kiremidjian) given 1994-95

212. Advanced Topics in Computer-Aided Civil Engineering — The use and development of advanced computer tools for civil engineering applications. Object-oriented programming for engineering applications, including software engineering, data management, graphics, and user interfaces. Prerequisite: previous course in programming.

4 units, Win (Howard) TTh 1:15-2:30

214. Symbolic Modeling in Engineering — (Same as Computer Science 379.) 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, Win (Kanz)

223. Architecture-Process and Practice — Open to juniors, seniors, and graduate students. Overall view of the process and practice of architecture. Taught by five practicing architects and one contractor, and coordinated and supported by the Center for Integrated Facility Engineering (CIFE). Each stage of the architectural life cycle is presented by one of the outside faculty including design awareness (spaces, forms, organization), site planning and layout, programming of requirements, design, administration and project management, construction management (cost, schedule). Technology used by architects. Design of a homeless shelter (by stu-
dent teams) illustrates each aspect of the course. Enrollment limited to 25.

4 units (Teicholz, Staff)

240. Productivity Improvements 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. Enrollment limited to 25.

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—Integration and application of techniques for managing individual construction projects and construction companies. Case studies for application of techniques covered in the prerequisite courses. Techniques for strategic planning and management of technology in construction companies. Requires individual and group efforts on problems and case studies. Prerequisites: 240, 241, 250, or consent of instructor.

3 units, Spr (Tatum) 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; field trips on Fridays. Prerequisite: Engineering 70A or equivalent.

4 units, Win (Paulson) MWF 8-9:50

244. Financial Accounting for Construction—Priority given to Construction Engineering and Management students. Introduces concepts of financial and management accounting emphasizing the requirements of construction projects and companies. Record-keeping and reporting requirements for government and private construction work under different forms of contract, and for support of claims, arbitration, and litigation.

3 units, Aut (Tucker, Meyer) F 8-10:50


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 inter-relationships 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. Also, 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) W 3:15-6:05

250. Management of Human Resources in Construction—A theoretical framework and group problem solving exercise to understand the behavior of people in the workplace, and to develop skills to manage them. Focuses project-oriented organizations in the construction industry, but applicable to students interested in project-focused teams in other industries. View 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

251. Organization Design for Projects and Firms—For master's or advanced degree students with a serious interest in formal organization theory. Presents a theoretical framework, methodology, and computational analysis tool for the systematic design of organizations to perform project-oriented work. Including concepts from sociology, economics (especially transaction cost economics), communication theory, and management science. Student teams model a real world organization using an ongoing NSF project exploratory Virtual Design Team software. Computer expertise not required. Enrollment limited to 20. Prerequisites: 250, Soci-

3-4 units, Spr (Fischer, Paulson)
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 for transporting; placing, finishing, and curing; and special techniques.

3-4 units, Aut (Tatum) MW 10-11:50

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, Win (Tatum) MWF 11-12:15
plus one hour by arrangement

259A. 1 unit, Aut (Tatum) day by arrangement 4-6 p.m.
259B. 1 unit, Win (Levitt) day by arrangement 4-6 p.m.
259C. 1 unit, Spr (Paulson) day by arrangement 4-6 p.m.

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 for 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 1994-95


3 units (Kitanidis) not given 1993-94


3 units, Win (Monismith) MWF 11

263. 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: 264 or equivalent. Recommended: 262.

4 units, Spr (Staff) TTh 8:30-9:50, T 1:15-2:20

264. 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

265. Sustainable Water Resources Development — Priority given to Environmental and Water Studies program graduate students. Alternative defi-
266. Environmental Policy Design and Implementation — Analysis of direct regulation, market incentives, the courts, and negotiation as bases for environmental quality management programs. Case examples involving hazardous substance management, environmental impact assessment, and air and water quality management demonstrate how environmental management programs combine various "social choice" mechanisms. Cases are used to examine the process of environmental policy formulation in the U.S., and to illustrate theories of policy implementation. Limited enrollment. Prerequisite: 171.

3 units, Win (Ortolano) Th 1:15-3:05


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


3-4 units, Win (Kitanidis) TTh 8:30-9:50, Th 3:15

269. Water Resources Seminar — Seminar on 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 (Monismith) 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

271A. Physical and Chemical Processes — Physical and chemical unit operations for water treatment, emphasizing treatment and process combinations for drinking water supply. Application of principles of chemistry, rate processes, fluid dynamics, and process engineering to define and solve water treatment problems by flocculation, sedimentation, filtration, disinfection, and adsorption. Prerequisites: 160N, 270. Recommended: 273.

3 units, Win (Staff) 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. Prerequisites: 270, 274.

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. Prerequisites: 270, 271A.

3 units (Roberts) alternate years, given 1994-95

272. Hazardous Waste Management and Remediation — Introduction to the management of hazardous waste and remediation of contaminated sites. Topics: definition of hazardous waste, waste minimization techniques, characterization of contaminated sites, overview of technologies for remediation of contaminated soil and groundwater, engineering analysis of selected chemical, thermal, and biological technologies for treatment of hazardous waste, contaminated soil and groundwater, cost estimating, uncertainty, and decision analysis for
site remediation. Project focuses on the technical options for proper management of hazardous wastes currently generated by industry and the technical basis for remediation of contaminated land and groundwater in the context of a high degree of uncertainty.

2 units, Spr (Kavanaugh) W 2:15-4:30 alternate years, not given 1994-95

273. Aquatic Chemistry — 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) M 2:15, TTh 11

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

274. Environmental Microbiology — Fundamental aspects of microbiology and biochemistry; microbial physiology, metabolism, growth kinetics and energetics, genetics, taxonomy, and ecology as related to water and soil environments. The role of major groups of microorganisms as pollutants, as purifying agents, and as agents of biogeochemical change. Connections with environmental pollution and water quality control processes. Prerequisite: Chemistry 31 or equivalent.

3 units, Aut (McCarty) TTh 10, M 3:15

274A. Environmental Microbiology Laboratory — Experimental approach to understanding fundamentals of microbiology. Topics: morphology, physiology, metabolism, ecology, growth, genetics, microbial interactions, water quality parameters, and genetic engineering.

2 units, Aut (Fraleys, Cresson) W 2:15-5:05 plus hours by arrangement

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, Spr (Leckie) Th 1:15-5:05 alternate years, not given 1994-95

275B. Water Quality Control Processes II — Lab and pilot plant studies of aerobic and anaerobic biological processes for the treatment of water and waste waters. Prerequisites: 271B and 273A (or equivalent), and 274.

3 units (McCarty) alternate years, given 1994-95


3 units (Grbic’-Galic’) not given 1993-94

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 (Umana) MW 1:15


3 units, Aut (Hildemann) TTh 1:15, F 2:15


3 units, Spr (Hildemann) MWF 10

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 defor-
motions; strong and weak forms; variational equation and relation to a principle of virtual work; finite element approximation based on local interpolation; element stiffness matrices and load vectors; direct assembly procedure. Analysis of complex two- and three-dimensional truss and frame structures, thermal loads, and substructure techniques for large systems. Analysis of two-dimensional problems including the quasi-harmonic equation (deflection of a membrane, heat conduction, etc.) and two-dimensional elasticity (plane stress, plane strain and axisymmetry). Element families, isoparametric mapping, numerical integration, optimal sampling for stresses. Practical modeling techniques. Prerequisites: elementary structural analysis and matrix algebra.

4 units, Aut (Pinsky) MW 11-12:15  
computer lab F 3:15


4 units, Win (Staff) MW 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) MWF 11

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 (Shah) MW 10

3 units, Spr (Law) MW 12:45-2:05


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, Spr (Krawinkler) TTh 10, Th 1:15-3:05

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 computer-aided structural engineering analysis and design software. Topics: basic data structure such as array, list, stack, queue, tree, and graph; computer representation of engineering systems; organization and processing of design codes and standards; computer graphics and geometric transformations. Prerequisites: 281A, 285 or equivalent, and Computer Science 106A or equivalent.  
3 units, Win (Law) MW 11-12:15

3 units (Borja) given 1995-96

3 units (Borja) alternate years, given 1994-95

291. Foundation Engineering—Types, characteristics, analysis, and design of shallow and deep foundations; rigid and flexible retaining walls; braced excavations; settlement of footings in sands and clays; slope stability analysis by method of slices including search algorithms for the critical slip surface; special seminars by guest speakers; computing assignment; Prerequisite: 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, Win (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 1:15, M 2:15

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, modal superposition, Rayleigh quotient, numerical solution to the eigenvalue problem, direct integration methods; introduction to nonlinear dynamics. Prerequisite: 296A.

4 units, Win (Smith) MWF 1:15, M 2:15

298. Structural Engineering and Geomechanics Seminar—Lectures on topics of current interest. Recommended for all graduate students.

1 unit, Win (Staff) 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.

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

310. Post-Master's Seminar—For post-master's students to serve as orientation to the selection of a research topic.

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

315. Advanced Knowledge-Based Systems for Planning and Design—Builds upon techniques in 214 to introduce architecture that can support design synthesis and planning applications. Blackboard architectures, distributed cooperative problem-solving architectures, and knowledge-based CAD environments. Prerequisite: 214 or equivalent.

3 units (Levitt) alternate years, given 1994-1995

316. Using Models to Guide Facility Engineering Research—How different kinds of models in the social and physical sciences can guide a variety of engineering and research efforts. Not a traditional research methodology. Focuses on the "art" and "science" of developing models to advance high quality research projects. Students iterate through several cycles of preparing and critiquing a research proposal to enhance modeling skills. Grades based on answers to queries, and on written and oral presentations of proposals.

2 units, alternate years, not given 1994-1995

320A,B,C. Seminar on Integrated Facility Engineering—For M.S. students interested in learning about new concepts and technologies related to the future of the project delivery process or considering post-master work, new Ph.D. students interested in learning about past and current research projects, and Ph.D. students interested in a "sounding board" for their ideas and results. Ideas and results are related to research and practice of integrated facility engineering. Topics: integrative computer technologies, use of models to support integrated design and planning of facilities, strategies for integration.

320A. I unit, Aut (Staff) Th 12:15-1:15

320B. I unit, Win (Staff) Th 12:15-1:15

320C. I unit, Spr (Staff) Th 12:15-1:15

361. Multiphase Flow in the Subsurface—The simultaneous flow of water and one or more other fluids (air, solvents, hydrocarbons, etc.) in subsurface environments. Physical and chemical processes. Development of governing equations and solution techniques. Applications to vadose zone flow (infiltration, redistribution, evapotranspiration, recharge), and contamination of groundwater by non-aqueous
phase liquids. Prerequisite: Geological and Environmental Sciences 230 or equivalent. Recommended: Math. 130, Math. 131 or Mechanical Engineering 200B, or equivalents.

3 units, Win (Staff) MWF 2:15-3:30


3 units, Aut (Kitanidis) MWF 10


4 units (Monismith) given 1994-95

364. Hydrodynamics of Lakes and Estuaries — Survey of transport and mixing mechanisms in lakes and estuaries. Topics: mixed-layer dynamics, inflows, outflows, internal waves, upwelling and deep mixing in lakes; tidal and buoyancy-driven flows in estuaries; residual currents in lakes and estuaries; effects of rotation on lake and estuarine flows. Prerequisites: 264, 363.

3 units, Win (Monismith) MWF 10

alternate years, not given 1994-95


2-3 units, Win (Reinhard) TTh 10

alternate years, not given 1994-95

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) given 1995-96

374. Microbial Degradation of Organic Pollutants — Analysis of mechanisms, biochemistry, and enzymology of microbial degradation of various synthetic organic compounds as influenced by environmental factors and substrate characteristics. Evolutionary and genetic explanations for existing metabolic pathways. The phenomena of substrate utili-
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


Aut, Win, Spr (Staff) by arrangement

COMPUTER SCIENCE

Emeriti: (Professors) George B. Dantzig, John G. Herriot, Donald E. Knuth

Chair: Jeffrey D. Ullman

Associate Chair for Education: Eric S. Roberts

Assistant Chair for External Relations and Graduate Studies: Carolyn E. Tajnai


Associate Professors: David Cheriton, Michael Gencersreth, Anoop Gupta, Oussama Khatib, John Mitchell

Assistant Professors: David Dill, Andrew Goldberg, Monica Lam, Marc Levoy, Rajeev Motwani, Serge A. Plotkin, Mendel Rosenblum, Yoav Shoham, Andrew M. Stuart

Professors (Research): Thomas Binford, Richard Fikes, Gio Wiederhold

Associate Professors (Teaching): Charles A. Bigelow, Eric S. Roberts

Courtesy Professors: Michael J. Flynn (Electrical Engineering), Grigori Mints (Philosophy), David E. Rumelhart (Psychology), Edward A. Shortliffe (Medicine), Fouad A. Tobagi (Electrical Engineering)

Courtes Assistant Associates: Giovanni De Micheli (Electrical Engineering), John T. Gill, III (Electrical Engineering), Mark A. Horowitz (Electrical Engineering)


Consulting Associate Professors: Robert B. Hagemann, Daniel Weise

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 nation-wide Internet.

The systems are:

XENON, a SUN 4/670 Multi-processor (4 CPUs) SunOS Release 4.1.2. This system is exclusively for student use as a primary "home base" machine for electronic mail and text processing.

SUNBURN, a SUN4/490 running SunOS 4.1.1, is used for departmental administration.

PESCADERO, 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 multi-processor (8 CPUs) compute 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 is used primarily by one of the AI groups.

In addition, approximately 12 medium scale Unix operating systems are used by specific research projects at CS.

The Department also operates approximately 40 SUN workstations, 20 HP workstations, 25 NC0 Xterminals, 40 DECstation 5000s, 30 DECstation 3100s, 10 NeXT machines, 100 MacIIs, 5 Symbolics workstations, 35 TI Explorers, and 20 laser printers of various types, all of which are connected by an ethernet network. In addition, the department operates a Graphics Lab that consists of 10 SGI 4D/35TG Color Workstations.

At present, students who are supported by research can receive an account on their sponsored machine. All CS students 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 inter-disciplinary degrees with a substantial computer science component. The Computer Systems Engineering major (also in Engineering) allows 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 "Degrees" section in this bulletin.

COMPUTER SCIENCE

The M.S. degree 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, 1993. 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 coursework 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, 109A, 109B, 110, 112, 140, 145 (for specialization 6 only); Math. 109 or 120.

Requirement 2 — The following "core" courses or their equivalent must be completed: CS 137 or 237A, 143, 154 or 254, 157, 161, 212, 221, 240A; 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 desiring 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 211, 243, 244A, 245, 248, 312, 348B; Elect. Engr. 271.

3. Software Theory
   a) CS 242, 243, 258, 260.
   b) At least one of: CS 244A, 245, 342, 343, 345.
   c) At least one course from the following: CS 254, 363, 367A, 367B.
   d) At least one additional course from '3b', '3c', 441, 443.

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 (23 units)
   a) CS 245, 346, 347.
   b) At least two of: CS 244A, 244B, 323, 324, 345, 395.
   c) At least one of: CS 265; Engr. Econ. Syst. 221, 231, 241; Op. Res. 241, 340; Stat. 376A.

Requirement 5: Additional elective units must be technical courses (numbered 100 or above) related to the degree program and approved by the adviser. Elective courses may be taken on a Satisfactory/No Credit basis provided that a minimum of 36 graded units is presented within the 45-unit program.

DOCTOR OF PHILOSOPHY
The University's basic requirements for the Ph.D. are discussed in the "Degrees" section in this bulletin. Applications to the Ph.D. program and all the supporting documents must be received before December 31, 1993. The following are departmental 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 departmental 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.

TEACHING AND RESEARCH ASSISTANTSHIPS
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, etc. 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 non-technical 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 upon their background. Students with little prior experience or who wish to take more time to study the fundamentals of programming should take 106A followed by 106B. Students in 106A need not have prior programming experience. Students with prior exposure to programming or who want an intensive introduction to the field should take 106X, which covers most of the material in 106A,B in a single quarter.

In summary:
- For exposure — 1C or 1U.
- For non-technical use — 105A. For scientific use — 106A.
- For a technical introduction — 106A.
- For significant use — 106A,B or 106X, followed by 107, 109A,B, and 110.

**NUMBERING SYSTEM**

The first digit of a CS course number indicates its general level of difficulty:

- 0-99 service courses for non-technical 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 ten's 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 — Satisfactory/No Credit 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 (Staff)

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 (Staff) TTh 2:45-4

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, Spr (Blachman) F 12-1

UNDERGRADUATE


5 units, Win

105A. Introduction to Computers—For non-technical majors. Develops a working knowledge of computers as utilized in our society. Two major components: programming and issues. Topics: artificial intelligence, graphics, databases, ethical and social implications of computer technology, and computer hardware. Requires considerable interaction between student and computer, but is oriented toward students without a strong math and/or technical background, and assumes no previous computer experience. Students in technical fields and students looking to acquire programming skills are encouraged to take 106A or 106X. DR:6(8)

*5 units, Aut (Staff) MWF 1:15
Spr (Staff) MWF 2:15

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 (Staff) MWF 1:15
Win (Staff) MWF 2:15

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). Analysis of running time and space requirements for arbitrary programs including an introduction to elementary recurrence relations. Prerequisite: 106A or consent of the instructor, based on prior exposure to ANSI C. DR:6(8)

*5 units, Aut (Staff) MWF 11
Win, Spr (Staff) 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 (Staff) MWF 3:15
Spr (Staff) MWF 1:15

107. Programming Paradigms—Possible programming languages introduced: Prolog, Lisp, Smalltalk, C, and Ada. Small programming projects are assigned. Prerequisite: 106B or 106X.

5 units, Aut (Staff) MWF 2:15
Spr (Staff) MWF 11

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 (Staff) MWF 10
Win (Staff) MWF 2:15

109B. 4 units, Win (Staff) MWF 10
Spr (Staff) 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—(Enroll in Electrical Engineering 182.)

3 units, Aut, Win

* May be taken for 3 units by graduate students.
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 (Oliger) MW 11-12:15
  Spr (Staff) 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, 110.

  3 units, Aut (Staff) MWF 10
  Win (Widom) TTh 9:30-10:45

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, and 110.

  *4 units, Aut (Dill) TTh 9:30-10:45
  Spr (Roberts) MWF 10

145. Introduction to Databases—Data models, Entity-Relationship model, designing a database for an application, relational database concepts, relational algebra and SQL. Dependencies, contraints, and normal forms. Interactive database interfaces, programmatic interfaces to database systems. Transactions, concurrency control. The role of databases and computers in application environments. Includes a substantial database design project using a database management system. Prerequisites: 109B, 110.

  *4 units, Aut (Keller) MWF 11

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, Aut (Goldberg) 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, Aut (Goldberg) 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


  *4 units, Aut (Plotkin) TTh 1:15-2:30
  Spr (Guibas) TTh 9:30-10:45

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

* May be taken for 3 units by graduate students.
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: 106B, 106X, or equivalent.

3 units, Aut (Staff) MWF 3:15
Spr (Staff) MWF 1:15

194A,B. Software Project Laboratory — Experience in designing and implementing large-scale software systems. Working in teams, students complete modest-sized projects through specification, coding, and testing. 194A: students work on a standard project to develop the relevant software engineering skills. 194B: students work on projects of their own design. Topics: design methodologies, object-oriented design, problems of team programming, examples of good software, debugging techniques, and approaches to testing. 194A and B must be taken in consecutive quarters to qualify for project credit. Prerequisites: 107, 110.

194A. 3 units, Win (Staff) MW 2:15-4:05
194B. 3 units, Spr (Staff) T 2:15-4:05

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.

3 units, Aut, Win, Spr (Roberts, Virnau)

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.

3 units, Aut, Win, Spr (Roberts, Kotadia)

MW 7-8:30 p.m.

198. Teaching of Computer Science — Teach other students by running a small discussion section/computer lab section for a 106 course, and acting as on-duty help at the computing center. Three weekly meetings to discuss introductory courses in general, the specific course, and techniques of teaching. Application and interview required; see the receptionist in Computer Science/Tresidder for information. Prerequisite: 106B or 106X.

4 units, Aut, Win, Spr (Roberts, Baker, Lilly) MTW 4:30-6

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 senior people from industry who informally describe their views of computer science as a field and their experience as computer scientists.

1 unit, Aut (Roberts) Th 1-2:30
Spr (Johnson) Th 3:15-5:05

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 (Winograd) MWF 11-12:15

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 1993-94

204. Undergraduate Programming and Problem-Solving Seminar — Students work on several problems for which the "best" solution is not known. Participants, in teams, design and implement their solutions. Class meetings exchange ideas and/or provide necessary background for a given problem.
Prerequisites: extremely comfortable with programming, several upperclass CS courses beyond 109B.  
3-6 units, Spr (Ullman) TTh 1:15-2:30

211. Logic Design — (Enroll in Electrical Engineering 381.)  
3 units, Aut, Win

212. Computer Architecture and Organization — (Enroll in Electrical Engineering 282.)  
3 units, Aut, Win

211. Introduction to Artificial Intelligence —  
Broad technical introduction to core concepts. Topics: knowledge representation, search, deduction, planning, constraint propagation, learning, expert systems, natural language understanding, and vision. General problems, critiques, and fundamental assumptions. Prerequisite: working knowledge of Lisp or Prolog; instructor determines which programming language is required for programming projects.  
3 units, Aut (Latombe) MW 12:50-2:05  
Win (Nilsson) TTh 9:30-10:45  
Spr (Shoham) TTh 11-12:15

222. Discrete Systems — For students planning to concentrate in robotics or artificial intelligence. Introduction to the theory of discrete systems. Overview of basic concepts: features, modules, systems, state machines, procedures, and Petri nets. Detailed treatment of principal topics in discrete system architecture: reactivity, representation, programmability, planning, learning, communication, and self-replication. Theoretical analysis of various pragmatic tradeoffs in discrete system design, e.g., cost, quality, and time to market.  
3 units, Aut (Genesereth) TTh 1:15-2:30

223. 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 (Khatib) MWF 3:15

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, from simple dead reckoning and reactivity, through planning and map building, to communication and cooperation. Students program robots to compete against others in a robot contest. Programming is in Common Lisp on the Macintosh computer; 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 — Expert Systems are the most important of the applications of Artificial Intelligence in the commercial and defense sectors. Topics: the rapid transition of the expert system technology from lab to societal use, what is in an expert system, what is knowledge engineering. Case studies of commercial applications: diagnosis and repair, interpretation of data, manufacturing planning and control, financial services, engineering design, etc. The sources of benefit from Expert Systems. The magnitude of these benefits. What an organization needs to do to realize the benefits. A “what” rather than a “how to build systems” orientation aimed for a broad interdisciplinary audience.  
3 units, Spr (Feigenbaum) TTh 2:45-4

227. AI Algorithmic Techniques — 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, Spr (Shoham) TTh 1:15-2:30

228A. Introduction to Knowledge Systems — Foundations for understanding symbols, search, and knowledge-level analysis. Topics: symbol systems, different approaches to semantics, blind, directed, and hierarchical search methods, the verbal data hypothesis for protocol analysis, multi-disciplinary concepts for knowledge acquisition, computational models and reasoning phenomena for classification, configuration and diagnosis, interfaces from embedded systems to data bases, users, and remote knowledge systems. Prerequisites: familiarity with logic and high-level programming languages.  
3 units, Win (Stefik) TTh 4:30-5:45

228B. Introduction to Knowledge Systems — Symbol-level topics in reasoning, representation, and machine learning. Topics: concepts from graph theory for efficient constraint satisfaction, search, and truth maintenance systems. Intensional representations and models for reasoning about space,
time, certainty, and qualitative models of mechanism. Introduction to concepts and methods for machine learning. Prerequisite: 228A.

3 units, Spr (Stefik) TTh 4:30-5:45


3 units, Spr (Nilsson) MW 11-12:15

237. Advanced Numerical Analysis — Three-quarter graduate sequence designed to acquaint students in mathematical and physical sciences and engineering with the fundamental theory of numerical analysis. Examples from applications.

237A. Numerical Linear Algebra — Solution of systems of linear equations: direct methods, error analysis, structured matrices; iterative methods and least squares. Parallel techniques. Prerequisites: 106A, 137, Math. 103 or 113.

3 units, Aut (Golub) 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: 110, 140, or equivalents. Recommended: 112.

4 units, Aut (Rosenblum) MWF 1:15

Win (Rosenblum) MWF 10

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 (Nelson) MWF 1:15

Spr (Rosenblum) MWF 10

242. Programming Languages — Basic elements of programming languages and programming paradigms (imperative, functional, logical, object-oriented). Introduction to formal semantic methods. Modern type systems. Runtime support for different language features. Emphasis is on separating the different elements of programming languages and styles; specific languages considered only to show the different incarnations of a given element. Prerequisite: 107, or experience with Lisp, C and Smalltalk (or similar languages).

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. Three hours lecture; one hour discussion led by a teaching assistant. 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, Win (Greenwald, Singhal) TTh 2:45-4

Spr (Tobagi) (Enroll in Electrical Engineering 384)

244B. Distributed Systems — (Formerly 340.) 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 (Cheriton) TTh 2:45-4

244C. Distributed Systems Project — (Formerly 341.) Companion project option for students taking 244B. Corequisite: 244B.

3-6 units, Spr (Cheriton)


3 units, Win (Garcia-Molina, Keller) MWF 10

247A,B. Human-Computer Interaction — Issues of human-computer interaction: interface styles, work design, communication structure, and organizational factors. Students in small groups develop 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. Enrollment limited. Consent of instructor required. Prerequisite for 247A: 109B. Prerequisite for 247B: 247A.

247A. 5 units, Win (Winograd) MW 2:15-4:45
247B. 5 units, Spr (Winograd) MW 2:15-4:45

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: 106B or 106X, Math. 113.

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; 140; basic knowledge of C++ (may be taken concurrently). Recommended: 193D.

3-5 units, Win (Cheriton) TTh 1:15-2:30

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, Win (Pratt) TTh 11-12:15


3 units, Spr (Manna) MW 11-12:15

257. Automated Deduction and Its Applications — Proving theorems and extracting information from proofs. Uses in software engineering (program synthesis, transformation, and verification) and artificial intelligence (commonsense and robotic planning, natural-language understanding). Foundations of logic programming. Deductive tableaux, nonclausal resolution, the truth behind skolemization, building theories into unification and inference rules, term rewriting. The design of theorem provers. Prerequisite: 157.

3 units, Spr (Manna, Waldinger) 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, and 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, etc. May be taken for 3 units by graduate students.
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 it is possible. Prerequisites: 109B, Math. 42, or equivalents.

3 units, Win (Floyd) 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 (Staff) not given 1993-94

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 (Dantzig) not given 1993-94

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 (Feigenbaum) Th 2:45-5:15

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—(Same as Medical Information Sciences 212.) For students who have completed 270 or 271 and who wish to implement some of those ideas in a computer program. Prerequisites: programming experience, 270 or 271.

3 units, Spr (Walker, Fagan) TTh 1:30-2:45

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; semiotics and semantics of writing systems.

3 units, Spr (Bigelow)

277. Topics in Computational Linguistics—(Enroll in Linguistics 236.)

3 units, not given 1993-94

290. Seminar on Computer Industry Research—Introduction to the Stanford Computer Industry Project, its goals, methods, results, and ongoing research issues. The project is a large multidisciplinary study of the organization and operation of the computer industry, from business, economic, and technical viewpoints, and from the perspective of global competition. Focus is on the software industry, and on the future impact of trends toward the ubiquity of the digital representation of information and signals. "Hands-on" involvement in ongoing research of the Computer Industry Project. Enrollment limited. Prerequisite: consent of instructor.

3 units, Aut (Feigenbaum) Th 2:45-5:15

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 providing 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
309. Industrial Lectureships in Computer Science — The department invites an outstanding computer scientist to give a course in his/her specialty. Lecturers and topics change yearly; courses may be taken repeatedly. See Time Schedule for offerings.

3 units, by arrangement

312. Processor Design — (Enroll in Electrical Engineering 382.)

3 units, Win

315A. Parallel Computer Architecture and Programming — Principles and major challenges in design of parallel architectures. Study of research and commercial parallel machines designed to support the shared-memory, message-passing, dataflow, systolic, and data-parallel paradigms. 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 multiprocessors, a message-passing machine, and a connection machine 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 1993-94

317. Fault Tolerant Computing Systems — (Enroll in Electrical Engineering 489.)

3 units, Spr (McCluskey) alternate years, not given 1994-95

318. Testing Aspects of Computer Systems — (Enroll in Electrical Engineering 488.)

3 units, alternate years, given 1994-95

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, Spr (Lenat, Guha) F 1:30-4:30

322. Philosophy of Computation — (Enroll in Philosophy 395A.)

3 units, Win

323. Nonmonotonic Reasoning — Formalisms for representing non-monotonic reasoning and their applications to AI. Nonmonotonic aspects of commonsense knowledge and reasoning. Default logic, autoepistemic logic, and circumscription. Computational nonmonotonic reasoning. Applications of nonmonotonic formalisms to inheritance systems, logic programming, and reasoning about action using the situation calculus. Prerequisite: basic knowledge of logic such as 157, or Philosophy 160A.

3 units, Win (McCarthy) TTh 1:15-2:30

324. Semantical 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, Spr (Geffner) TTh 11-12:15

325. Planning Methods in Artificial Intelligence — Introduction to AI methods for planning courses of 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 architectures. Interaction with execution and learning. Underlying problems — frame, qualification, prediction, and persistence; notions, such as 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 (Latombe) not given 1993-94

326. Motion Planning — Computing object motions is central to many application domains (e.g., design, manufacturing, robotics, animated graphics, medical surgery) to generate collision-free paths among static obstacles. Extensions include uncertainty, moving among mobile obstacles, manipulating movable objects, and maneuvering with kinematic constraints. Introduction to this domain uses configuration space as a unifying link, describes effective planning methods (roadmap, cell decomposition, potential field, preimage backchaining, centralized/decoupled planning, non-directional planning), illustrated with applications in various domains. Assumes interests in computer graphics, geometrical computing, robotics, and/or artificial intelligence.

3-6 units (Latombe) not given 1993-94

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/mini-manipulator systems, effective inertia, sensor-based primitives, artificial potential field and force strategies, robot design. Prerequisites: 223, consent of instructor.

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


3 units, Win (Binford) TTh 11-12:15

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

335. Statistical Computing — (Enroll in Statistics 327.)

3 units, Spr (Staff)


3 units, Win (Golub) TTh 11-12:15

337. 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) given 1994-95

338. Numerical Analysis of Dynamical Systems — Dynamical systems arise in science and engineering, and typical applications involve the prediction or simulation of long-time evolutions, e.g., weather prediction, turbulent fluid simulations, phase separation calculations, and interplanetary motions. Standard analysis of algorithms for approximating initial value problems leads to an error bound of no value over long time intervals. Analysis and construction of algorithms in this case requires an interdisciplinary approach using ideas from numerical analysis and dynamical systems. Topics: introduction to dynamical systems, dissipative dynamical systems and their approximation; conservative and Hamiltonian dynamical systems and their approximation, convergence of approximations to invariant sets. Theory illustrated with applications. Prerequisite: 237C.

3 units, Aut (Stuart) TTh 9:30-10:45

339. Topics in Numerical Analysis — Advanced material is often taught for the first time as a "topics" course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See Time Schedule for current topics.

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, Spr (Partridge) TTh 1:15-2:30

342. Programming Language Design — (Same as 358.) Exposure to problems of programming language design and known 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 parallel machines. 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

345. Deductive and Object-Oriented Database Systems — Object-orientation: object identity, relationships, composite objects, inheritance, object query languages, persistence, implementation strat-

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


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, 245. Recommended: 347.

3 units, Spr (Garcia-Molina) TTh 9:30-10:45

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.

3 units, Aut (Guibas) TTh 11-12:15

348B. Computer Graphics: Image Synthesis Techniques — (Same as Medical Information Sciences 348.) Intermediate level, emphasizing sampling, shading, and display aspects of computer graphics. Topics: local and global illumination methods including radiosity and distributed ray tracing, texture generation and rendering, volume rendering, strategies for anti-aliasing and photorealism, human vision and color science as they relate to computer displays, and high-performance architectures for graphics. Written assignments and programming projects. Prerequisite: 248 or equivalent. Recommended: exposure to Fourier analysis or digital signal processing.

3 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. Includes a significant 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, Spr

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, Win (Motwani) MW 2:15-3:30


3 units (Staff) alternate years, given 1994-95

3 units, Aut (Pratt) TTh 11-12:15

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, Aut (Buntine, Cheeseman) TTh 2:45-4


3 units, Spr (Dill) TTh 9:30-10:45

356A. Reasoning about Knowledge — Knowledge plays a crucial role in distributed systems, game theory, and artificial intelligence. Material examines formalizing reasoning about knowledge and extent to which knowledge is applicable to the areas above. Issues: common knowledge, knowledge-based programs, applying knowledge to analyzing distributed systems, attainable states of knowledge, and modeling resource-bound reasoning. Prerequisites: mathematical maturity, an acquaintance with propositional logic.

1-3 units, Win (Halpern) F 2:15-4:05
alternate years, not given 1994-95

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, the Dempster-Shafer approach, going from statistical information to degrees of belief. Prerequisites: mathematical maturity and an acquaintance with propositional logic. Recommended: 356A.

1-3 units (Halpern)
alternate years, given 1994-95

358. Topics in Programming Language Theory — (Same as 342.) Possible topics of current research interest in the mathematical analysis of programming languages: structured operational semantics, domain theory, semantics of concurrency, rich type disciplines, problems of representation independence, and full abstraction. May be repeated for credit. Prerequisites: 154, 157, 258, or equivalents.

3 units, Spr (Mitchell) MW 12:50-2:05

359. Topics in Theory of Computation — Advanced material is often taught for the first time as a "topics" course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See Time Schedule for topics currently being offered.

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, Aut (Motwani) MW 2:15-3:30
alternate years, not given 1994-95


3 units, alternate years, given 1994-95

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, Win (Goldberg) MW 11-12:15
alternate years, not given 1994-95
3 units (Motwani) alternate years, given 1994-95

367A. Parallel Computation — Introduction to theoretical issues in parallel computation. Properties of parallel computation models and algorithm design techniques specific to each model, including systolic arrays, mesh-connected computers, hypercube-related networks, and PRAM. Topics: algorithms for sorting, connected components, shortest paths, and other basic problems. Upper and lower bounds for randomized and deterministic routing on hypercube and related networks. Techniques for reducing the processor-time product for PRAM algorithms.
3 units, Win (Plotkin) W 2:15-4:05 alternate years, not given 1994-95

3 units (Plotkin) alternate years, given 1994-95

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, Spr (Guibas) TTh 1:15-2:30

369. Topics in Analysis of Algorithms — Advanced material is often taught for the first time as a "topics" course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See Time Schedule for topics currently being offered.
3 units, Spr (Plotkin) 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 — "Filmcraft in User Interface Design." Enrollment limited to 20. May be repeated for credit.
3 units, Aut (Clanton) TTh 1:15-2:45

378. Phenomenological Foundations of Cognition, Language, and Computation — (Same as Linguistics 237.) Critical analysis of theoretical foundations of the cognitive approach to language, thought, and computation. Readings contrast the rationalistic assumptions of current linguistics and artificial intelligence with alternatives drawn from phenomenology, theoretical biology, and socially-oriented speech act theory. Emphasis on the relevance of theoretical orientation to the design, implementation, and impact of computer systems dealing with language.
3-4 units, Win (Edwards) 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 — Focus is on issues involved in business decision making; uses the case method to examine 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.

4 units, Aut (Liddle) MF 8-9:45

395. Database Project — For graduate students of 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 — Existing carbon-based lifeforms exploit energy available from the environment to organize matter available from the environment in order to survive, reproduce, evolve, and learn. Computational forms of artificial life exploit computer time to organize computer memory to the same effect. 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, Win (Koza) MW 12:50-2:05

426. Genetic Algorithms and Their Applications — Genetic algorithms are mathematical algorithms for search, optimization, and machine learning patterned after the evolutionary processes of reproduction, survival of the fittest, and genetic recombination. 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; genetic programming; implementation on parallel computer architectures.
3 units, Spr (Koza) MW 12:50-2:05

441. Topics in ADA Programming — The ADA language is used as an example for discussing current research in high-level languages for programming large systems and distributed systems. Related developments in specification languages are discussed. Part 1 (the ADA language design and programming techniques): multi-task programming, compilation algorithms for tasking, runtime supervisors for distributed systems in ADA, detection of concurrency error: 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 (Luckham)
alternate years, given 1994-95

443. Design and Prototyping Languages — (Enroll in Electrical Engineering 418.)
3-4 units, Win
alternate years, not given 1994-95

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 lecturers who are specialists in these fields. Prerequisite: 221 or equivalent.
1 unit, Spr (Staff) T11
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 implications, social issues.
   1 unit, Aut, Win, Spr (Staff) F 12:05-1:15

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 (Kohavi)

524. Seminar on Expert Systems Research—(Enroll in Medical Information Sciences 229.)
   2 units (Musen, Shortliffe)
   alternate years, given 1994-95

525. Seminar on Knowledge Acquisition for Expert Systems—(Same as Medical Information Sciences 230.) 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, automated tools which facilitate knowledge acquisition. Enrollment limited to 20. Prerequisite: 228A or equivalent.
   2 units, Spr (Musen) W3:30-5
   alternate years, not given 1994-95

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

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, any quarter (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 12-1:30

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 (Cheriton) Th 4:15

ELECTRICAL ENGINEERING


Acting Chair: Gene F. Franklin
Acting Vice Chair: Robert M. Gray
Associate Chair (Admissions): Butrus T. Khuri-Yakub

Assistant Chair: Sharon A. Gerlach


Assistant Professors: Constance Chang-Hasnain, Gregory T. A. Kovacs, Marc S. Levoy, Teresa H. Y. Meng, Dwight Nishimura, Oyekunle Olukotun
ELECTRICAL ENGINEERING


Courtesy Associate Professors: Norbert Pelc

Courtesy Assistant Professors: David L. Dill, Monica Lam, Sandy Napel, Mendel Rosenblum, Zhi-Xun Shen

Acting Professor: Dale Harris

Consulting Professors: Forest Baskett III, Charlie C. Bass, Carl Berglund, Raymond Browning, Robert Burmeister, Bruce Deal, Bruce Delagi, Abbas Emami-Naeini, Joseph Feinstein, Ninder Kapany, Else Kooi, Robert L. Kosut, Franklin Kuo, David Liddle, Robert Maxfield, Madhally Narasimha, Susan Owicki, Sydney Parker, Raghu Raghavan, Richard Reis, Donald Scharfetter, Arden Sher, Joachim Stohr, Martin Walt, Cindy Yuen, Louis Zitelli

Consulting Associate Professors: Ruby Lee, Mark Linton, Stephen Lundstrom, Roger D. Melen, David Stork, Noel P. Thompson, David B. Tuckerman, John F. Wakerly

Consulting Assistant Professor: Jehoshua Bruck, David Goldberg, Norman P. Jouppi, Mehrdad Moslehi, Yi-Ching Pao, Nirmal Saxena, David Ungar, Daniel Weise

Visiting Professors: Martin Morf, John Walkup

Visiting Associate Professors: Byoung Kim, Haniph A. Latchman, Sang Lee, Sigurd Meldal, David Meyer, Samiha Mourad

Visiting Assistant Professor: Amir Donenfeld

*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" coterminus section in 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 in 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 the Graduate Admissions Support Section of 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 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 faculty research supervisor. No time is lost in first completing the master's degree since a thesis is not required.

MASTER OF SCIENCE

University regulations governing the M.S. degree are described in the "Degrees" section in 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 com-
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 ‘1’ to provide breadth.

3. Enough additional units of electrical engineering courses so that items ‘1’ through ‘3’ total at least 21 units of graded EE courses numbered above 200, including at least 9 units of such courses numbered in the 300s or 400s. Some 600 or 700 level summer courses may also be considered for inclusion in the M.S. program.

4. Additional 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 conflict, 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 physics, mathematics, circuits, fields, electronics, digital systems, and lab work. 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). Full information should be obtained from the department office. 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.

**ELECTRICAL ENGINEERING ADMINISTRATION**

Some students may wish to combine a program in Electrical Engineering with courses related to business management, quality control, or other business oriented areas. This is particularly relevant for engineers whose career will advance into management areas or engineers interested in entrepreneurship. Some offerings in Electrical Engineering relate to these areas (EE 205 and 392L), but the majority of such courses are available in the School of Business and the Department of Industrial Engineering, whose listings should be consulted. The guidelines for the master’s degree in Electrical Engineering allow up to 21 of the required 45 units to be in business related areas so that a substantial program in these areas can be planned. Both business and Industrial Engineering courses may be counted as "technical areas" for this purpose.

**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 "Degrees" section in this bulletin.

Admission to a graduate program does not imply that the student is a candidate for the Ph.D. degree. Advancement to candidacy requires superior academic achievement, satisfactory performance on a qualifying examination, and sponsorship by two faculty members. Enrollment in Electrical Engineering 391, Special Studies, is recommended as a means for getting acquainted with a faculty member who might be willing to serve as a supervisor.

Not later than the first Autumn Quarter after receiving the M.S. degree, the applicant should submit an application to take the department qualifying examination (given each Winter Quarter). Upon successful completion of the qualifying examination and after securing agreement by two faculty members to serve as dissertation advisers, the student should file an "Application for Doctoral Candidacy." Only after receiving department approval to that application does the student become a candidate for the Ph.D. degree.

Requirements may be summarized as follows:

The student must complete successfully (1) a minimum of three years of residence with graduate standing, two years of which must be in residence at Stanford; (2) one or more qualifying examinations given by the faculty of the Department of Electrical Engineering; (3) an approved program of courses in electrical engineering and allied subjects; (4) an approved topic of research and a written dissertation, based on research, which must be a contribution to knowledge; (5) an oral dissertation which is a defense of dissertation research and which 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 the Graduate Admissions Section of 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

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
Application-Specific Integrated Circuits
Bipolar, MOS, and Other Devices and Circuit Technologies
Computer-Aided Analysis and Design
Custom Integrated Circuits for Computers and Telecommunications
Digital Integrated Circuits
Integrated Sensors and Transducers
Optoelectronic Integrated Circuits
Process, Device, and Circuit Modeling
Semiconductor Manufacturing
VLSI Device Structures and Physics
VLSI Fabrication Technology
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
PicoSecond Laser Pulses
Ultra-Fast Optics and Electronics
Semiconductor Lasers and Opto-Electronic 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
ELECTRICAL ENGINEERING 153

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 Photo-Devices

SPACE PHYSICS AND RADIOSCIENCE
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 "Space Science and Astrophysics" section in 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

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
Information Theory and Coding
Lasers and Quantum Electronics
Network Systems
Optics, Imaging, and Communications
Radioscience
Signal Processing
Space and Radio Science
Solid State Materials and Devices
Transmission Systems and Telephony
VLSI Design

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 (Boyd) MWF 9
Win (Helliwell) MWF 9


4 units, Win (Boyd) MWF 9
Win (Helliwell) 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 (Cioffi) MWF 11
Spr (Staff) MWF 1:15

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 catastrophies (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 10
Win (Chang-Hasnain) MWF 11

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 10
Spr (Chang-Hasnain) 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, 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 oscillators (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 cotermination 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 (Bloom) Th 1:15
lab by arrangement

141. Engineering Electromagnetics — Transmission lines. Reflection, transmission, attenuation, and dispersion. Standing wave ratio, impedance matching, pulses and transients. Electrostatics, Gauss’ Law, capacitance, divergence, and currents. The static magnetic field, magnetic forces, Ampere’s

4 units, Aut (Kino) MWF 12:50-2:05
Win (Staff) MWF 8:30-9:45


3 units, Spr (Staff) MWF 9

181. Introduction to Computer Systems and Assembly Language Programming — (Enroll in Computer Science 110.)

182. Computer Organization — 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.

3 units, Aut (Wakerly) TTh 1:15-2:30
Win (Gupta) 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, Win (Staff) MWF 8
Spr (Olukotun) MWF 8
four-hour lab by arrangement

184. Programming Paradigms — (Enroll in Computer Science 107.)

188. Concurrent Programming — (Enroll in Computer Science 140.)

189A,B. Software Project Laboratory — (Enroll in Computer Science 194A,B.)

190. Special Studies or Projects in Electrical Engineering — Independent work under the direction of a faculty member. Individual or team activities involving lab experimentation, design of devices or systems, or directed reading.

by arrangement

191. Special Studies and Reports in Electrical Engineering — Independent work under the direction of a faculty member given for a letter grade only. If a letter grade given on the basis of required written report or examination is not appropriate, student should enroll in 190.

by arrangement

192. Special Seminars — Special seminars and experimental courses are given on topics of current interest by specialists in the field. Announcements are made one or two quarters prior to presentation. See Time Schedule and bulletins in the department office for current listing.

by arrangement

UNDERGRADUATE AND GRADUATE

201A,B. 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 Ph.D. students. Speakers from faculty, students, and outside. Students with a conflict may arrange to view seminar via videotape in the library.

201A. 1 unit, Aut (Reis) M 4:15
201B. 1 unit, Win (Pantell) M 4:15

202. Medical Electronics — Primarily biological in nature. Introduces electrical engineers to the physiological and anatomic aspects of medical monitoring and imaging. Biological content, transducers, electronic systems, the socio-economic impact, and the constraints unique to medicine. Recommended: some familiarity with circuits and electrical instrumentation techniques (e.g., 113).

3 units, Aut (Thompson) MW 12:50-2:05

205. The Entrepreneurial Engineer — Seminar furthers the knowledge base of prospective entrepreneurs with an engineering background. Major content 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 — Fundamental principles of silicon integrated circuit fabrication processes. Physical and chemical models of crystal growth, oxidation, diffusion, ion implantation, etching, deposition, lithography, and
metalization. Geometrical layout and process integration of bipolar and MOS devices and integrated circuits. Prerequisite: 112 or equivalent.


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.

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.

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.

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.

229B. Thin Film and Interface Microanalysis — (Enroll in Materials Science and Engineering 323.)

229D. Introduction to Magnetism and Magnetic Materials — (Enroll in Materials Science and Engineering 347.)

231. Lasers I — Introduction to lasers and how they work, including quantum transitions in atoms, stimulated emission and amplification, rate equations, saturation, feedback, coherent optical oscillation, laser resonators, and optical beams. Limited primarily to steady-state behavior; uses classical models for atomic transitions with little quantum mechanics background required. Prerequisites: electromagnetic theory to a level of at least 142, preferably 241, and some knowledge of atomic or modern physics such as Physics 57, 130-131.

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.

238. Electrical and Magnetic Properties of Solids — Electrical and magnetic properties of solids from a fundamental point of view. Introduction to band theory, surface states, dielectric and ferroelectric materials, magnetic materials, ferromagnetism, and superconductivity. Emphasis on physical understanding. Much of material is systematized using the twin concepts of extended wave functions (transport, band theory, etc.) and more localized wave functions. Prerequisites: 111 and Physics 57, or graduate standing.

239A. Solid State Theory: Survey — (Enroll in Applied Physics 372.)

239B. Solid State Theory: 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 using exponential notation and vector phasors. Treatment limited to plane harmonic waves in isotropic media. Nonhomogeneous cases limited to plane interfaces and exponentially stratified media. Prerequisite: 142 or equivalent or other wave course.

3 units, Aut (Tyler) 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. Uniaxial and gyrotropic anisotropic media with magnetoionic plasma, and ferrite applications. Resonators. Perturbation theories, attenuation and energy conservation. Prerequisite: 241.

3 units, Win (Kino) MWF 10


3 units, Win (Pantell) MWF 11

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, Spr (Pantell) MWF 11


3 units, Aut (Kazovsky) TTh 9:30-10:45

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, Aut (Fraser-Smith) MWF 1:15 alternate years, not given 1994-95

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 equation and systems parameters, components of radar systems, radar cross-section and target characteristics, signal detection in noise, ambiguity function (with applications to measurement precision, resolution, clutter rejection and waveform design); pulse compression waveforms, synthetic aperture radar, tracking and scanning radars, HF (OTH) radar, radar remote sensing, radar astronomy. Prerequisite: senior undergraduate or graduate standing.

3 units, Win (Tyler) MWF 1:15 alternate years, not given 1994-95

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, the uncertainty relation, and the central limit theorem. Also, 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 10


3 units, Aut (Widrow) 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: ray matrices, 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, not given 1993-94

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 (DeMicheli) 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

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 (Gray) MW 4:15-5:30

279. Introduction to Communication Systems — Analysis and design of communication systems; analog and digital modulation and demodulation, frequency conversion, multiplexing, noise and quantization; spectral and signal-to-noise ratio analysis. Prerequisites: 278, and 102 or 261.

3 units, Win (Macovski) 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, Win (Olukotun) TTh 1:15-2:30

283. Compilers — (Enroll in Computer Science 143.)


3 units, Win (Tobagi) TTh 9:30-10:45

285. Programming Languages — (Enroll in Computer Science 242.)

286A,B. Operating Systems — (Enroll in Computer Science 240A,B.)

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, 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

GRADUATE

300. Master’s Thesis and Thesis Research — For students who wish to do independent work under the direction of an EE faculty member as part of their master’s degree program. Written thesis is required for final letter grade. The continuing grade ‘N’ is given in quarters prior to the thesis submission. (See 390 if a letter grade is not appropriate.)

by arrangement

310. Integrated Circuits Technology and Design Seminar — In-depth treatment of device structures, fabrication technologies and circuit design issues in integrated circuits. Introduces current research topics in these areas.

1 unit, Aut (Wong) 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 very 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, Wong) 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 include biological, chemical, mechanical, optical, thermal, and others, with discussion of basic mechanisms of transduction, fabrication techniques, and relative merits of the different technologies. Micromachining techniques are also approached 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, Win (Wooley) MWF 10


3 units, Spr (Wooley) TTh 11-12:15

316. Advanced VLSI Devices — In modern VLSI technologies, MOS and Bipolar device electrical characteristics are very sensitive to structural details and hence 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 (Wong) 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 and basic competence in computing.

3 units, alternate years, given 1994-95

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, Win (DeMicheli) MW 3:15-4:30

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 presents 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, alternate years, 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, Aut (White) MWF 1:15

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, Win (White) MWF 2:15

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 photon devices. Examples are related to the up-to-date research carried out in lab. Prerequi-
sites: 216, 228, and 328A (for 328B). Recommended: 238.

3 units, Win, Spr (Staff) 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, Aut (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-Insulator-Semiconductor (MOS and MIS) Systems; atomic level mechanisms for traps and fixed charge; accurate derivation of band bending for accumulation, depletion, and inversion; effect of impurities and defects. Metal-Semiconductor (MES) Systems; importance of metal-semiconductor chemical reactions; mechanisms of Schottky barrier formation; mechanisms for ohmic contact formation, including tunneling, MIS diodes, and heterostructures. Interface effects in heterostructures; interdiffusion and defects. Prerequisites: any two of 216, 228, 238, 322A, 328A.

3 units, Spr (Helms) TTh 1:15-2:30
alternate years, not given 1994-95

332. Semiconductor Lasers — Overview of physical principles and characteristics of semiconductor lasers, including energy bands in semiconductor materials; optical gain in bulk, quantum well, and strained quantum well materials; dielectric multilayer waveguides and 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; rate equation and transport characteristics; potential applications. Prerequisites: 142, 216. Corequisite: 231.

3 units, Aut (Chang-Hasnain) TTh 2:45-4

334. Superconducting Electronics — Superconducting electronics and applications. Brief introduction to phenomena of superconductivity through a discussion of Josephson junctions and superconducting quantum devices; analysis of promising applications in computer logic and memory, magnetometry, and low noise electromagnetic detectors and mixers in the millimeter and submillimeter wave region. Recommended: exposure to quantum mechanics and a good grounding in electromagnetic theory.

3 units, Spr (Beasley) TTh 1:15-2:30

337. Solid-State Characterization Laboratory — Lab involving experimental techniques used to characterize the electronics and optical properties of solids and solid-state devices. Present experiments: Hall Effect, Deep Level Transient Spectroscopy (DLTS), Electron Beam Induced Conductivity (EBIC), photoluminescence and optical absorption. Prerequisite: 238 or Material Science and Engineering 188.

3 units, Win, Spr (Bates) by arrangement

338A. Quantum Optics I — (Enroll in Applied Physics 387.)

338B. Quantum Optics II — (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 (Bloom) WF 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, alternate years, given 1994-95

354. Introduction to Radio Wave Scattering — Integral and differential equations of radio wave scattering; exact, approximate, and numerical solutions of single particle scattering for spheres, edges, points, and cylinders. Scattering from rough surfaces with large and small roughness scales, as time permits. Multiple scattering; formulation and solution techniques for equation of transfer in discrete media and scattering by continuous media in weak and strong regimes. Applications to radar, radar astronomy, remote sensing, and biological media. Prerequisites: 241 or equivalent, and partial differential equations, or consent of instructor.

3 units, alternate years, given 1994-95

357. Microstructures Fabrication Laboratory — Enrollment preference to students pursuing doctoral research programs requiring the use of the Ginzton microfabrication facility. Projects on the application of microfabrication technologies to exploratory devices. Planar fabrication techniques including contact lithography, vacuum deposition, and chemical etching emphasized. Use of analytical instruments including the scanning electron microscope, surface profilometer, and wafer probe station. Prerequisites: 212 or 333, consent of instructor.

3 units, Sum (Bloom, Khuri-Yakub) by arrangement

358A. Lasers Laboratory — (Enroll in Applied Physics 304.)

358B. Nonlinear Optics Laboratory — (Enroll in Applied Physics 305.)

361A. Digital Control Design — (Enroll in Engineering 207A.)

361B. State-Space Digital Control Design — (Enroll in Engineering 207B.)

361C. Optimal Control and Estimation — (Enroll in Engineering 207C.)


3 units, Spr (Kino) MWF 11-12:15


3 units, Aut (Staff) MWF 1:15

tubed systems. Robustness of systems. Prerequisites: 363, linear algebra.

3 units, alternate years, given 1994-95


3 units, Spr (Boyd) WF 12:50-2:05
alternate years, not given 1994-95


3 units, Win (Hesselink) MW 11-12:15

367. Statistical Optics — Applications of statistical tools to a variety of problems in modern optics. First-order statistical properties of thermal and laser light, effects of partial polarization, basic definitions of coherence, propagation of mutual coherence functions, the Van Cittert-Zernike theorem, imaging with partially coherent light, imaging through randomly inhomogeneous media, and statistics of optical detection processes. Prerequisites: 278, 366.

3 units, alternate years, given 1994-95

368. Digital Image Processing — Topics: physical descriptions of continuous images; properties of the human visual system; sampling and quantization of image; matrix representation of image forming and image processing systems; unitary transforms; image enhancement and restoration; scene matching and recognition, and applications. Demonstrations. Students write image processing algorithms. Prerequisites: 261 or equivalent, Math. 133 or 363.

3 units, Spr (Staff) MWF 10

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 (Nishimura) 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 and 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 (Mavrovski) Th 4:15-5:30
Win (Staff) Th 4:15-5:30
Spr (Cioffi) Th 4:15-5:30

371. Advanced VLSI Circuit Design — Overview of important issues in high performance digital VLSI design. Focus is from a system perspective (a fast processor, DSP, etc.), CMOS, 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 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 and 278.

3 units, alternate years, given 1994-95


3 units, Win (Widrow) TTh 1:15-2:30
374. Digital Transmission Systems in Telecommunications — Introduction to and comparison of analog and digital telecommunications; voice digitization — PCM, DPCM, and DM techniques; low bit rate coding of speech; segment of companding laws in PCM; time division multiplexing-framing, synchronization and pulse stuffing; transmission of digital signals-baseband and carrier techniques. Prerequisites: 261 or equivalent, and 278 or equivalent.

3 units, Win (Narasimha) MWF 9


3 units, alternate years, given 1994-95


3 units, Spr (Gray) TTh 11-12:15


3 units, alternate years, given 1994-95


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, Spr (Kailath) MW 2:15-3:30 alternate years, not given 1994-95

379A. Digital Communication I — Maximum-likelihood data detection, signaling methods and bandwidth requirements, bandpass systems and analysis, intersymbol interference and equalization methods, continuous phase modulation, Viterbi Detection, 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, 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, Spr (McCluskey) TTh 2:45-4
acter-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. Examples of point-to-point, satellite, packet radio, and local area networks.

3 units, Win (enroll in Computer Science 244A) Spr (Tobagi) TTh 2:45

385. Special Seminars in Computer Systems — Seminars on current research topics in computer systems are given occasionally and are usually announced one or two quarters in advance. See the Time Schedule and bulletins in department office.


1-4 units, Aut, Win, Spr (McCluskey) 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

392F. 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

392L. Business Management for Electrical Engineers — The processes, tools, and logical basis for business planning and decision making. Topics: strategic planning and the management of new product development, finance, marketing, and manufacturing. Provides an understanding of typical corporate and functional issues, an appreciation of the focus of each of the functional management principles, and independent pursuit of areas of further interest. Case method of instruction with examples from high technology companies. Enrollment limited to 60.

3-4 units, Spr (Liddle) MF 8-9:45

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.

(Franklin) by arrangement

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 and physical sputtering. Prerequisites: 212, consent of instructor.

3-4 units, Win (Saraswat) 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 real-time 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, Win (DeMicheli, Luckham)
MW 12:50-2:05
alternate years, not given 1994-95

3 units, Win, Spr (J. Harris) MWF 10

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, solar energy conversion, rapid thermal annealing, 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, Staff, Helms)
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 invariants, 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, Win (Walt) TTh 9:30-10:45
alternate years, not given 1994-95

478. Special Topics in Information Systems — Problems selected from recent faculty research in areas of information systems at a level of development suitable for course presentation.
3 units, alternate years, given 1994-95

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, alternate years, given 1994-95


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, not given 1993-94

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, Aut (Flynn) TTh 11-12:15
alternate years, not given 1994-95

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: 182, 264,
ENGINEERING-ECONOMIC SYSTEMS 167

and some CMOS circuit background.

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, alternate years, given 1994-95


3 units, Spr (McCluskey) TTh 2:45-4 alternate years, not given 1994-95

492. Special Seminars — Special seminars and experimental courses are given on topics of current interest by specialists in the field. Announcements are made one or two quarters prior to presentation. See the Time Schedule and bulletins in department office.

by arrangement

ENGINEERING-ECONOMIC SYSTEMS

Emeritus (Professor): Willis W. Harman
Chair: James L. Sweeney
Professors: Donald A. Dunn, 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, D. Warner-North
Consulting Assistant Professor: 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 structuring 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 the applications rather than purely by 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, etc.

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 and several courses applying calculus would constitute minimum preparation. A course in linear algebra is strongly recommended, as is some familiarity with formal proofs. 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 co-terminal 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.

Up to 18 units of the M.S. degree program may be taken outside the department. However, most M.S. programs include more EES units than the minimum requirement.

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 "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 "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 departmental 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 on the core courses (see "Courses" below), (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 which 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 $27,500 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 the Graduate Admissions Section of the Registrar's Office. Applications for fellowships must be made by February 15 preceding the Autumn Quarter that admission is desired and must be accompanied by a complete application for admission. (Applications not requiring financial aid are accepted until June 1.) 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 the application of system concepts in at least one specific problem area. This experience can be gained through an internship, through applied research projects, and through special courses that concentrate on the application of system concepts to specific areas.

The major research programs of the department are listed below. Regular and consulting faculty who are 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 decision 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 design and management, new product development, medical policy formation and decision making, 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, 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 AND ANALYSIS**
(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 gambling strategy, energy, and the environment.

**MATHEMATICAL SYSTEM ANALYSIS**
(Chiu, Luenberger, Morris, Tse)

Mathematical system analysis is the development and application of those mathematical principles and techniques that form the basis for problem formulation and solution in the system area. 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. Current projects include studies of: (1) the adoption of new technologies in the telephone industry, (2) the economics of electronic publishing, and (3) optimal pricing and product selection in the telecommunications industry. Close ties with the Center for Economic Policy Research (CEPR) 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 Medicine exist and EES students are working on projects with both EES and medical school faculty members.

COURSES

Core Courses:

Project Courses:

Lecture Courses:

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 equal emphasis given to development of general dynamic system theory and to exploration of classical models from social, physical, and life systems. Goal: to recognize and analyze dynamic phenomena in diverse situations. Concepts: formulation and analysis; state-space formulation; linear systems, fundamental solution sets, equilibria, dynamic diagrams; and eigenvector analysis of linear systems, the concept of control and feedback, controllability, observability, and linear stabilizing feedback. Dynamic programming and optimal feedback control. Prerequisite: Math. 113 or equivalent.
3 units, Win (Tse) MW 9:30-10:45

201B. Dynamic Systems — Positive 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 (Tse) not given 1993-94

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, Win (Chiu) MW 11-12:15

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 criticizing 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); individual preferences and demands; consumer theory; economic efficiency (Pareto efficiency, welfare theorems). Emphasis on the translation of theory into qualitative understanding and concrete procedures for analysis and implementation. Recommended: 241 taken concurrently.
3 units, Aut (Sweeney) MW 2:30-4

212B. Economic Analysis — Continuation of 212A. Topics: equilibrium theory (existence of competitive equilibria, methods for computation, special models); game-theoretic models (strategic behavior of firms, bargaining, market games); public goods, externalities, truthful revelation of preferences. Emphasis on building a framework to formulate and solve important economic problems or as a basis for additional study.
3 units, Win (Staff) MW 2:30-4

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

215. Public Policy Design — Project course in which policies designed to achieve an integrated set of economic and social objectives are studied. Students prepare an analysis of some particular law, regulation, or institution that contributes to the policy design being developed. Previous studies: telecommunications deregulation and sustainable national economies. Recommended: 212A, 214.
3 units, Spr (Dunn) TTh 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, Sum (de la Grandville) MW 2:15-4

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) MW 9:30-10:45

255. Economics of Natural Resources — Economic analysis of natural resource use and preservation, including clean air and water, pollution, depletable mineral resources, energy, and biological resources. Emphasis is on depletable resources. Stock-flow relationships; wealth maximizing choices over time; short-run and long-run equilibrium conditions; depletion/extinction conditions; market failure mechanisms (common-property, public goods, discount rate distortions, rule-of-capture); policy options. Prerequisites: Math. 43 and 212A or Economics 51Q.
4 units, Spr (Sweeney) MW 9:30-10:45

PROBABILITY

221A. Probabilistic Analysis — Self-contained development of probability theory that is theoretically sound and suited to application. Appropriate as a terminal course or as a foundation for further graduate work in applied areas. Theory emphasizes outcome space representation for discrete and continuous random variables. Basic concepts of conditional probability and probabilistic relevance, characterization of random variables, changes of variable, named distributions, and probability updating based on additional information. Most students have previous probability courses, but learn to apply probability concepts to problems of un-
certainty. Objective: provide an understanding and competence in analysis of probabilistic problems and to emphasize the need for formal probabilistic reasoning. Prerequisite: working knowledge of calculus.

3 units, Aut (Chiu) MW 11-12:15

221B. 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, Win (Chiu) MW 1:15-2:30


3 units, Spr (Shachter) TTh 9:30-10:45

DECISION ANALYSIS

31. Introduction to Decision Analysis — How to make good decisions. Psychological research shows that in simple situations people make decisions that upon close examination they regard as wrong. Decision analysis is a rationale that allows one to convert the opaque decision situations that confuse into a clear basis for action by using transparent, logical steps in personal or professional life, and in areas that run from health to investment. Topics: distinctions, clarity test, possibilities and probabilities, probability assignments, relevance, rules of actional thought, value measures, valuing intangibles, value of information and experimentation, relevance and decision diagrams, risk attitude, analysis of large scale decisions. Examples from fields of application, providing the philosophical concepts and practical techniques necessary to master decision-making in a complex, dynamic, and uncertain world. Requires rigorous and analytical thought, and high school algebra. DR: 6(8)

3 units, Aut (Howard) TTh 11-12:15

231. Decision Analysis — Decision analysis as a means for achieving clarity of action in the face of uncertainty, complexity, the passage of time, and perplexing preferences. Emphasizes logical development through clear distinctions, probability assignment to represent information, the rules of actional thought, value measures, risk attitude, the value of information and experimentation, representation by decision trees, relevance and decision diagrams. Professional decision analysis using the decision analysis cycle. Demonstrations of the practical problems in carrying out decision analysis and presenting the results to decision-makers. Applications to business, engineering, law, and medicine. Prerequisite: knowledge of basic probability (221 or equivalent).

3 units, Win (Howard) TTh 11-12:15

232. Advanced Decision Analysis — Extension of decision analysis beyond the basic paradigm. Emphasis on determining and extending the boundaries of logical analysis of decisions. Topics: creation of alternatives; the encoding of subjective information without bias; foundations of inference; invariance and exchangeability principles; relationship of decision analysis to classical inference and data analysis procedures; analysis of complex preference structures; normative preference principles; repetitive, iterative, and decentralized decision systems; value of information in special contexts; use of experts; competitive and social decision analysis; sensitivity and approximation; and decision analysis in dynamic processes. Content varies with current research interests. Prerequisite: 231.

3 units, Spr (Howard) Th 2:45-5:15

234. Intelligent Decision Systems — Use of computers to deliver automated decision analysis assistance. Topics: designing and analyzing classes of decisions, explicitly representing the decision process, formulating individual decisions, automating probability and risk attitude assessment, automating determinstic and stochastic sensitivity analysis, and supporting basis appraisal. Discussions are tailored toward a substantial term project. Student teams design and implement an experimental intelligent decision system. Prerequisite: 31 or 231. Recommended: 232 or 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 simulta-
neously with 236. Prerequisite: 31 or 231.
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 presentations. Taught simultaneously with 235. Prerequisite: 31 or 321.
4 units, Spr (Holtzman, Matheson)
MWF 3:15-4:30

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 desirability of physical coercion and deception as 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 2:45-3:15

OPTIMIZATION

3 units, Aut (Shachter) TTh 9:25-10:50

3 units, Win (Shachter) TTh 9:30-10:45

246. Investment Science — Introduction to the modern version of quantitative investment analysis, both theory and practical application. Objective is to teach how modern investment concepts can be used by individuals, firms evaluating business ventures, and by financial services institutions. 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, futures contracts, optimal portfolio growth). Examples of applications for every major topic.
3 units, Win (Luenberger) TTh 1:15-2:30

247. Advanced Investment Science — Seminar on advanced topics and research in the theory and application of investment concepts. Topics: futures contracts, 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. Prerequisite: 246.
3 units, Spr (Luenberger) T 1:15-2:30

APPLICATIONS AND RESEARCH

170. The Role of Technology in National Security — (Same as Political Science 134P; Science, Technology, and Society 171.) Examines critical decisions made by the U.S., including development of the A-bomb and H-bomb, the crash ICBM program after Sputnik, and the military space program. Current issues, e.g., demilitarization and defense conversion in the post-cold war era, proliferation of weapons of mass destruction, and ballistic missile defense against potential threats from regional powers. Case studies illustrate the fundamentals of the process by which technical issues are synthesized and explained to policymakers with no background in technology; in particular, the way in which technical organizations in government,
government committees, and science advisory boards interact to bring a broad spectrum of informed advice to senior policymakers. For certain technologies, the U.S. government decision process is compared with other countries.

3 units, Aut (May) MW 4:15-5:30

171. The Role of Technology in Policy Decisions—(Same as Political Science 136P.) Same objectives and use of relevant case studies as 170. Emphasis is on cases which involve policy decisions not directly affecting national security. How information on technologies crucial to the formulation of rational policies in energy, environment, health care, manned space exploration, and international competitiveness gets to the executive or legislative branch, and how the judicial branch is increasingly seeking technical advice in reaching its decisions.

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, 231, and 241, or equivalent, or consent of the instructor.

3 units, Spr (Borison, Cohan) MW 11-12:15

281. Product Planning—Product planning as a synthesis of technology, cost, demand, user preferences, and legal rules. Students create product plans for new products that use existing technology and take existing laws as given.

3 units, Aut (Dunn) T 3:15-5:45

283. Strategy and Planning Models—Design and application of formal models in the study of strategic public and private sector planning problems. Problems involving issues of individual choice, social welfare, 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, 231, and 241, 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, remaining time completing small programming projects. Recommended: experience with programming in some language.

3 units, Aut (Fehling) T 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 knowl-
edge 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: 221 or 241; 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. Students form teams that 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.

1-4 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. Prerequisites: 201A, 212A, 221A, 231, and 241.

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 — 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, Luenberger) 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

Areas — Seminar for graduate students with an in-
terest 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.
1-3 units, Aut, Win, Spr (May, Shachter)
by arrangement

INDUSTRIAL
ENGINEERING
AND
ENGINEERING
MANAGEMENT

Emeriti: (Professors) Eugene L. Grant, Robert V.
Oakford, Henry E. Riggs, David A. Thompson
Chair: Robert C. Carlson
Deputy Chair: Hau L. Lee
Associate Chair: James V. Jucker
Professors: James L. Adams, Robert C. Carlson,
Warren H. Hausman, James V. Jucker, Hau L.
Lee, Elisabeth Paté-Cornell, Robert I. Sutton
Associate Professors: Margaret L. Brandeau,
Kathleen M. Eisenhardt
Professor (Teaching): Robert McGinn
Lecturers: Charles F. Banfe, Thomas J. Kosnik,
Michael G. Lyons, Marshall Turner
Visiting Associate Professor: Sultan Bimjee
Affiliated Faculty: David Beach (Mechanical En-
gineering), Robert A. Burgelman (Graduate
School of Business), J. Michael Harrison (Gradu-
ate School of Business), Frederick S. Hillier
(Operations Research), Charles A. Holloway
(Graduate School of Business), James G. March
(Graduate School of Business), David B. Mont-
gomery (Graduate School of Business), Evan
L. Porteus (Graduate School of Business), Nathan
Rosenberg (Economics)

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 which may
be in private industry, federal, state or local gov-
ernment, or in public, quasi-public, or non-profit
institutions.

Engineering management is concerned with the
knowledge and processes required to manage tech-
ically based enterprises.

UNDERGRADUATE PROGRAM
BACHELOR OF SCIENCE

The program leading to the B.S. degree in Indus-
trial 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, design-
ing, and implementing of complex economic and
 technological management systems where a sci-
tific 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 utilization of
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 sur-
rounding community.

Many students completing the bachelor’s pro-
gram will wish to pursue graduate study in indus-
trial engineering, in other professional schools —
law, medicine, or business — or in fields related to
industrial engineering such as economics, statist-
ics, or operations research.

GRADUATE PROGRAMS

The Department of Industrial Engineering and
Engineering Management (IEEM), in collabora-
tion with other departments of the University, of-
fers 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 Manage-
ment. The department also offers a master’s de-
gree 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, quan-
titative, and analytical parts of the Graduate Record Examination. The deadline for application is February 15.

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 over 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. An additional use of the master's degree is 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 45 units of work as outlined above, but must also have successfully completed or must complete the equivalent of 45 units of mathematics, science, and engineering breadth. In addition, the student must be sure that he or she has complied 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, organizations, production, marketing, and general management. 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 co-term 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 Departments of Mechanical Engineering and Industrial Engineering and Engineering Management. The program seeks highly qualified students with strong educational backgrounds in engineering and provides a demanding curriculum strong in both hardware and engineering management.

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 background 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 impact, as well as their impact on the firm's manufactur-
ing policy. A key integrating experience in the program is a year-long project course (e.g., 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 both the engineering management perspective, engineering-design hardware, and aspects of computer science. Here 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 courses required for the M.S. plus approximately 36 units of additional courses of a more advanced level and 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 will take 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 15 preceding the start of the academic year for which the award is to be made.
tions 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 (Sutton) MW 3:15-4:30

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 quality control in production course. Enrollment limited.

4 units, Win (Adams) TTh 11-1

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 on the design of high-performance manufacturing systems. Multidisciplinary approach.

4 units, Spr (Jucker) MW 2:15-4

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, Foster) MTh 8-9:45


4 units, Win (Weyant) MWF 10

240. Engineering Risk Analysis— Techniques of analysis of engineering systems for risk management decisions involving trade-offs (technical, hu-
mans, 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, Win (Pate-Cornell) MWF 11

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, Spr (Paté-Cornell)


4 units, Aut (Brandeau) 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

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, Hausman) MW8:15-9:45

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 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 (Turner, Banfe, Lyons) 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 (Banfe, Lyons) TTh 1:20-3:05

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.

2 units (Forbes) T 3:15-5:05

291. Directed Study — Directed study on 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 (Staff) given 1994-95

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 1994-95

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, structure and unstructured observation, field stimulations, and field experiments. Reading, writing assignments, lecture, and a modest field study. Enrollment limited to 12.

4 units, Aut (Sutton) W 9-12

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, emphasizing probabilistic methods and decision analysis. Applications to risk management problems involving technical, economic, and organizational aspects of engineering system safety. Possible topics: treatment of uncertainties, learning from near-misses, and use of expert opinions. Enrollment limited to doctoral students.

3 units, Spr (Paté-Cornell) by arrangement

362. Advanced Models in Production and Operations — Design and operation of production-inventory systems. Production scheduling, capacity planning, plant location, sequencing, assembly line balancing, multiglobal optimization. Reading material is primarily from journal articles. Prerequisite: 260.

3 units (Staff) alternate years, given 1994-95

363. Advanced Models for Logistics Planning — Theoretical treatment of advanced models for procurement, transportation, storage, and distribution problems in 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 (Brandeau) alternate years, given 1994-95

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, Spr (Hausman) MW 2:45-4 alternate years, not given 1994-95

366. Planning Models for Manufacturing Systems — Optimization models for manufacturing system design and control, focusing primarily on deterministic models. Topics: resource allocation prob-
lems, 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 1994-95

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) T4:15-5:45

MATERIALS SCIENCE AND ENGINEERING

Chair: William D. Nix
Associate Chair: John C. Bravman
Associate Professors: John C. Bravman, Bruce M. Clemens
Assistant Professor: Shan X. Wang
Professor (Research): Robert S. Feigelson
Courtey Professors: Curtis W. Frank, Huajian Gao
Consulting Professors: Roger W. Barton, Paul A. Flinn, Timur Halicioglu, Michael A. Kelly, David Redfield, Arden Sher, John Stringer, Jeffrey Wadsworth
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 which 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 physical metallurgist or 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; metal forming; 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 campus-wide 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 in 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 under the “School of Engineering” section in 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 “Degrees” section in 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 cotermital 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 will be 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 cotermital program may be obtained from the department’s Academic Affairs Administrator.

GRADUATE PROGRAMS

Graduate students can specialize in any of the areas of materials science and engineering. In collaboration with other departments of the University, additional special programs are available.

MASTER OF SCIENCE

The University’s basic requirements for the M.S. degree are discussed in the “Degrees” section in 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 Academic Affairs Administrator 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 conferal.

Degree requirements (for students entering after September 1, 1993) are as follows:
1. A minimum of 30 units of MSE course work (including crosslisted work) taken on a letter grade basis. One unit seminars cannot be used to fulfill this requirement; nor can thesis units (MSE 200) except when writing a research report (see below for details).
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 Academic Affairs Administrator to have this requirement waived.
3. Five courses selected from MSE 151, 152, and 201 through 209.
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. See department’s Academic Affairs Administrator for more information on what constitutes an approved course.
6. A minimum letter grade indicator average (LGI) of 2.75 for course work at Stanford.

MASTER’S 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 attendance-only 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 Academic Affairs Administrator 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 “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 Academic Affairs Administrator 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 Academic Affairs Administrator 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, etc.) 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 members of the department's faculty and submitted in quadruplet.

DOCTOR OF PHILOSOPHY

The University's basic requirements for the Ph.D. degree are outlined in the "Degrees" section in this bulletin.

Degree requirements (for students entering after September 1, 1993) 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 one year after admission. An LGI of 3.25 from the nine core classes (201-209) is required for admission to the Ph.D. qualifying 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 their second year of study. 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, etc.) taken on a letter grade basis. 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, etc. Please see the department's Academic Affairs Administrator for further clarification. The program should include the following:
   a) MSE 201 through 209 (27 units), except for students who have had 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 departmental seminar immediately preceding the University Oral examination.

ADVANCED SPECIALTY COURSES


COURSES

PRIMARILY FOR UNDERGRADUATES

50. Introductory Science of Materials — (Enroll in Engineering 50.) DR:6(8)  
3 units, Win (Bravman) MWF 11  
Spr (Sinclair) MWF 11

100. Undergraduate Special Problems — 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

3 units, Aut (Hufnagel) TTh 9-10:15

152. Electronic Materials Engineering — Electrical properties of materials from conductivity through optical and dielectric properties to magnetism and superconductivity. Emphasis is on semiconductor materials including operation of solar cells, LEDs, transistors, and the manufacture of integrated cir-
cults. No formal training in quantum mechanics is required although qualitative results from the theory are used extensively to describe physical properties. Recommended: Engineering 50 or equivalent.

3 units, Spr (Staff) MWF 10

161. Materials Science Labs I — Hands-on exposure to standard lab procedures for materials scientists, including metallography, optical microscopy, scanning electron microscopy, darkroom photographic processing, heat treating, etc.

2 units, Aut (Staff) W 3:15-5


2 units, Win (Staff) W 3:15-5

163. Materials Science Labs III — Lab on experimental techniques for the study of mechanical, electrical, and optical properties of materials. Experiments include: effects of grain size on yielding and strain hardening, high temperature creep, fracture toughness, electrical transport, n-p-n junction properties and optical absorption.

2 units, Spr (Bates, Taleff) M 3:15-5

170. Polymer Science and Engineering — (Enroll in Chemical Engineering 170.)

3 units, Spr (Frank) MWF 1:15-2:30

178. Foundations of Electricity, Magnetism, and Optics — A compact logical exposition of the fundamental laws (Maxwell’s equations) of the electric and magnetic field, and elementary applications of these laws to circuits, to a study of the electrical and magnetic properties of matter, and to the field of optics.

3 units, Aut (Bates) TTh 1:15-2:30

191. Mathematical and Computational Methods in Materials Science — For undergraduates; see 201 for description. Prerequisites: familiarity with ordinary differential equations.

4 units, Aut (Barnett) MWF 11 and by arrangement

192. Solid State Thermodynamics — For undergraduates; see 202 for description. Prerequisites: elementary thermodynamics equations.

4 units Aut (Staff) TTh 10:30-11:45 and by arrangement

193. Atomic Arrangements in Solids — For undergraduates; see 203 for description.

4 units, Aut (Bravman) MWF 10 and by arrangement

194. Phase Equilibria and Statistical Thermodynamics — For undergraduates; see 204 for description. Prerequisite: 192.

4 units, Win (Staff) TTh 9-10:15 and by arrangement

195. Waves and Diffraction in Materials — For undergraduates; see 205 for description. Prerequisite: 193.

4 units, Win (Clemens) MWF 9 and by arrangement

196. Imperfections in Crystalline Solids — For undergraduates; see 206 for description.

4 units, Win (Sinclair) MWF 10 and by arrangement

197. Rate Processes in Materials — For undergraduates; see 207 for description. Prerequisites: 191, 192, and 194.

4 units, Spr (Clemens) MWF 9 and by arrangement

198. Mechanical Properties of Materials — For undergraduates; see 208 for description.

4 units, Spr (Nix) MWF 11 and by arrangement

199. Electronic Behavior of Materials — For undergraduates; see 209 for description.

4 units, Spr (Bates) TTh 10:30-11:45 and by arrangement

PRIMARILY FOR GRADUATES

200. Graduate Special Problems

1-15 units, any quarter (Staff) by arrangement


3 units, Aut (Barnett) MWF 11


3 units, Aut (Staff) 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

205. Waves and Diffraction in Materials — Fundamentals of wave motion, including Fourier analy-
sis, interference, diffraction, polarization, and wave packets. Electromagnetic waves. Review of Maxwell's equations. Diffraction in solids, starting from scattering of x-rays by free electrons, then electrons in atoms and atoms in crystals, stressing the Fourier transform relationship between real space electron densities and reciprocal space diffraction features. Experimental techniques, e.g., electron diffraction, single crystal diffraction, and powder diffraction. Phonons, or lattice waves, including dispersion relationships, acoustic and optical modes, density of states and the Debye model. Electrons in solids, including the free electron model and the effect of a periodic potential. Prerequisites: 201, 203.

3 units, Win (Clemens) MWF 9


3 units, Win (Sinclair) MWF 10


3 units, Spr (Clemens) MWF 9

208. Mechanical Properties of Materials—Introduction to the mechanical behavior of solids emphasizing relationships between microstructure and mechanical properties. Description of elastic, anelastic and plastic properties of materials. Study of the relations between stress, strain, strain rate, and temperature for plastically deformable solids. Application of dislocation theory to the study of strengthening mechanisms in crystalline solids. Description of the phenomena of creep, fracture, and fatigue and discussion of their controlling mechanisms.

3 units, Spr (Nix) MWF 11

209. Electronic Behavior of Materials—Introduction to the electronic, optical, and magnetic properties of metals, semiconductors, and insulators emphasizing basic concepts and models used in describing these systems. Origin and properties of energy bands in solids, with applications to electronic transport in applied electric and magnetic fields and thermal gradients, and to optical properties. Elementary quantum concepts introduced where necessary.

3 units, Spr (Bates) TTh 10:30-11:45

230. Materials Science Colloquium

1 unit, Aut (Nix, Bravman) F 3:30
Win (Clemens, White) F 3:30
Spr (Bates, Barnett) F 3:30

299. Practical Training—(Formerly 175.) 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 Academic Affairs Administrator before enrolling.

1 unit, any quarter (Staff) by arrangement

300. Research

1-15 units, any quarter (Staff) by arrangement

310. Electrochemistry and Corrosion—Development of electrochemical principles with application to corrosion, electrolytic processes, and galvanic cells. Practical considerations for solid electrolyte devices, e.g., sensors, fuel cells, and selective membranes. Prerequisite: elementary thermodynamics.

3 units (Staff) alternate years, given 1994-95


3 units (Staff) not given 1993-94

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; and new processing techniques, e.g., sol-gel processing, laser melting, organo-metallic chemical vapor deposition (MOCVD) are discussed for bulk and thin film preparation. Application of ceramic materials in science and technology.

3 units, Win (Feigelson) TTh 10:30-11:45

314. The Science of Crystallization — Emphasis on qualitative and semi-quantitative understanding, with a broad look at phenomena involved in the growth and perfection of crystalline solids from the melt, solution, vapor, and electrodeposition. Topics: thermodynamic coupling equations, interface energetics, molecular attachment kinetics, dynamic interface shape effects in bulk crystals, the solute partitioning process, thin film formation via CVD and MBE, convection and heat transport, steady state solute partitioning, transient solute redistribution, morphological stability of interfaces, dynamic interface morphologies and defect formation in bulk crystals and thin films.

3 units, Aut (Feigelson) TTh 10:30-11:45 alternate years, not given 1994-95

315. Polymer Physics — (Enroll in Chemical Engineering 233.)

3 units, Spr (Frank) MWF 2:15 alternate years, not given 1994-95

316. Polymer Chemistry — (Enroll in Chemical Engineering 234.)

3 units (Frank) alternate years, given 1994-95


3 units (Sinclair) not given 1993-94

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: 203, 205, or equivalent.

3 units (Sinclair) alternate years, given 1994-95

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). Also, generic processes such as sputtering and high-vacuum generation. Prerequisite: some prior exposure to atomic and electronic structure of solids.

3 units, Spr (Braiman) 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: 203, 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 Spr (Staff) TTh 2:45-4

331. Materials Considerations in Semiconductor Processing — Case histories from the development and processing of electronic materials. Persistent and "unsolved" problems illustrate limits to our fundamental understanding or lack of control in the manufacturing environment. Examples include contacts to wide band-gap semiconductors (blue lasers) and defect control in heteroepitaxial layers. Emphasis on library research and presentation. Recommended: 312, 314, Electrical Engineering 212.

3 units, Spr (Barton) TTh 9-10:15

332. Solid State Ionics — Structure of point defects in crystalline and noncrystalline solids. Defect equilibria and transport; influence of chemical and electrical potentials, interfaces, association. Solid-state electrochemical transducer systems and effects; compositional and structural control. Various scientific and technological applications including sensors, batteries, and fuel cells. Prerequisites: 204, Engineering 50 or equivalent.

3 units, Win (Staff) TTh 10:30-11:45

3 units, Win (Redfield) MWF 2:15
alternate years, not given 1994-95

334. Basic Physics for Solid State Electronics — (Enroll in Electrical Engineering 228.)

3 units, Aut (Harris) TTh 9:30-10:45

335A,B. Physics of Semiconductor Devices — (Enroll in Electrical Engineering 328A,B.)

3 units, Win, Spr (Staff) MWF 3:15

337. Electrical and Magnetic Properties of Solids — (Enroll in Electrical Engineering 238.)

3 units, Win (Helms) TTh 11-12:15

338. Fundamentals of the Detection of Optical Radiation: Materials and Processes — Fundamentals of detection of radiation in the optical region of the electromagnetic spectrum, i.e., from 0.01 μm to 1000 μm, in terms of behavior of the radiation field, material properties of the detector, and statistical behavior of the detector output signal. Thermal and photon detectors described, including bolometer and superconducting bolometer, thermopile, Golay cell and pyroelectric thermal detectors, and photoconductor, p-n junction, Schottky barrier, vacuum diode, and photomultiplier photon detectors. Image intensifiers, charge transfer devices, and pyroelectric vidicons as applications of these detectors. Emphasis on properties and use of materials used in these detector schemes, e.g., Hg, Cd, Te for detection in the 3μm to 5μm and 8μm to 12μm atmosphere windows and GaAs and Si for detection of visible radiation. Prerequisite: 209 or Electrical Engineering 216.

3 units, Win (Bates) MF 2:15-3:30

340A,B. Basic Quantum Mechanics — (Enroll in Electrical Engineering 322A,B.)

340A. 3 units, Aut (White) MWF 1:15
340B. 3 units, Win, Spr (White) MWF 2:15

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, Spr (Helms) TTh 1:15-2:30
alternate years, not given 1994-95

344. Solid-State Characterization Laboratory — (Enroll in Electrical Engineering 337.)

3 units, Win, Spr (Bates) by arrangement


3 units, Spr (White) TTh 1:15-2:30

348. Principles of Magnetic Recording — Develops the relationship between the magnetic recording process and the properties of the magnetic materials required for various aspects of the process. Magnetic materials and the character of the recording process, including the fields generated and detected by the read-write head and the relationship of the read/write process to noise and interference. The desired magnetic characteristics of the recording media and the read/write head materials. Particulate and thin film media. Magneto optic media. The technology for generating the heads and media.

3 units, Win (Mahvan) TTh 4:15-5:30


3 units, Win (Barnett) MWF 1:15
alternate years, not given 1994-95

351. Strength and Microstructure — Primarily for non-materials science majors. Mechanical properties of solids as viewed by the materials scientist or the metallurgist. Basic aspects of dislocation theory and the role of dislocations and other defects on mechanical behavior of solids. Elastic, anelastic, and plastic properties of solids, stressing the relation between the internal structure of solids and the corresponding mechanical properties. Methods of hardening materials and mechanisms of hardening. Specific mechanical properties such as fracture, fatigue, and creep. Application of the concepts developed to materials useful in technology. Prerequisite: upper division or graduate standing in engineering or science.

3 units, Aut (Yaney, Wittenauer) MWF 8

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 technique pioneered by Stroh. Stress states generated by thermal and elastic mismatch and local stress concentrations at interfacial cracks
or corners studied with applications to integrated circuit devices, aircraft materials, and geophysical media. Prerequisites: introductory course in strength of materials or the theory of elasticity, and some familiarity with matrix algebra.

3 units (Barnett)

alternate years, given 1994-95


3 units (Nix) alternate years, given 1994-95

354. Introduction to Fracture Mechanics — (Enroll in Mechanical Engineering 240A.)

3 units, Win (Gao) MWF 11

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: 208.

3 units (Nix) alternative years, given 1994-95

356. Fatigue Design and Analysis — (Enroll in Mechanical Engineering 245.)

3 units, Aut (Nelson) MW 2:15-3:35


3 units, Win (Nix) MWF 11

alternate years, not given 1994-95

359. Crystalline Anisotropy — Introductory matrix and tensor analysis with applications to the effects of crystal symmetry on elastic deformation, thermal expansion, diffusion, piezoelectricity, magnetostriiction, and thermodynamics, following a treatment at the level of Nye's text. Homework sets involve the use of Mathematica™.

3 units, Spr (Barnett) MWF 10

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) Th 12

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) by arrangement

408. Seminar in Diamond Thin Films

1 unit, Aut, Win, Spr (Gur) W 12:15-1:05

MECHANICAL ENGINEERING


Chair: William C. Reynolds

Associate Chair: John K. Eaton

Associate Chair of Student Services: James P. Johnston

Division Chairs: Juan Simo (Applied Mechanics), Ronald K. Hanson (Thermosciences); (The Design Division operates without a chair.)

Laboratory Directors: David W. Beach (Program Director, Manufacturing Systems Engineering and Mechanical Engineering Student Shops), Mark Cutkosky (Manufacturing Sciences Lab and Manufacturing Models Laboratory), Daniel B. DeBra (Guidance and Control), John K. Eaton (Heat Transfer and Turbulence Mechanics), Ronald K. Hanson (High Temperature Gasdynamics), Larry J. Leifer (Smart Product Design Laboratory; Center for Design Research), Parviz Moin (Center for Turbulence Research)


Associate Professors: Mark R. Cutkosky, Rolf A. Faste, David M. Kelley, Reginald E. Mitchell, M. Godfrey Mungal, Drew V. Nelson, Sheri D. Sheppard, Juan Simo

Assistant Professors: Mark A. Cappelli, Huajian Gao, Sanjiva Lele, Andrew M. Stuart
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 medicine, law, political science, business, and other professions where a good understanding of technology is often important. Both undergraduate and graduate programs provide excellent technical background for work in environmental pollution control, ocean engineering, transportation, and other multidisciplinary problems that concern our society. Throughout the various programs, considerable emphasis is placed on development of 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 micro-mechanics, and mechanics of deformable solids. Design Division emphasizes the 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, kinematics, manufacturing technology, microcomputers in design, optimization, rehabilitation engineering, and robotics. The Design Division offers undergraduate and graduate programs in Product Design (jointly with the Department of Art). The division offers a master's program in Manufacturing Systems Engineering jointly with the Department of Industrial Engineering and Engineering Management. A master's program in Biomechanical Engineering is also offered.

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.

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 which 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; flow 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 design of composite structures, development of novel manufacturing processes, and evaluation of environmental effects on composites.

Applied Mechanics Division has a Computational Mechanics Lab. Its facilities include a CONVEX CI supermini computer (a vector machine with CRAY-like architecture), SUN colorgraphics work stations, a cluster of Mac II Apple computers, and a variety of terminals, laser printer, and hard copy devices.

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 School of Engineering Structures and the Solid Mechanics Research Laboratory. Laboratories in biomechanical and rehabilitation engineer-
ing 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. Lab space is available for instruction, construction of projects, and graduate research work in disciplines of interest to the division faculty. The School of Engineering Structures Laboratory is used extensively for experimental work in structural mechanics and biomechanics. The ME 210 Design Project Laboratory has facilities for CAD, simple fabrication, 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 (Mac) and IBM personal computers; a Symbolics Lisp machine; and a motion analysis system for collecting biomechanical and kinesiological data. Neuromuscular Biomechanics and Electrophysiology Laboratories complement campus facilities.

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 Departments of Aeronautics and Astronautics, and 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 ‘Degrees’ section of this bulletin.

A Product Design program is offered by 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; eng
neering 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 coterminal 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 will be 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. Coterminal 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 "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 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 (e.g., 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 look at 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 292.

The departmental requirements which must be met for the M.S. in Mechanical Engineering are:

1. Mathematical Competence in Two of the Following Areas: complex variables, linear algebra, numerical analysis, or partial differential equations as demonstrated by completion of two courses from the following: ME 200-208; Math. 106, 113, 131, 132; Computer Science 237A, B. (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 advisors 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, there must be at least one each in two independent subject areas that add breadth to the program, as approved by the adviser.

Courses 200-208, 280, and 286-301 may not be counted in these categories.

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 be taken from ME 291 and 292, and no more than 3 may come from 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.

Courses 200-208, 280, and 286-301 may not be counted in these categories.

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 their adviser.

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.

PRODUCT DESIGN

The graduate program leading to M.S. in Engineering (Product Design) is unique in that it is jointly offered by the Departments of Mechanical Engineering and Art. Students with undergraduate engineering degrees other than Stanford's B.S. in Product Design spend an additional year taking prerequisite undergraduate and product design courses. The degree 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><strong>Total</strong></td>
<td><strong>45</strong></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
Indust. Engr. 133. Industrial Accounting
Indust. Engr. 269. Industrial Marketing
Indust. Engr. 271. New Enterprise Management
Indust. Engr. 272. Managing Small Technical Companies

Design Philosophy
ME 215. The Designer in Society

Engineering Design
ME 210A,B,C. Mechatronic Systems Design
ME 216. Global Optimization in Design
ME 217A. Design for Methodology Manufacturability
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 (e.g., photos or slides of several art and design projects).

Students with non-engineering 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 non-engineering degrees who wish to earn the M.S. degree should consult with the program adviser.

MANUFACTURING SYSTEMS ENGINEERING

The M.S. in Engineering (Manufacturing Systems Engineering) addresses the need for engineers who combine management and design skills focused on manufacturing. There is a critical need for individuals who can deal directly with product design for manufacturability; design of manufacturing tools; financial, organizational, and strategic management issues; and elements of automation technology such as computer-aided design, computer-aided manufacturing robotics, and microprocessor control.

Manufacturing Systems Engineering (MSE) is offered jointly by two departments: Mechanical Engineering, and Industrial Engineering and Engineering Management. The program seeks high-quality students with strong educational backgrounds in engineering and provides a demanding curriculum strong in both hardware aspects and engineering management.

The hardware and engineering-design aspects of the program include:
ME 210A,B,C. Mechatronic Systems Design
ME 217A,B,C. Design for Manufacturability
ME 218A,B,C. Smart Product Design
ME 313. Ambidextrous Thinking
ME 319. Robotics and Vision Lab

The engineering management subjects include:
Indust. Engr. 121. Statistics and Quality Control
Indust. Engr. 133. Industrial Accounting
Indust. Engr. 203. Organization Behavior and Management
Indust. Engr. 261. Inventory Control and Production Systems
Indust. Engr. 268. Manufacturing Strategy

Hardware and engineering design courses provide hands-on knowledge of these functions and the trade-offs that must be made to take advantage of the relationships between design and manufacturing.

Engineering management subjects provide a suitable perspective, so that alternative system choices can be evaluated for financial, organizational, and production impact as well as impact on 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.

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 De-
partment of Mechanical Engineering (ME) requires (1) filing of a petition for admission to this program on the day before instruction begins, and (2) that the center of gravity of the proposed program lie 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.

**ENGINEER**

The basic University requirements for the degree of Engineer are discussed in the "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 arranged with 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.

Departmental requirements for the degree include an acceptable thesis; up to 15 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 approval of the adviser. Students who have not fulfilled the Stanford M.S. degree requirements are required to do so (with allowance for approximate equivalence of courses taken elsewhere).

Candidates for the degree must have faculty approval and have a minimum 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 (e.g., 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 "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 departmental 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 departmental 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 arranged with 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 divisional or departmental 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, 293, 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 "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 departmental channels and must have earned an M.S. in Mechanical Engineering, or an M.S. in Biomechanical Engineering, or a comparable master's degree. Students must pass the Department of Mechanical Engineering Ph.D. qualifying examination and pursue a doctoral thesis in a biomechanical engineering area.

The M.D. degree is administered by the School of Medicine. Students must apply separately through normal channels for admission to the M.D. program and satisfactorily complete 204 units in courses and clerkships approved for credit toward the M.D. degree. Of these, 72 quarter units must be in clerkships. For further information on the M.D. program, consult the bulletin School of Medicine.

For students fulfilling the full M.D. requirements who earned their master's level engineering degree at Stanford, the Department of Mechanical Engineering may waive its normal departmental requirement that the 36 units applied towards the Ph.D. degree (beyond the master's degree level) be formal course work. Consistent with the University Ph.D. requirements, the department may instead accept 36 units comprised of courses, research, or seminars that are approved by the student's Ph.D. thesis reading committee and the department chair. For further information, consult the Manager of Student Services.

Ph.D. MINOR

Students who wish a Ph.D. minor in ME should consult the department office for designation of a minor adviser. A minor in ME may be obtained by completing 20 units of approved graduate-level ME courses or by completing 9 units of graduate-level courses and passing the departmental qualifying oral examination in two appropriate areas identified by the minor adviser.

Courses approved for the minor must form a coherent program and must be selected from those satisfying requirement '2' for the M.S. in Mechanical Engineering.

FINANCIAL ASSISTANCE

The department annually awards a number of fellowships, teaching assistantships, and research assistantships to incoming graduate students. Fellowships are usually awarded to first-year graduate students. Research assistantships are used primarily for post-master's degree students. Preference for teaching assistantships is generally given to students who obtain the bachelor's or master's degrees at Stanford. Research assistantships are awarded by individual faculty research supervisors, not by the department.

Research assistants can, and normally do, carry out dissertation research work and write the dissertation as an integral part of the commitments of assistantships.

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 (Eaton) MWF 10
Spr (Johnston) MWF 11
lab MTWTh 1:15-3:05 or 3:15-5:05,
or a two-hour lab by arrangement

75. Introduction to Small Computer Hardware and Interfacing — Self-guided class teaching fundamentals and practical aspects of interfacing a small computer with the external environment. Basic computer architecture, analog and digital interfacing, serial interfacing, and simple control systems. No lectures. Material is covered in computer-based textbook and lab projects. Weekly demonstrations. Prerequisite: Engineering 40.
3 units, Aut (Eaton) T 1:15

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 (Sheppard) MWF 3:15-4
lab W 3:15-5:05

100. Differential Equations in Engineering—
Origin of differential equations, linear first order differential equations, linear second order equations with constant coefficients, variation of parameters, finite difference methods for first order equations, higher order methods, methods for boundary value problems, series solution, singular points, eigenvalue problems, Sturm-Liouville problem, stiffness and curing it. Limited enrollment. Prerequisites: Math. 43 and 44.

3 units, Win (Ferziger) MWF 11


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

102. Design Communication — Fundamentals of the four basic methods of engineering design communication: freehand sketching, technical drawing, verbal, and written presentations. Introduction to computer-aided tools in the design process. To encourage innovative and relevant use of engineering skills, class exercises and projects are based on instructor’s professional experiences.

3 units, Spr (Della Bona, Scott) MWF 8-10

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 9:10-10:50
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 (Sheppard) 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 (Roth) 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, and 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, Janik) 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 p.m.

115D. 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.

116A. Advanced Product Design — Small-scale projects carried to a high degree of refinement. Emphasis upon craftsmanship and aesthetics. Prerequisites: 115B, Art 160.  
3 units, Aut (Kelley) TTh 9-12

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) 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 (Burnett, Della Bona) TTh 11-1:05

4 units (Katz) given 1994-95

119. Precision Engineering — Lectures, lab experiences, field trips, individual design and fabrication projects, current topics of interest in manufacturing, emphasizing precision engineering. How are microinch resolution and repeatability accomplished? 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

130. Internal Combustion Engines — Internal combustion engines including conventional and turbocharged 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. Prerequisite: Engineering 30, 131A (or concurrent enrollment in 131A), or equivalent.  
3 units, Aut (Rinehart) MW 9 lab by arrangement

131A. Heat Transfer — First of consecutive 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 and Engineering 30. Recommended: intermediate calculus and ordinary differential equations.  
5 units, Aut (Mungal, 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. A 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 T9 labs four hours weekly by arrangement

138. Noise Pollution — (Enroll in Aeronautics and Astronautics 138.)

161. Dynamic Systems — Linear modeling, analysis, and measurement of mechanical and electromechanical systems. Topics: resonance, damping, stability, harmonic analysis, and force transmission. Extensions to multiple degrees of freedom using computers. Demonstrations and practical examples. Assumes a background in dynamics and math. Enrollment limited to 60. Prerequisites: Engineering 12, Math, 43, or equivalent. Recommended: Math
113 and Engineering 40, or equivalent (can be taken concurrently).

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
165. Processing of Advanced Structural Materials
225. Gasdynamics
250. Introduction to Heat Transfer

PRIMARILY FOR GRADUATES

ENGINEERING MATHEMATICS


3 units, Aut (Staff) MW 11-12:15

200B. 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, self-similarity.

3 units, Win (Stuart) MWF 9


3 units, Spr (Ferziger) MW 11-12:15


3 units, Aut (T. P. Liu)

205B. Methods of Mathematical Physics — (Enroll in Math. 220B, Engineering 220B.) Continuation of 205A.

205C. Methods of Mathematical Physics — (Enroll in Math. 220C, Engineering 220C.) Continuation of 205B.

206. Similitude in Engineering Mechanics — Reduction of physical problems: similarity rules revealed by dimensional analysis; supplementary information; self-similar solutions by dimensional analysis and other groups of transformations; applications to fluid mechanics and other fields; local solutions and their uses; self-similar solutions with concealed exponent. Prerequisite: 200B or Math. 131, or consent of instructor.

3 units, Aut (Staff) MW 11-12:15

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: 200 or Math. 131, or consent of instructor.

3 units (Van Dyke) given 1994-95
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. Topic for 1993-94: model yachts. Enrollment limited to 15; consent of instructor required.

1-3 units, Spr (Faste) WF 9-10; lab F 10-12 alternate years, not given 1994-95

210A. Mechatronic Systems Design: Methodology — 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 constraint specifications; and identifies design approach alternatives, supported by a design coach, corporate liaison, and faculty advisors. 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 50.

4 units, Aut (Leifer) TTh 3:15-5:05

210B. Mechatronic Systems Design: 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, as well as on 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 CAD, CNC part programming software, and CNC milling machines. Lectures alternate between student and instructor presentations of work in progress. Enrollment limited to 12; priority based on student project proposals made at the first class meeting. Coaching in project development is available from instructors during Autumn and Winter Quarters. Prerequisites: programming ability in Pascal (or other high-level language), 101, 103.

3 units

210C. Mechatronic Systems Design: 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 project taught jointly with Department of Art faculty. Emphasis on assisting individuals in assessing and engaging needs, exploration of design in two and three dimensions, construction of working prototypes that synthesize human, aesthetic, and technological concerns, and presenting the result to a professional jury.

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.


3 units

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 CAD, CNC part programming software, and CNC milling machines. Lectures alternate between student and instructor presentations of work in progress. Enrollment limited to 12; priority based on student project proposals made at the first class meeting. Coaching in project development is available from instructors during Autumn and Winter Quarters. Prerequisites: programming ability in Pascal (or other high-level language), 101, 103.

3 units (Milroy, Knapp) given 1994-95

214. Quality and the Products of Technology — (Same as Industrial Engineering 214; Science, Technology, and Society 118.) Dimensions of product quality studied include factors such as performance, economy, reliability and emotional response of the product, 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

215. The Designer in Society — Open to graduate students of 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.

3 units, Win (Roth) W 1:15-4:05


3 units (Wilde) given 1994-95

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. Homework and term paper involving team effort on application of DFM concepts to the critical analysis of an existing product. Prerequisite: 113 or equivalent design experience.

4 units, Win (Staff) 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. QFD, TQM, Pugh concept selection, manufacturing process, selection, flexible product design and product line structuring, prototyping, accelerated testing, application of robust design of product and process, cost driver accounting. Grade based solely on team effort related to term project. Progress reports, term paper, and oral presentations. Prerequisite: 217A.

4 units, Spr (Staff) TTh 1-2:15

217C. Manufacturing Systems 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 1:15-3:15

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 1:15-3:15

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. Also, a 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

220. An Introduction to Sensors — Sensors (transducers) are widely used in engineering and scientific research and as an integral part of products and automated systems. Introduction to available techniques for sensing displacement, force, pressure, acceleration, velocity, temperature, optical and nuclear radiation, and other physical parameters. Elementary electronic interface circuits are presented in a manner which assumes no prior knowledge of electronic circuits. Case histories of several sensing systems designed and patented by the instructor.

2 units (Adler) given 1994-95

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-curve analysis, circle and center-point theory.

3 units, Spr (Roth) TTh 11-12:15

223. Creative Problem Solving — (Same as Industrial Engineering 201, Engineering 190.) Problem solving emphasizing problem definition, creativity, and interpersonal problem definition and organizational factors that influence thinking. Common blocks to problem solving and methods of dealing with them. The advantages of integrating various problem solving strategies is stressed through reading, abstracted problem situations, and projects.

3 units (Adams) given 1994-95

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.)


3 units, Spr (DeBra) by arrangement

MECHANICS OF SOLIDS

230. Advanced Kinematics — Kinematics from mathematical viewpoints of point, line, and plane elements. Introduction to algebraic geometry. Application of matrix, tensor, and dual-quaternion methods to kinematic analysis and synthesis.

3 units, Aut (Roth) M 2:15-3:30


3 units, Aut (Staff) TTh 9:30-10:45

231B. Dynamics — Generalized active forces. Contributing and noncontributing interaction forces. Generalized inertia forces. Relationship between generalized active forces and potential energy; generalized inertia forces and kinetic energy. Prerequisite: 231A.

3 units, Win (Staff) TTh 9:30-10:45


3 units, Spr (Staff) TTh 9:30-10:45

232A. Spacecraft Attitude Dynamics I — Kinematics of spacecraft; specification of large orientation changes of a rigid body in terms of direction cosines. Euler parameters, Rodrigues parameters, orientation angles; generalized speeds, partial angular velocities and partial velocities. Gravitational forces and moments. Dynamics of simple spacecraft; effects of gravitational moments and orbit eccentricity; gyrostats.

3 units (Staff) given 1994-95


3 units (Staff) given 1994-95


3 units (Hughes) given 1994-95

233B. Finite Element Methods in Fluid Mechanics — Continuation of 233A.

3 units (Hughes) given 1994-95

233C. Finite Element Methods in Fluid Mechanics — Continuation of 233B.

3 units (Hughes) given 1994-95


3 units, Aut (Hughes) TTh 2:45-4:00


3 units, Win (Hughes) TTh 2:45-4


3 units, Spr (Hughes) TTh 2:45-4

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 (Staff) not given 1993-94

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 (Simo) MWF 10


3 units, Win (Steele) MWF 10

238C. Waves in Solids and Fluids — Waves in unbounded media, in elastic half-spaces, and in plates.

3 units (Staff) given 1994-95


3 units (Simo) given 1994-95


3 units (Simo) given 1994-95


3 units (Simo) given 1994-95
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, Win (Gao) MWF 11

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, Spr (Gao) MWF 11

241A. Theory of Plates — Analysis of stress, deformation in plates bent by transverse loads. Applications to circular, rectangular, other shapes. Vibrations, buckling. Prerequisite: 111 or Civil Engineering 114.
3 units, Aut (Gao) MWF 2:15

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 (Steele) given 1994-95

241C. Theory and Numerical Simulation of Shells — Part I: basic results on differential geometry and tensor analysis, and derivation of the linear and non-linear shell equations from the three dimensional theory are summarized. Galerkin formulation of the shell equations for the static and dynamic problems. Part II: computational aspects and state-of-the-art finite element techniques, emphasizing displacement, and mixed and hybrid finite element methods. Consistent treatment of finite rotations in rod and shells. Newton and quasi-Newton solution procedures, continuation methods suitable for post-buckling analysis. Explicit and implicit algorithms from transient dynamic analysis. Exact energy and momentum conserving schemes suitable for flexible multibody dynamics. Prerequisites: 235A, 241A or equivalent.
3 units (Simo) alternate years, given 1994-95

3 units, Spr (Steele)

3 units (Simo) given 1994-95

3 units, Win (Springer)

3 units, Aut (Nelson) MW 2:15-3:35

247A. Strength and Microstructure — (Enroll in Materials Science and Engineering 351.)

248. Introduction to Experimental Mechanics — Theory and applications of photoelasticity, strain gages, and holographic. 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.” Lab fee.

3 units, Win (Nelson) M 2:15-3:05
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 (Ferriger) 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 (Johnston) 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: 251A.

3 units, Win (Bradshaw) 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 (Moffat) TTh 2:15


3 units, Spr (Staff) MWF 2:15

253. Radiative Heat Transfer — Fundamentals of thermal radiation heat transfer; analysis of reactive exchange between block and non-block surfaces and enclosures; radiation from gases at high temperature, and particulate-laden gases; combined radiation and conduction. Advanced course for students with strong 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 and 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, Spr (Mungal) TTh 11-12:15

259A. Numerical Methods in Fluid Mechanics — (Enroll in Aeronautics and Astronautics 214A.)

259B. Numerical Computation of Compressible Flow — (Enroll in Aeronautics and Astronautics 214B.)
208 SCHOOL OF ENGINEERING

259C. Numerical Computation of Viscous Flow —
(Enroll in Aeronautics and Astronautics 214C.)

261A. Introduction to Turbulence — Navier-
Stokes equations and their general solution: turbu-
lence. Vorticity and vortex stretching, and the en-
ergy cascade. Reynolds stresses; introduction to
transport equations. Length scales and spectra; “uni-
versal” scaling of small eddies. Law of the wall,
local equilibrium, and eddy viscosity. Properties of
boundary layers and other “thin” shear layers; com-
plex flows. Introduction to prediction methods;
local equilibrium, stress-transport, and eddy-vis-
cosity transport models. Heat transfer and com-
pressible flow.
3 units, Aut (Bradshaw) MWF 3:15

261B. Analytical Methods for Turbulent Flows —
The analytical framework of homogeneous turbu-
lence, turbulent transport, rational modeling of tur-
bulence in flows of engineering interest, zonal mod-
els for turbulent flows and sub-grid scale and near-
wall modeling for large eddy simulation. Prerequi-
sites: 261A, plus a graduate sequence in fluid me-
chanics.
3 units (Reynolds) given 1994-95

262A. Physical Gas Dynamics — Concepts and

262B. Non-Equilibrium Processes in High-Tem-
perature Gases — Introduction to chemical kinet-
ic energy transfer in high-temperature gases.
Collision theory, transition state theory, and
unimolecular reaction theory. Vibration-translation
energy transfer. Applications in shock waves and
expansions.
3 units (Hanson)
alternate years, given 1994-95

263. Partially Ionized Plasmas and Gas Dis-
charges — Introduction to partially ionized gases
and the nature of gas discharges. Topics: fundamen-
tals of plasma physics emphasizing collisional and
radiative processes, equilibrium and non-equilib-
rium plasmas; plasma diagnostics, application to
energy conversion devices, and materials process-
ing. 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, ve-
locity, and other flowfield properties. Topics: elec-
tronic, vibrational, and rotational transitions; spec-
tral lineshapes and broadening mechanisms; ab-
sorption, fluorescence, Rayleigh and Raman scat-
tering methods; collisional quenching. Prerequi-
site: 262A or equivalent.
3 units (Hanson)
alternate years, not given 1994-95

267. Optical Diagnostics and Spectroscopy Lab-
oratory — Introduction to principles, procedures, and
instrumentation associated with optical measure-
ments in gases and plasmas. Absorption, fluores-
cence and emission, and light-scattering methods.
Measurements of temperature, species concentra-
tion, and molecular properties.
4 units, Spr (Hanson) MWF 10
one 3-hour lab by arrangement

268. Experimental Methods in the
Thermosciences — Planning experimental pro-
grams, uncertainty analysis, and selection of instru-
ment 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

269. Computational Methods in Fluid Mechani-
ces — Finite difference methods for solving partial
differential equations, emphasizing the equations of
fluid dynamics. Integral methods for boundary lay-
ers and their coupling to potential flow solutions,
boundary integral methods for potential flow, choice
of dependent variables, finite difference methods
for solving boundary layer problems, finite differ-
ence methods for incompressible flows including
turbulent flows, introduction to large eddy simula-
tion. Prerequisites: 252B and 200C, or equivalent.
3 units (Ferziger)
alternate years, given 1994-95

270. Engineering Thermodynamics — Thermo-
dynamic analysis of engineering systems empha-
sizing systematic methodology for application of
basic principles. Introduction to availability analysis.
Thermodynamics of gas mixtures and reacting sys-
tems. Use of modern computational equations of
state. Thermodynamics of condensed phases. Pre-
requisites: undergraduate background in engineering thermodynamics and computer skills.

3 units, Aut (Bowman) 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 — (Same as Engineering 280.) Invited speakers present research topics at the interfaces of biology, medicine, physics, and engineering.

1 unit, Aut, Spr (Carter, van den Meulen) M4:15


3 units, Aut (Carter, Staff) MW2:15-3:30

281B. Musculoskeletal Biomechanics-II — Interdisciplinary approaches are used in specific research and development projects associated with orthopaedic patient care. Example topics: fracture plate fixation, artificial joint replacement, muscle mechanics, rehabilitation devices. Attendance at Orthopaedic and Rehabilitation Grand Rounds. Limited enrollment. Prerequisite: 281A.

4 units, Win (Carter, Staff) MW 2:15-3:30
W 7:30-8:30

281C. Musculoskeletal Biomechanics-III — (Continuation of 281B.) Limited enrollment.

4 units, Spr (Carter, Staff) MW 2:15-3:30
W 4-5:30

SPECIAL AREAS

289. The Nature of Technology in Modern Society — (Enroll in Engineering 221.)

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, micro-surgery, 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 (Gao, Steele) Th 4:15-5:30


1 unit, Aut, Win, Spr (Beach) F 3:15-5:15

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, Win (Leifer) W 5:15
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, Win (Moin) TTh 9:30

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; also 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. Prerequisites: ability to program in Fortran or Pascal, Math. 103, or equivalent, consent of instructor. Recommended: 111, Civil Engineering 114, or equivalent in structural and/or solid mechanics; some exposure to principles of heat transfer.
3 units, Win (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 idea production. Enrollment limited to 60.
3 units, Aut (Faste) lecture/lab MW 3:15-5:05

315A,B. Integrated Design, Manufacturing, and Marketability — (Same as Business 466A,B.) Teams of business and engineering students: conduct market surveys to determine consumer preferences regarding product attributes, design a product that is responsive to consumers, build a prototype using mechanical engineering shops resources, compete in a simulated market with their prototypes via pricing and production decisions. Objectives: develop in management students an appreciation of the process of design and manufacture via detailed familiarity with design lab tools, develop in engineering students an appreciation of the constraints placed on design and manufacture by a competitive economic context. Students must enroll both quarters. Limited enrollment.
4 units, Aut, Win (Beach, Lovejoy, 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) given 1994-95

326. Introduction to Robotics — (Enroll in Computer Science 223.)

327A. Advanced Robotic Manipulation — (Enroll in Computer Science 327)

327B. Introduction to Computer Vision — (Enroll in Computer Science 328.)

330. Micromechanics of Dislocations, Plasticity, and Fracture — Introduction to physical concepts and mathematical analysis of micromechanics of plasticity in solids. Fundamental theory of dislocation mechanics, transformation strains, and their relation to the continuum theory of plasticity. Macroscopic concepts such as yield surfaces, plastic

3 units (Barnett, Gao, Simo) given 1994-95

338. Numerical Analysis of Dynamical Systems — (Enroll in Computer Science 338.) Dynamical systems arise in science and engineering, and typical applications involve the prediction or simulation of long-time evolutions, e.g., weather prediction, turbulent fluid simulations, phase separation calculations, and interplanetary motions. Standard analysis of algorithms for approximating initial value problems leads to an error bound of no value over long time intervals. Analysis and construction of algorithms in this case requires an interdisciplinary approach using ideas from numerical analysis and dynamical systems. Topics: introduction to dynamical systems, dissipative dynamical systems and their approximation; conservative and Hamiltonian dynamical systems and their approximation, direct approximation of invariant sets. Theory illustrated with applications. Prerequisite: Computer Science 237C.

3 units, Aut (Stuart) TTh 9:30-10:45


3 units (Kim) alternate years, given 1994-95

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 (Lele) given 1994-95

351B. Advanced Fluid Mechanics — Waves in fluids: surface waves, internal waves, inertial and acoustic waves, dispersion and group velocity, wave trains, transport due to waves, propagation in slowly varying medium, wave steepening, solitons and solitary waves, shock waves. Stability of fluid motion: dynamical systems, bifurcations, Kelvin-Helmholtz instability, Rayleigh-Benard convection, energy method, global stability, linear stability of parallel flows, necessary and sufficient conditions for stability, viscosity as a destabilizing factor. Focus is on flow instabilities. Prerequisites: graduate-level courses in compressible flow and viscous flow.

3 units, Aut (Lele) TTh 11

351C. Advanced Fluid Mechanics — Special topics change each offering. Compressibility effects in viscous flows, effects of rotation, stratification and buoyancy, modern concepts in non-linear hydrodynamics stability theory, or free-shear flows. Focus is on compressible flows. Topics: measures of fluid compressibility, low Mach number variable density flow; small disturbances in subsonic and supersonic flow; limitations and extensions of Biot-Savart formula; baroclinic generation of vorticity; curved shock waves; Crocco's Theorem; substitution principle; acoustic, vorticity and entropy modes; boundary layers; structure of shock waves; interaction of disturbances with a shock wave. Prerequisites: graduate-level courses in viscous flow.

3 units, Spr (Moin) TTh 11

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, by arrangement

OPERATIONS RESEARCH

Emeriti: (Professors) Kenneth J. Arrow, George B. Dantzig, Alan S. Manne
Chair: Richard W. Cottle
Associate Professor: Peter W. Glynn
Professors (Research): Walter Murray, Michael A. Saunders
Senior Research Associate: Gerd Infanger
Consulting Professor: Sam L. Savage
Affiliated Assistant Professor: Andrew Goldberg

Operations Research is concerned with formulation, analysis, and use of mathematical models relevant to the understanding and/or solution of significant problems of decision making. The department's principal objectives are to provide a comprehensive program of instruction in the mathematical foundations of operations research, to acquaint students with applications of these methods to significant problems, and to develop research scholars.

The department offers programs leading to a Master of Science, Engineer, and Doctor of Philosophy, and participates in a program leading to a Bachelor of Science in Mathematical and Computational Science. Under the Graduate Special (Ph.D.) Programs, it is also possible to arrange a well-considered program that is a combination of operations research with some other departmental area.

Among the many areas of operations research, the department has special competence in: applied probability; dynamic programming; inventory, queueing, reliability theory, and simulation methodology; linear, nonlinear, and integer programming; networks and combinatorial optimization; nonlinear equations; and energy and economic modeling.

The Systems Optimization Laboratory provides the opportunity to gain firsthand experience with computational methods, to participate in research on new algorithms, and to learn about modeling complex systems dealing with energy, the economy, water, etc.

Office facilities are available for doctoral students. In addition, the department has its own remote-access computer terminals, microcomputers, and computer workstations.

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 any mathematics beyond high school algebra. Applications are given to important socio-economic problems.

OR 152 is an introduction to linear, nonlinear, and dynamic programming for students familiar with calculus. OR 153 is an introduction to stochastic processes and models in operations research for students with a knowledge of calculus and undergraduate level probability theory. OR 154 is a condensation of 152 and 153 for students with similar backgrounds.

OR 241 is a first course in linear programming, having matrix algebra as a corequisite. OR 242 discusses 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 emphasis is on providing a solid foundation for a lifelong professional career involving the formulation, analysis, and use of operations research models of complex systems problems in business or government.

In addition to the University's basic requirements for the master's degree discussed in the "Degrees" section in 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 part time under the Honors Cooperative Program, taking one or two daytime classes per quarter.

Each student normally fulfills the following requirements for the M.S. degree:
The University's basic requirements for the Engineer degree are outlined in the "Degrees" section in 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, emphasis is given to 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, queueing 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 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, queueing 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 chosen from Groups 1, 2, and 3 (e.g., 340, 341, 342, 343, 345, 347, 348); at least five in Group 2 (351, 353, 355, 356, 358, 359); and at least 14 total courses chosen from Groups 1, 2, and 3 (e.g., 344, 346, 363, 371, 373, 377, 381, 382).

A doctoral candidate must also fulfill several University requirements, as described in the "Degrees" section in this bulletin. These include passing a University oral examination and completion of a dissertation which 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 examina-

### Course No. and Subject

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
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<tbody>
<tr>
<td>Comp. Sci. 106A or 105A, or 106X</td>
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<tr>
<td>Computer Programming</td>
<td>3*</td>
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<tr>
<td>Math. 103. Matrix Theory and its Applications</td>
<td>3*</td>
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<tr>
<td>OR 241. Linear Programming</td>
<td>3</td>
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<tr>
<td>OR 242. Network Programming</td>
<td>3</td>
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<tr>
<td>OR 243. Integer and Nonlinear Programming</td>
<td>3</td>
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<tr>
<td>OR 251. Probability Models in Operations Research</td>
<td>3</td>
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<tr>
<td>OR 252. Stochastic Models in Operations Research</td>
<td>3</td>
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<tr>
<td>OR 253. Simulation</td>
<td>3</td>
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<tr>
<td>OR 281. Cases in Operations Research</td>
<td>4</td>
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<tr>
<td>OR 282. Projects in Operations Research</td>
<td>3</td>
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<tr>
<td>Stat. 116. Theory of Probability</td>
<td>3*</td>
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<tr>
<td>Stat. 200. Introduction to Statistical Inference</td>
<td>3</td>
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<tr>
<td>Stat. 217. Introduction to Stochastic Processes</td>
<td>3</td>
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<tr>
<td>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</td>
<td>11</td>
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<td>Total</td>
<td>45</td>
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</tbody>
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* These three courses are prerequisites; at most, 6 of these 9 units may contribute to the 45 units.

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, e.g., 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 research assistantship for the thesis project. These arrangements are then subject to the approval of the department’s Admissions and Financial Aid Committee.
tion, students normally select three of the following courses: 351, 353, 355, 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 socio-economic 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:4(6) or 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 uncertainty. 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. DR:6(8)

4 units, Aut (Hillier) MWF 1-2:05
Spr (Veinott) MWF 1-2:05


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, queueing 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 1993-94

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 1:15-2:30

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 2:45-4

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. Probability Models in Operations Research — For students anticipating doing project work in government or industry. Formulation, solution, and analysis of models in operations research incorporating probabilistic elements. Topics: inventory, forecasting (including regression), decision analysis, and quality and reliability. Relevant software packages are utilized. Prerequisite: Statistics 116 or equivalent.

3 units, Win (Iglehart) 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, queueing 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 team journals case analysis integrating (and enhancing) problem identification, case definition, case selection, case analysis, teamwork, project scheduling, task definition, task allocation, task amalgamation, group behavior, technical writing, public speaking, presentation skills, questioning skills, software usage, 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, Aut (Dantzig) TTh 1:15-2:30

lab (Thapa) Th 4:15-5:30

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, discussion with clients, report writing, and presentation to clients. Enrollment limited. Prerequisite: 281 or consent of instructor.

3 units, Spr (Eaves, Iglehart) TTh 2:45-4:15

283. Operations Research with Spreadsheets and Databases — Reexamines 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 environments of the spreadsheet and database. 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) MW 10:15-11:30

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 (Cottle) TTh 1:15-2:30

342. Equilibrium Programming — Development and application of the solution of equations 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, Spr (Eaves) TTh 1:15-2:30


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, Win (Goldberg) MW 11-12:15 alternate years, not given 1994-95

346. Mathematical Programming Computation — (Same as 246.)

3 units, Sum (Staff) MW 3:15-5


3 units, not given 1993-1994

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, not given 1993-94


3 units, Spr (Veinott) TTh 9:30-10:45


3 units, Aut (Iglehart) TTh 9:30-10:45


3 units, not given 1993-94

356. Inventory Theory — Methods for qualitative characterization and efficient computation of optimal solutions of structured nonlinear and dynamic programs. Lattice programming, substitutes and complements in network flows, invariant network flows, minimum concave-cost flows in networks,
stochastic comparison of distributions. Application to selection of optimal inventory policies for single and multi-item-dynamic inventory models with convex or concave cost functions and known or uncertain requirements. Myopic policies. Multi-echelon models. Heuristics with high-guaranteed effectiveness. Prerequisites: Lagrangian duality theory, Statistics 116.

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, online algorithms and competitive analysis, strings and pattern matching, heuristic and probabilistic analysis (TSP, satisfiability, cliques, colorings), local search algorithms.

3 units, Aut (Motwani) MW 2:15-3:30 alternate years, not given 1994-95


3 units, alternate years, given 1994-95


3 units, not given 1993-94

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, Ayres, Tversky, Ross) Wilson T 4:10-5:30


5 units, Aut (Chichilniski) TTh 1:15-3:05

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. Recommended: 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 (Dantzig, Hillier) TTh 2:45-4:15
382. Projects in Operations Research — (Same as 282.)
3 units, Spr (Eaves, 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) Raymond E. Clayton (Psychiatry), Edwin M. Good (Religious Studies), Eric Hutchinson (Chemistry), Alex Inkeles (Sociology), Stephen J. Kline (Mechanical Engineering), Bernard Siegel (Anthropology), Walter G. Vincenti (Aeronautics and Astronautics)

Chair: Walter G. Vincenti
Associate Chair: Robert E. McGinn
Advisory Committee: James L. Adams (Industrial Engineering and Engineering Management), John H. Barton (Law), W. Bliss Carnochan (English), John J. Corn (History), Gabrielle Hecht (History), John W. Rick (Anthropology), Nathan Rosenberg (Economics), G. Leonard Tyler (Electrical Engineering)

Professors: James L. Adams (Industrial Engineering and Engineering Management), John McCarthy (Computer Science), Nathan Rosenberg (Economics), Paul S. Seaver (History)

Associate Professors: Timothy Lenoir (History), Clifford I. Nass (Communication)

Assistant Professors: Gabrielle Hecht (History)

Professors (Teaching): Gilbert Masters (Civil Engineering), Robert E. McGinn (Industrial Engineering and Engineering Management)

Senior Lecturer: Joseph J. Corn (History)

Lecturers: Renee Courey (STS), Paul Edwards (STS), Naushad Forbes (STS), Keith Gandal (STS)

Consulting Professor: Richard Meehan (STS)

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 nontechnical professionals and ordinary citizens as well as by engineers and scientists. Issues of professional ethics and social responsibility confront technical practitioners. At the same time, lawyers, public officials, civil servants, and business people are increasingly called upon to make decisions requiring a basic understanding of science and technology and their ethical, social, and environmental consequences. Ordinary citizens, moreover, are being asked with increasing frequency to pass judgment on controversial matters of public policy related to science and technology. These circumstances require education befitting the complex socio-technical character of the contemporary era.

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 (e.g., 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, sub-area, 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, 155, 162).
   c) Advanced courses (one course in each category):
      1) Disciplinary analysis (STS 207, 210, 220, 222, 232).
      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:
      1) Completing a four-course “sequence” (minimum of 12 units) in one field of engineering or science (sample sequences available in the STS office), or
      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. 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 theme, problem, or sub-area. The STS Policy Committee has certified the following topics as suitable Thematic Concentrations for the STS A.B. degree: 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 (e.g., 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 in a single field of science or engineering, with the remaining units, except for at most two stand-alone courses, grouped in clusters of at least three courses each in other fields of science or engineering, e.g., eight industrial engineering, three physics, three mathematics, and three computer science courses, and one course each in electrical engineering and chemistry.

2. “Clustered depth” — 50 units comprised of two or more clusters of at least five courses each in different fields of science or engineering, with at most two stand-alone courses, e.g., five courses each in physics, electrical engineering, and computer science, and one course each in industrial engineering and earth sciences.

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 enrich their education through in-depth study of the interaction of science and technology with society leading to honors in STS. 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 Spring Quarter 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 proposal submission, 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: one of STS 121 or 122.
4. Social Science Perspective: one of STS 107, 155, or 162.
5. Honors Project: an original critical essay or investigative project with accompanying explanatory essay on a 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 1-4 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 Values, Technology, Science, 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.

1. Technology and Ancient World — 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 1994-95

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 1994-95

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 1994-95

51. 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, writing assignments, field trips, and a design project. DR:6(8)

3 units, Aut (Adams) MW 2:15-4:05

52. An Introduction to Physics (Physics for Poets) — (Enroll in Physics 19.) Non-technical study of the aims, methods and achievements of attempts to understand the basic principles governing the physical world. Topics are introduced through their historical background, emphasizing present knowledge and current problems. Possible topics: classical mechanics, relativity, and quantum mechanics. High school level algebra and trigonometry used. DR:5(7)

3 units, Aut (Yearian) TTh 9

one-hour discussion by arrangement

53. The Nature of Mathematics — Overview of mathematics, its history, and its influence on thought, technology, science, and society. Topics: connections between history of geometry and calculus and our changing conceptions of the universe; prime numbers and their surprising applications; symmetry in mathematics, art, and nature; logic and philosophy; uses and misuses of statistics; mathematical principles underlying many modern inventions. DR:4(6)

3 units, Aut (Feferman) TTh 11-12:15

Spr (Feferman)
101. Science, Technology, and Contemporary Society — (Same as Engineering 130.) Analysis of the interplay of science, technology, and society in 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, technology, and public policy. DR:9(5)

4-5 units, Aut (McGinn) 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). Optional section for extra unit. DR:9(5)

4 units, Spr (Rosenberg) MWF 10

110. Ethics and Public Policy — (Same as Public Policy 103B.) Philosophical and 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 (euthanasia, pre-determination of sex of offspring, and genetic testing); environmental affairs (endangered species, wilderness preservation, high-rise proliferation; the ethical professions (“whistle-blowing,” fraud, human subjects research); and international relations (warfare, technology transfer, immigration, and repatriation of artistic patrimony). DR:8(3)

5 units, Win (McGinn) MW 2:15-3:30
plus two-hour section by arrangement


4 units, Spr (Meehan) TTh 9-10:50

114. Environmental Ethics — Analysis of ethical issues raised by the ways humans have altered the environment in contemporary Western societies. Emphasis on 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 sophomores.

3-4 units, Aut (McGinn) W 3:15-5:05

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) TTh 2:15-3:45

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, Win (Adams) TTh 2:15-4:05

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.

4 units, Win (Adams) TTh 11-1

121. Technology and Culture in 19th-Century America — (Same as History and Philosophy of Science 121.) Social and cultural aspects of technological change from the American Revolution through WWI. Emphasis on technologies of pro-
duction 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).

3-5 units, Win (Corn) TWh 10, optional discussion section for 5 units Th 1:15-3:05

122. Technology and Culture in 20th-Century America and Europe — (Same as 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, Spr (Hecht) W 2:15-4:05.

124. Introduction to Material Culture — (Same as American Studies 152, History 152.) American history through the evidence of things, especially the 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 (Corn) TTh 1:15-3:05

126. History of Physics — (Same as History 139A, History and Philosophy of Science 168, Philosophy 148.) Late 19th-century reductionist world-views leading to special and general relativity. Einstein's response. How did early workers in quantum mechanics attack the wave-particle duality? The problem of scientific realism in quantum mechanics. Nuclear fission, the bomb, and growth of large-scale experimental high-energy physics.

5 units, Win (Dresden) MThWh 10

128. The Rise of Scientific Medicine — (Enroll in 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" in the 19th century? What differences did it make to the physician? Why did it displace other approaches to medicine? Focuses on developments in France, Germany, and England from 1750 to 1912 and U.S. from 1890 to 1912. Development of experimental physiology and biomedical technology and their claimed contributions to the medical revolution of the 19th century. Concrete relationships of scientific developments in physiology, pharmacology, and bacteriology and effects on medical practice and therapy. Patterns of professionalization of medicine in different national contexts. Were forces driving professionalization of medicine in these contexts the same or different? How institutional structure of the medical profession differed according to its local context.

4 units (Lenoir) given 1994-95

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, Aut (Lenoir) MW 11-12:15

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.

5 units, Aut (Hecht) TTh 11-12:30

140. American Counterculture Literature: Ethics and Technology — Explores American literature that portrays lifestyles of subculture as a basis of identity. What makes up a lifestyle. The role of artifacts of material culture and "social technologies" and "technologies of the self" in the production of lifestyle. Readings: Abraham Cahan, Joan Didion, Jack Kerouac, Henry Miller, Toni Morrison, Hubert Selby, Hunter Thompson.

5 units, Spr (Gandal) Th 3:15-5:05

144. Gender and Science — (Same as Feminist Studies 147A, 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 vs. de-gendered science. DR: 8†(3) or 9†(5)

5 units, Spr (Fujimura)

145. Women and Technology — (Same as Feminist Studies 147B, History and Philosophy of Science 123.) Seminar explores 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. Dis-
cussion based on novels, reports and historical literate, commercials, and films.

5 units, Win (Courrey) W 2:15-4:05

146. From Gutenberg to Volkswagen: Technology and Culture in Germany — (Same as History and Philosophy of Science 148.) Surveys the interaction of material life, technology, and culture in Germany, beginning with the emergence of print culture. Developments since 1850 emphasized. Topics: the Industrial Revolution, mechanization, urban development, new means of transportation and communication, "Americanization," technological heroes and crazes, the symbology of progress, and anti-technological movements.

4 units, Spr (Lowood) MWF 10

152. The Rise of Industrial Asia — (Same as Economics 130, Political Science 125.) The political, economic, security, social, and cultural aspects of industrial development and change in Asia as a region. Enrollment limited to 15. Prerequisite: consent of instructor.

5 units, Aut (Lau, Okimoto, Raphael, Rohlen)

155. The Sociology of Scientific Knowledge — (Enroll in History and Philosophy of Science 155, Anthropology 158, History 133B; graduate students register for History and Philosophy of Science 255.) 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) given 1994-95

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 Computing — 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.) 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, Aut (Nass) TTh 10-11:50

163. The Nuclear Age — (Same as History 135A, 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 Asia, the Middle East, and S. America.

5 units, Spr (Hecht) TTh 11-12:30

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.

Win (Bernstein)

169. Technology in Newly Industrializing Countries — The relationship between technology and industrial development from technical, social, and economic perspectives. Technology in developing countries and in newly industrializing countries (India, Brazil, Mexico, and Korea), including transfer of technology, "appropriate" technology, factors affecting choice of technology, technological capability, and the relationship between technology and culture. Limited enrollment.

4 units, Aut (Forbes) TTh 1:15-2:30

170. Work, Technology, and Society — Work in contemporary society as influenced by rapid technological innovation. Causes and consequences of the current revolution in work, and policies for grappling with resultant problems. Focuses on the
U.S. and corresponding situations in Italy, Mexico, and Japan. Topics: new technology at the workplace and its bearing on occupational and organizational changes, industrial relations, worker health and safety, economic competitiveness, women, workplace ethics, and innovative work policies in Silicon Valley firms. Limited enrollment. DR:9(5)

4 units (McGinn) given 1994-95

171. The Role of Technology in National Security—(Same as Engineering-Economic Systems 170, Political Science 134P.) Examines critical decisions made by the U.S., including development of the A-bomb and H-bomb, the crash ICBM program after Sputnik, and the military space program. Current issues, e.g., demilitarization and defense conversion in the post-cold war era, proliferation of weapons of mass destruction, and ballistic missile defense against potential threats from regional powers. Case studies illustrate the fundamentals of the process by which technical issues are synthesized and explained to policymakers with no background in technology; in particular, the way in which technical organizations in government, government committees, and science advisory boards interact to bring a broad spectrum of informed advice to senior policymakers. For certain technologies, the U.S. government decision process is compared with other countries.

3 units, Aut (May) MW 4:15-5:30

172. The Role of Technology in Policy Decisions—(Same as Engineering-Economic Systems 171, Political Science 136P.) Same objectives and use of relevant case studies as 170. Emphasis is on cases which involve policy decisions not directly affecting national security. How information on technologies crucial to the formulation of rational policies in energy, environment, health care, manned space exploration, and international competitiveness gets to the executive or legislative branch, and how the judicial branch is increasingly seeking technical advice in reaching its decisions.

3 units, Spr (North, May) MW 4:15-5:30

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) M 3:15-5:05

ADVANCED UNDERGRADUATE AND GRADUATE

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)

210. Ethics and the Built Environment—(Same as Urban Studies 178.) 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, Spr (McGinn) MW 2:15-3:45

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. Introduction to relevant background in ethical theory, and social, political, and legal considerations. Analysis of scenarios in a number of 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 (Winograd)

220. The Process of Industrialization: Europe, the United States, and Latin America—(Same as History 303C.) For graduate students; undergraduates with prior work in the history of technology may be admitted with consent of instructor. Comparative study of the process of industrialization in England, the U.S., Brazil, Mexico, and the former Soviet Union. How differences in processes of industrialization reflected differences in prior socioeconomic settings. Whether industrialization should be interpreted as basically a transformation
in the organization of work as a social process or as a process of revolutionary technological change.

5 units, Aut (Haber) Th 3:15-5:05

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 (J. Corn) not given 1993-94

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 (Lecuyer, Lenoir, Lowood)

232. Science, Technology, and Society — (Same as Anthropology 232, History and Philosophy of Science 232.) Seminar for graduate students and advanced undergraduates. 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.

5 units, Win (Fujimura)

243. Technology, Work, and Culture Since the Industrial Revolution — (Same as History 336A, History and Philosophy of Science 243.) Colloquium, limited to graduate students. Examines 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, Win (Hecht) W 2:15-4:05

269A,B,C. Workshop in the Economics of Science and Technology — (Same as Economics 303A,B,C, History and Philosophy of Science 269AB,C.) Sponsored by the Department of Economics 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

280. Management of Technology in Newly-Industrializing Countries — 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.

2-4 units, Aut (Forbes) T 3:15-5:05

OVERSEAS STUDIES

117T. Industrial Revolution and Its Impact on Art, Architecture, and Theory — Berlin. (Same as Art 173Y.) DR:7(2)

5 units, Aut (Neckenig)
GRADUATE PROGRAMS
MASTER OF SCIENCE

A candidate must complete a program of 45 units of courses numbered 100 or greater. In addition, a number of courses are required that must be at the 200 level or above. 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 (15-18 units): students are required to take Math. 220 A,B,C. Nine additional units in mathematics are required with at least 6 units at the 200 level. Suggested courses are: Math. 173, 224, 230, 256A,B,C, 274; Statistics 310A,B,C. 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 (9-12 units): students are required to take Computer Science (CS) 237 A,B,C and 3 units of one of the advanced courses in numerical analysis: CS 335, 336, 337, 338, 339; Mechanical Engineering (ME) 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 would be acceptable candidates: Aeronautics and Astronautics 210A,B, 214A,B,C; Civil Engineering 212; Electrical Engineering 363, 364, 365, 378A,B; Mechanical Engineering 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, etc.) are discussed in the “Degrees” section in this bulletin. The following are program 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 applications. 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 ‘B.’ In addition, a student must pass a qualifying examination and give a presentation on his/her chosen research area. The qualifying examination must be taken within one year of admission into the Ph.D. program while 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 disser-
tation. 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

137. Fundamentals of Numerical Computation — (Enroll in Computer Science 137.) 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: Computer Science 106A; Math. 103 or 113 or equivalents.

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, Winter (Golub) TTh 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 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) given 1994-95

338. **Numerical Analysis of Dynamical Systems**— (Enroll in Computer Science 338.) Dynamical systems arise in science and engineering, and typical applications involve the prediction or simulation of long-time evolutions, e.g., weather prediction, turbulent fluid simulations, phase separation calculations, and interplanetary motions. Standard analysis of algorithms for approximating initial value problems leads to an error bound of no value over long time intervals. Analysis and construction of algorithms in this case requires an interdisciplinary approach using ideas from numerical analysis and dynamical systems. Topics: introduction to dynamical systems, dissipative dynamical systems and their approximation; conservative and Hamiltonian dynamical systems and their approximation, convergence of approximation to invariant sets. Theory illustrated with applications. Prerequisite: Computer Science 237C.
3 units, Autumn (Stuart) 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
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 it is through study of the ethical, policy, and technological issues related to kidney transplants or study of the relevance of contemporary social and philosophical theories to an interpretation of Dante’s writings, our undergraduates, graduate students, and faculty are engaged in the challenge of transcending the barriers among scholarly disciplines, those between research and teaching, and those between the academy and the rest of 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, Center for Teaching and Learning, Ethics in Society, History and Philosophy of Science, Jewish Studies, Medieval Studies, Overseas Studies, and Undergraduate Research Opportunities.

Faculty and academic staff of the School of Humanities and Sciences are listed under the respective departments or programs.

DEGREES OFFERED

Candidates for the degree of Bachelor of Arts, Bachelor of Science, Bachelor of Arts and Sciences, Master of Arts, Master of Fine Arts, Master of Science, Doctor of Musical Arts, or Doctor of Philosophy should consult appropriate sections of the announcements following. They should consult also
the department or program in which they intend to specialize.

For regional or area studies and other special programs leading to the degree of Doctor of Philosophy, refer to the “Graduate Special Programs” section in this bulletin.

UNDERGRADUATE PROGRAM IN AFRICAN AND AFRO-AMERICAN STUDIES

Chair: Horace Porter (English, on leave)
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), Thomas Massey (Humanities and Sciences), John Rickford (Linguistics), Arthur Walker (Physics and Applied Physics), Sylvia Wynter (Spanish and Portuguese), one representative from the Black Student Union.

Participating Faculty: Lucius Barker (Political Science), Clay Bates (Material Science and Engineering, and Electrical Engineering), Clay Carson (History), Sandra Drake (English), Harry Elam (Drama), John Gill (Electrical Engineering), William Gould (Law), Kennell Jackson (History), Halifu Osumare (Athletics), Horace Porter (English), John Rickford (Linguistics), Arthur B. C. Walker (Physics and Applied Physics), Sylvia Wynter (Spanish and Portuguese)

UNDERGRADUATE PROGRAM

The curriculum is based on the idea that the African and Afro-American Studies (AAAS) program should provide an inter-disciplinary 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.

With option (III), students majoring in AAAS may devise a program around a special theme. This choice allows the student to focus 25-30 units on developing previous work in the major or to explore new areas. In organizing this plan, the major works with an adviser on the chosen theme and must have prior written approval from the director of the program. Honors work is possible as part of 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, faculty with expertise in the different areas will be available. The program gives the students a chance to discuss academic choices with the many faculty involved in the program, and aims to provide the best possible advising for majors.

REQUIREMENTS

CORE COURSES

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<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
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<tbody>
<tr>
<td>105. Introduction to African and Afro-American Studies</td>
<td>5</td>
</tr>
<tr>
<td>114. Africa and the Black Diaspora</td>
<td>5</td>
</tr>
<tr>
<td>291. Race, Discourse, and the Origin of the Americas: A New World View of 1492</td>
<td>5</td>
</tr>
<tr>
<td>English 161C. 20th-Century Afro-American Fiction</td>
<td>5</td>
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<tr>
<td>History 148. Introduction to African History</td>
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<td>History 164. Race and Ethnicity in American Experience</td>
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(I) AFRO-AMERICAN HISTORY, LITERATURE, CULTURE, AND SOCIETY

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<th>Course No. and Subject</th>
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<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>127. Professional Development for Minority Engineers</td>
<td>2</td>
</tr>
<tr>
<td>Drama 5. Introduction to Black American Drama</td>
<td>4</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>
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<tr>
<td>Sociology 144. Social Mobility</td>
<td>5</td>
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(II) AFRICAN HISTORY, CULTURE, AND SOCIETY; HISTORY, CULTURE, AND SOCIETY OF THE BLACK DIASPORA

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
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<tbody>
<tr>
<td>115. Africa and Philosophy, Philosophy and Africa</td>
<td>5</td>
</tr>
<tr>
<td>248. The Caribbean-Americas: An Introduction to their Literature and Thought</td>
<td>5</td>
</tr>
<tr>
<td>251. The Afro-Hispanic World: An Introduction History 148C. Africa in the 20th Century</td>
<td>5</td>
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</table>
Many students in the program are double majors. Over the years, students have found that continuing a major in one field with a strong concentration 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 core courses (25-30 units) should be taken. In addition, 25-30 units from various departmental offerings must be chosen. The total number of units required for a double major in this field is, therefore, 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 the student to synthesize several of the skills he or she has acquired and to produce a document or project demonstrating some measure of competence in the student's 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 which brings together faculty and students for research on an intensive, individual basis. In 1990, 26 students were placed with 17 professors in a variety of fields. Each student receives a research stipend and a certificate upon completion of 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 that was made to advertise the program is available for viewing by interested applicants. 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 (Osumare)

78. Uniquely Human: Rethinking "Race," Rethinking "Culture" 5 units, Win (Wynter)

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*)

3 units, not given 1993-94

114. Africa and the Black Diaspora: An Introduction to its Literature, Thought, and Cultural Worlds — The parallelisms and differences in the literature, thought, and cultural worlds of contemporary Africa and of the African-descended communities in the New World, i.e., the U.S., Brazil, Spanish-speaking Latin America, and the Caribbean. (DR:2*)

5 units, Win (Wynter)

115. Africa and Philosophy, Philosophy and Africa: Introduction to a Polemic — Introduces an ongoing dispute between African intellectuals. Which political "philosophy" (liberal humanism or Marxism-Leninism in its African variants, or a resurgent Islamic fundamentalism) best serves a viable contemporary Black African civilization? If not one of these, what then? (DR:2*)

5 units, not given 1993-94


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, Win (Gibbs)

127. Professional Development for Minority Engineers — (Same as Engineering 7.) The role of, and opportunities available to, Blacks in engineering and other technical fields, emphasizing the relationship between technological development and opportunities for Black and Third World communities.

2 units, Spr (Bates)


5 units (Porter) not given 1993-94

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

3-10 units, Aut, Win, Spr (Staff)

2 units, Aut, Win, Spr (Staff)

248. The Caribbean-Americas: An Introduction to Their Literature, Thought, and Cultural Worlds — (Same as Spanish 248, English 262.) Literature, thought, and popular culture of the Caribbean Basin area within the context of an overview of its multiple cultural and linguistic worlds.

3-5 units (Wynter) not given 1993-94

249. Afro-Iberian-American Literature and Thought — (Same as Spanish 249.) Overview of the literature and thought of the Afro-Iberian Americas, i.e., the Spanish and Portuguese-speaking countries of the Caribbean. Introduction to the popular cultural forms of these worlds (music, dance, carnival), oral poetry-narrative and the interaction between popular and “formal” literature and art, identifying the perspective unique to the emergent worldview of this area.

3-5 units, not given 1993-94

251. Afro-Hispanic Literature and Thought: An Introduction — (Same as Spanish 251.) Literature and thought of Black Latin American writers in the Spanish-speaking Americas and Brazil. Introduction to the popular syncretic cultures of these interesting but little known worlds. Readings in Spanish, Portuguese, and in English translations.

3-5 units (Wynter) not given 1993-94

291. “Race,” Discourse, and the Origin of the Americas: A New World View of 1492 — (Same as Spanish 291.) Examines the Event of 1492 and the prelude voyage of the Portuguese around Cape Bojador to W. Africa, which constitutes the formation of a new legitimating basis for structures of New World societies. Analysis of juridico-theological, historical, and literary texts, from the perspective of the Americas; attempts to decipher the politics of representation in the orthodox interpretation of Columbus’ discovery and to deconstruct the strategies whereby a symbolic construct of “race” (in a Natural Law variant) would take primary place in the New World instead of the “gender” construct of previous human societies. (In English)

5 units (Wynter) not given 1993-94

OFFERINGS IN OTHER DEPARTMENTS

See respective department listings for course descriptions and Distribution Requirement (DR) information.

ANTHROPOLOGY

15. Anthropological Perspectives on American Culture — (Same as Education 116X.)

3-5 units (Staff) not given 1993-94


5 units, Aut (Gibbs)

108B. Africa: Gender and Representation

5 units (Ebron) not given 1993-94

130. Film Images of African-American Culture — (Same as African and Afro-American Studies 122.)

5 units, Win (Gibbs)

234. Seminar on African Law

5 units (Gibbs) not given 1993-94

DANCE

182. Jazz Dance II

1 unit, Aut, Win, Spr (Osumare)

183. Jazz Dance III

1 unit, Win (Osumare)

185. African-Caribbean Roots of American Jazz Dance

2 units, Aut (Osumare)

186. African-Caribbean Dance Technique

2 units, Spr (Osumare)

DRAMA

5. Introduction to Black American Drama

4 units (Elam) given 1994-95
29. Theater Performance: Acting  
1-3 units, any quarter (Staff)

39A,B,C. Theater Performance: Crew  
1-3 units, any quarter (Staff)

155. American Drama, 1960 to the Present  
4 units (Elam) given 1994-95

157. Contemporary Black Playwrights  
4 units (Elam) given 1994-95

ECONOMICS

118. The Economics of Development — Prerequisite: Economics 51.  
5 units, Spr (Kochar)

ENGLISH

161A. Afro-American Writings, 1950-1970  
5 units, Aut (Drake)

163A. Literacy Foremothers: African-American Literacy History, 1830 to Present  
5 units, Spr (Holland)

187A. Seminar: Poetry and Politics: Black Women Write  
5 units, Win (Holland)

187E. Seminar: Afro-American Auto-Biography  
5 units (Porter) not given 1993-94

FOOD RESEARCH INSTITUTE

103. The World Food Economy — (Same as Economics 106.)  
4 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)

HISTORY

147S. Introductory Seminar: Ethnicity and Violence in South Africa — The Historical Background  
3 units, Aut (Staff)

147C. Introduction to the Social History of South Africa  
5 units, Aut (Larson)

148. Introduction to African History  
5 units, Win (Jackson)

148C. Introduction to Modern African History  
5 units, Win (Larson)

149. Africa since 1935  
5 units, Spr (Jackson)

246A. Undergraduate Colloquium: African History and African Novel  
5 units, Win (Jackson)

246B. Undergraduate Colloquium: Mau-Mau Uprising — Kenya in the 1950s  
5 units, Aut (Jackson)

246S. Senior Research Seminar: East Africa in Transition 1880s-1920s  
5 units, Win (Jackson)

247A. Undergraduate Colloquium: African Identity in a Changing World  
3-5 units, Win (Roberts)

248A. Undergraduate Colloquium: Slavery in Comparative World Perspective  
5 units, Spr (Larson)

249C. Undergraduate Colloquium: Ethnicity in African History  
5 units, Win (Larson)

LINGUISTICS

73. African American Vernacular English  
4 units, Win (Green, Rickford)

150. Introduction to Sociolinguistics  
4-6 units, Aut (Rickford)

153. Inter- and Intra-Ethnic Variations in Urban Vernacular English  
4 units (Green, Rickford) not given 1993-94

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, Win (Johnson)

POLITICAL SCIENCE

118A. Political Change in Tropical Africa  
5 units, Spr (Abernethy)

118B. The Politics of Race and Class in Southern Africa  
5 units (Abernethy) given 1994-95

181. African-Americans and the Political System  
5 units, Spr (Barker)

PSYCHOLOGY

127. African American Psychology  
3 units, Spr (McCants)

PORTUGUESE

3-5 units, Win (Carvalho)
AFRICAN STUDIES

Emeriti: Raymond D. Giraud (French and Italian), Joseph H. Greenberg (Anthropology and Linguistics), Bruce F. Johnston (Food Research Institute), William O. Jones (Food Research Institute)

Chair: Richard Roberts (History)

Professors: David B. Abernethy (Political Science), Jean-Marie Apostolidès (French and Italian), Paul F. Basch (Medicine), Russell Berman (Comparative Literature), Joan Bresnan (Linguistics), Martin Carnoy (Education), Walter P. Falcon (Food Research Institute), Carl Gotsch (Food Research Institute), James Lowell Gibbs, Jr. (Anthropology), William B. Gould (Law), William R. Leben (Linguistics), Scott R. Pearson (Food Research Institute), Hans N. Weiler (Education and Political Science), Sylvia Wynter (Spanish and Portuguese), Pan A. Yotopoulos (Food Research Institute)

Associate Professors: Sandra E. Drake (English and Comparative Literature), Kennell A. Jackson, Jr. (History), Horace A. Porter (English, and African and Afro-American Studies), Francisco O. Ramirez (Education), Richard Roberts (History)

Assistant Professors: Paulla A. Ebron (Anthropology), Marcel Fafchamps (Food Research Institute), Akhil Gupta (Anthropology)

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 Rozkuszka (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 (e.g., Anthropology, History, Political Science, etc.). 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 advisor and two other faculty members, the student can plan a program of study focused on Africa which 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:
AFRICAN STUDIES 235

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 which 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

AFRICAN AND AFRO-AMERICAN STUDIES


5 units (Staff) not given 1993-94

114. Africa and the Black Diaspora: An Introduction to Its Literature, Thought, and Cultural Worlds — (Enroll in African and Afro-American Studies 114.) The parallelisms and differences in the literature, thought, and cultural worlds of contemporary Africa and of the African-descended communities in the New World, i.e., the U.S., Brazil, Spanish-speaking Latin America and the Caribbean. DR:2(*)

5 units, (Wynter)

115. Africa and Philosophy, Philosophy and Africa: Introduction to a Polemic — (Enroll in African and Afro-American Studies 115.) Introduces an ongoing dispute between African intellectuals. Which political “philosophy” (liberal humanism or Marxism-Leninism in their African variants, or a resurgent/Islamic fundamentalism) best serves a viable contemporary Black African civilization? If not one of these, what then? DR:2(*)

5 units, not given 1993-94

ANTHROPOLOGY

6. Human Origins — (Enroll in Anthropology 6, Human Biology 106.) The human fossil record from the first nonhuman primates in the late Cretaceous or early Paleocene, 80-65 million years ago, to the anatomically modern people in the late Pleistocene, 100,000-50,000 B.C. Emphasis is on broad evolutionary trends and on the natural selective forces behind them. DR:5(7)

5 units, Win (Klein)

11C. Gender in Cross-Cultural Perspective — (Enroll in Anthropology 11C, 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. Asks 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:2(*) or 9f(5)*

5 units, Win (Ebron)

108. African Societies in a Changing World — (Enroll in Anthropology 108.) Lectures, discussions, 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 pat-
terms, art, shifts in patterns of marriage and family life, the emergence of new classes, and the impact of Islam and Christianity. DR:2(*) or DR:9(5*)

5 units, Aut (Gibbs)

108B. Africa: Gender and Representation—(Enroll in Anthropology 108B, 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 1993-94

155. Food Production, Poverty, and Famines—(Enroll in Anthropology 155.) Widespread and long-lasting famine in Africa has shown that new technologies for the production of food and modern transportation have not by themselves eradicated hunger in the world. The distribution of food in its complex relationship with production, focusing on the paradox of poverty amidst plenty, the long-term ecological consequences of new agricultural technology, and the factors that lead to famine. Materials from different areas, emphasizing Africa and South Asia. DR:9(5)

5 units (Gupta) not given 1993-94


5 units (Gibbs) not given 1993-94

243. Culture as Commodity—(Enroll in Anthropology 243.) Graduate seminar focusing on theories of commodification, interests in tourism, national cultures as marketable objects, and how identities are constituted through production and consumption. Formation of global style and taste.

5 units, Spr (Ebron)

DANCE


2 units, Aut (Osumare)

186. African-Caribbean Dance Technique—(Enroll in Dance 186.) Based on the Katherine Dunham technique which utilizes traditional African diasporic dance forms and contemporary modern dance. Studio work amplified by lectures/readings.

2 units, Spr (Osumare)

EDUCATION

206A. Introduction to the Study of International Development Education—(Enroll in Education 206A.) Theoretical orientations and the research agenda in international development education and resources for study and research at Stanford. Prerequisite: consent of instructor.

1 unit, Aut (Weiler) M 12 and by arrangement


5 units, Aut (Carnoy) TTh 2:15-4:05 and by arrangement

306D. Sociology of Development and Education—(Enroll in Education 306D, 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.

5 units, Spr (Ramirez) TTh 2:15-4:05 and by arrangement

ENGINEERING

297A,B,C. Ethics of Development in a Global Environment (EDGE)—(Enroll in 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 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 are from Stanford and other institutions and are experts who directly deal with world policy makers through research and advisory activities.

1-4 units, Aut, Win, Spr (Packenham, Lusignan) lecture W 7:30-9:30 p.m., workshops by arrangement
FOOD RESEARCH

103. The World Food Economy — (Enroll in Economics 106, 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.
4 units, Win (Falcon, Naylor) TTh 1:15-3:05

121. Development and Population Interactions in the Third World — (Enroll in Economics 119/219, Food Research 121.) 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) MW 1:15-3:05

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

149/249. Economic Development in Africa — (Enroll in Food Research 149/249, Economics 125.) Economic development issues in Africa, emphasizing the sub-Saharan region. Topics: economic history, development strategies, institutional change, agricultural policies and technology, environmental degradation, informal sector industrialization, external debt, and structural adjustment.
5 units, Aut (Staff) TTh 1:15-3:05

FRENCH AND ITALIAN

186. Contemporary Francophone Literature: Africa, Caribbean — (Graduate students register for 269D.) Authors: Simone Schwartz Bart, Césaire, Driss Chraibi, Maryse Condé, Mohamed Dib, Camara Laye, Sembene Ousmane, and Senghor. (In French)
4 units (Apostolidès) not given 1993-94

HEALTH RESEARCH AND POLICY

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 the instructor.
2-4 units, Spr (Basch) Th 1:15-3:05

HISTORY

47S. Introductory Seminar: Ethnicity and Violence in South Africa — The Historical Background — (Enroll in History 47S.) Examines historical background of ethnicity and violent political conflict in contemporary South Africa by looking at theory and the history of formation of ethnic consciousness in S. Africa, the historical approach of important black political movements to issues of ethnicity, and the recent political violence. Focuses on Natal region and Zulu ethnic groups.
5 units, Aut (Staff) Th 1:15-3:05

48S. Introductory Seminar: Slavery in Precolonial Africa — (Enroll in History 48S.) The main historical and anthropological debates animating the study of slavery in Africa. Topics: origins of indigenous African slavery, the volume of the Atlantic slave trade and its impact on African societies during the early colonial period, and the consequences of abolition. Students analyze the use and limitations of travelers’ accounts, slave narratives, personal diaries, parliamentary debates, etc., as they relate to themes and issues.
5 units, Win (Staff) W 2:15-4:05

147C. Introduction to the Social History of South Africa — (Enroll in History 147C.) Social themes in the making of modern South Africa, emphasizing oral history, personal testimony, and gendered experience. Khoisan and Cape society, Xhosa and European interactions in the Eastern Cape, transformations in the Zulu kingdom, the creation of an Afrikaner identity, social and cultural life on the Rand mines, transformations in African agriculture, themes of rural and urban resistance, the social and health impact of apartheid, popular culture and popular struggle since the 1960s.
5 units, Aut (Larson) MTWTh 9

148. Introduction to African History — (Enroll in History 148.) African history from ancient Africa to the 1990s, from ancient societies, e.g., Egypt, to the democracy movement. What is history in Africa and how Africans see their past.
5 units, Win (Jackson) MTWTh 9

148C. Introduction to Modern African History — Central themes in the history of Africa, emphasizing social transformations in the 19th and 20th centuries. The slave trade and its impact on Africans and African societies, international commodity trade and socioeconomic transformations, European im-
perialism, the scramble for Africa, colonial administrative and economic systems, patterns of African resistance, nationalism, and independence. DR:2(*)

5 units, Win (Larson) MTWTh 11

149. Africa since 1935—(Enroll in History 149.)
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 1993-94

149A. East Africa in History—(Enroll in History 149A.)
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, Spr (Jackson) MTWTh 9

246A. Undergraduate Colloquium: African History and the African Novel
5 units (Jackson) not given 1993-94

246B. Undergraduate Colloquium: Mau-Mau Uprising—Kenya in the 1950s—(Enroll in History 246B.)
5 units, Aut (Jackson) T 2:15-4:05

246S. Senior Research Seminar: East Africa in Transition—1880s-1920s
5 units (Jackson) not given 1993-94


3-5 units (R. Roberts) not given 1993-94

Oral histories in Africa and how they can be assembled in field research. With stress on women’s history.

5 units, Win (Jackson) W 2:15-4:05

248A. Undergraduate Colloquium: Slavery in a Comparative World Perspective—(Enroll in History 248A.) Explorations in slavery worldwide, the problem of defining slavery, the characteristics of slave societies, the variety of slave settings, slavery in ancient societies, debates on slavery and capitalism, varieties of master-slave relationships, women and slavery in diverse societies, variations in the development of slave sub-cultures, varieties of resistance and revolt, the several paths in the transformation from slave to free labor.

5 units, Spr (Larson) T 2:15-4:05

249C. Undergraduate Colloquium: Ethnicity and African History—(Enroll in History 249C.) Explorations in an engaging and emerging field of scholarship. Theories of ethnicity, their use and abuse by Africanist scholars, studies of ethnicity and pre-colonial economic transformations, early statebuilding, slavery and the slave trade, literacy, education, and missions, the controversy over the “creation” of tribalism, anthroplogy and African ethnicity, ethnicity and political mythologies, ethnicity and gender. The elaboration, transformation, and “death” of ethnic identities as an ongoing process influenced by local as well as international historical forces which vary geographically and temporarily.

5 units, Win (Larson) T 2:15-4:05

347B. Graduate Core Colloquium: African History—The Colonial Period—(Enroll in History 347B.)
5 units, Spr (R. Roberts) Th 2:15-4:05

348A. Graduate Colloquium: Comparative Slavery—(Enroll in History 348A.)
3-5 units, Spr (Larson) Th 2:15-4:05

349. Graduate Core Colloquium: Precolonial Africa
5 units (R. Roberts) not given 1993-94

349B. Graduate Colloquium: African Social History Workshop
1 unit (R. Roberts) not given 1993-94

349C. Graduate Colloquium: Ethnicity in African History—(Enroll in History 349C.)
3-5 units, Win (Larson) T 2:15-4:05

5 units (Jackson) not given 1993-94

5 units, Win (Jackson) W 2:15-4:05

449. Graduate Seminar: Colonial State and Society in Africa—(Enroll in History 449.)
5 units (R. Roberts) not given 1993-94

LINGUISTICS

602A,B,C. Beginning Hausa—(Enroll in Linguistics 602A,B,C.)
602A. 4 units, Aut (Staff)
602B. 4 units, Win (Staff)
602C. 4 units, Spr (Staff)

606A,B,C. Beginning Swahili—(Enroll in Linguistics 606A,B,C.)
606A. 4 units, Aut (Mugane)
606B. 4 units, Win (Mugane)
606C. 4 units, Spr (Mugane)
AFRICAN STUDIES

607A. 4 units, Aut (Mugane)
607B. 4 units, Win (Mugane)
607C. 4 units, Spr (Mugane)

608A,B,C. Advanced Swahili — (Enroll in Linguistics 608A,B,C.)
608A. 4 units, Aut (Mugane)
608B. 4 units, Win (Mugane)
608C. 4 units, Spr (Mugane)

613A,B,C. Intermediate Wolof — (Enroll in Linguistics 613A,B,C.)
613A. 3 units, Aut (Diame)
613B. 3 units, Win (Diame)
613C. 3 units, Spr (Diame)

615A,B,C. Intermediate Shona — (Enroll in Linguistics 615A,B,C.)
615A. 3 units, Aut (Staff)
615B. 3 units, Win (Staff)
615C. 3 units, Spr (Staff)

618A,B,C. Beginning Zulu — (Enroll in Linguistics 618A,B,C.)
618A. 3 units, Aut (Staff)
618B. 3 units, Win (Staff)
618C. 3 units, Spr (Staff)

620A,B,C. Beginning Arabic — (Enroll in Linguistics 620A,B,C.)
620A. 4 units, Aut (Barhoum)
620B. 4 units, Win (Barhoum)
620C. 4 units, Spr (Barhoum)

621A,B,C. Intermediate Arabic — (Enroll in Linguistics 621A,B,C.)
621A. 4 units, Aut (Barhoum)
621B. 4 units, Win (Barhoum)
621C. 4 units, Spr (Barhoum)

622A,B,C. Advanced Arabic — (Enroll in Linguistics 622A,B,C.)
622A. 4 units, Aut (Barhoum)
622B. 4 units, Win (Barhoum)
622C. 4 units, Spr (Barhoum)

POLITICAL SCIENCE

118B. The Politics of Race and Class in Southern Africa — (Enroll in Political Science 118B.) The political history of the region’s ten countries, emphasizing relations among racial and ethnic groups. Diplomatic, economic, and military interactions among these states, and 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 DR:9(5*)
5 units, Spr (Abernethy)

227D. Seminar: Consolidating Democracy — (Enroll in Political Science 227D.) 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, Spr (Diamond)

PORTUGUESE

191. Lusophone African Literature in Translation: Angola — Introduction to African culture and oral literature as developed in the Portuguese-speaking countries. Examines the discourse of a transcultural society and the concepts of angolanidade, colonial vs. national literature, anticolonial resistance, urban/rural, post-independence, and the reenchantment of the traditional indigenous culture as shown in myth, humor, philosophy, and criticism.
3-5 units, Win (Carvalho)

3-5 units, Spr (Carvalho)
AMERICAN STUDIES

Administrative Committee: (Chair) Jay Fleigelman (English); Lucius J. Barker (Political Science), Barton Bernstein (History), Albert Camarillo (History), Joseph Corn (American Studies Program Coordinator), Wanda Corn (Art), George Fredrickson (History), Albert Gelpi (English), Richard Gillam (American Studies Program Coordinator, on leave Autumn) Horace A. Porter (English, African and Afro-American Studies), Jack Rakove (History), Karen Sawislak (History), Gavin Wright (Economics)

The American Studies Program is administered through the Department of Humanities Special Programs.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

Note — Students who declared an American Studies major before September 1991 may complete the major under either the old or new guidelines.

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 upon 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 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. This specialization may be obtained from the program administrator.

Optional Specialization in Race and Ethnicity — Students who take at least five approved race and ethnicity courses will graduate with an American Studies specialization in race and ethnicity. This will be noted on the final undergraduate transcript.

HONORS PROGRAM

Majors with a letter-grade indicator (LGI) of 3.5 or higher in American Studies may apply, preferably during the junior year and no later than the second week of the third full quarter before graduation, to see 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 Administrative Committee 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 that are open to majors, whether 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.

CORE LECTURES

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, Aut (Fliegelman)

151. The Transformation of American Thought and Culture, 1865 to the Present—
(Same as History 163A.) 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 upon 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, Spr (Gillam) not given 1993-94

152. Introduction to Material Culture —
(Same as History 152; Science, Technology, and Society 124.) 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)

159. 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. 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 developments during the past two centuries. DR:3
5 units, Spr (Camarillo, Fredrickson)

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 THE AMERICAN CHARACTER

200. The American Character—
(Same as History 260A.) Required for American Studies major. Analysis of changing interpretations of American character and “Americanness” since the 17th century. DR:3
5 units, Aut (J. Corn)
Spr (Gillam)

ANTHROPOLOGY

130. Film Images of African-American Culture
5 units, Win (Gibbs)

ART

130B/230B. American Art between the Wars
5 units, Win (W. Corn)

130D/230D. American Art Since 1960
4 units, Spr (Nemerov)

130F/230F. Romantic Landscape Painting in America, 1825-1875
4 units, Aut (Nemerov)

232A. Seminar: The Art of the Old West—Fulfills “second seminar” requirement.
4 units, Aut (Nemerov)

232B. Colloquium: Contemporary Cultural Criticism—Fulfills “second seminar” requirement.
4 units, Win (Nemerov)
COMPARATIVE LITERATURE

169B. Readings in the Asian American Novel
5 units, Aut (Palumbo-Liu)

196. Modern Chicano/a Fiction — (Same as English 163D.)
4-5 units, Aut (Espinosa)

DRAMA

65. American Musical Theater
4 units, Win (Eddelman)

ENGLISH

112. Masterpieces of American Literature
5 units, Win (Solomon)

124C. Introduction to Chicano Life and Culture — (Same as Anthropology 110, Chicano Studies 110, Political Science 92, Spanish 281.)
5 units, Aut (Saldívar, Fraga)

126. 20th-Century American Fictions — (Same as Comparative Literature 126.)
5 units, Win (Saldívar)

156. American Poetry since 1945: Neoromanticism and Postmodernism
5 units, Win (A. Gelpi)

161A. Afro-American Writing, 1950-1970
5 units, Aut (Drake)

163A. Literary Foremothers: African-American Literary History, 1830-Present — (Same as Chicano Studies 163, Spanish 183.) Students should have some knowledge of Spanish.
5 units, Spr (Holland)

163C. Chicana Writers and Feminist Theory
5 units, Spr (Romero)

168A. 20th-Century American Indian Writing
5 units, Spr (Warrior)

168B. Modern Southern Writers
5 units, Win (A. Gelpi)

175. Henry James
5 units, Spr (Dekker)

186A. Seminar: Emerson and Whitman — Writing and Reception — Fulfills “second seminar” requirement.
5 units, Spr (Grossman)

186B. Seminar: American Realism and Naturalism — Fulfills “second seminar” requirement.
5 units, Aut (Solomon)

5 units, Win (Romero)

5 units, Win (Holland)

5 units, Spr (Sorrentino)

5 units, Spr (Grossman)

4-5 units, Win (Warrior)

4-5 units, Win (Solomon)

229A. Colloquium: Death and the Grotesque in Native and African-American Literature — Fulfills “second seminar” requirement.
4-5 units, Spr (Holland)

FEMINIST STUDIES

5A. Feminist Issues in 20th-Century American Music
3-5 units, Spr (Kozak)

MUSIC

8. Religions in America
4 units, Spr (Busto)

163. Religion and Ethnicity
5 units, Aut (Busto)

4 units, Spr (Busto)

276. Topics in Race and Religion — Fulfills “second seminar” requirement.
4 units, Win (Busto)

AMERICAN SOCIAL ORGANIZATION AND BEHAVIOR

AMERICAN STUDIES

120. The Process and Practice of Community Service — Seminar combines theoretical and hands-on approaches. Weekly readings, research, speakers, and discussions generate the ability to identify accurately community needs, examine issues surrounding public service, and provide opportunities to initiate and participate in public service
projects. Participants spend additional one to two hours a week in community service.

4 units, Aut (J. Cohen)

152. Introduction to Material Culture — (Same as History 152; Science, Technology, and Society 124.) See “Core Lectures.”

5 units, Spr (J. Corn)

179. Introduction to American Law — (Same as Law 106, Political Science 182F.) See “Core Lectures.”

5 units, Aut (Friedman)

214. The American 1960s: Thought, Protest and Culture — (Same as History 262.) Fulfills “second seminar” requirement.

5 units, Win (Gillam)

ECONOMICS

116. American Economic History

5 units, Aut (Wright)

HISTORY

59S. Introductory Seminar: American Society and Culture in the 1950s — Fulfills “second seminar” requirement.

5 units, Aut (Staff)


5 units, Win (Staff)

61S. Introductory Seminar: Social Movements of the 1960s in California — Fulfills “second seminar” requirement.

5 units, Spr (Staff)

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 (radio, scientific management).

4-5 units, Win (J. Corn)

165A. Colonial and Revolutionary America — Required for the American Studies major.

3 units, Aut (Rakove)

165B. 19th-Century America — Required for the American Studies major.

5 units, Win (Tobin)

165C. 20th-Century America

5 units, Spr (Kennedy)

172A. America since 1945

4-5 units, Win (Bernstein)

251A. Undergraduate Colloquium: Poverty and Homelessness — Fulfills “second seminar” requirement.

5 units, Win (Camarillo)

252S. Senior Research Seminar: Museums and History — Fulfills “second seminar” requirement. How museums and historic sites have interpreted the past. Examines 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.

5 units, Aut (J. Corn)

253S. Senior Research Seminar: Museum Practicum — Fulfills the “second seminar” requirement. Supervised curatorial work on exhibition at local museum. Prerequisite: History 252S or equivalent and consent of instructor.

1-3 units, Win (J. Corn)


5 units, Spr (Rakove)


5 units, Spr (Rakove)

SCIENCE, TECHNOLOGY, AND SOCIETY

101. Science, Technology, and Contemporary Society — Analysis of the interplay of science, technology, and society in contemporary U.S. Topics: key social, cultural, and values issues raised by scientific and technological developments on 20th-century society; transformations and problems of work, leisure, human values, and international relations; ethical conflicts in scientific and engineering practice; and science, technology, and public policy.

4-5 units, Aut (McGinn)

SOCIOMETRY

169. Gender and Organizations

5 units, Win (Staff)

AMERICAN POLICY AND INSTITUTIONS

AMERICAN STUDIES

179. Introduction to American Law — (Same as Law 106, Political Science 182F.) See “Core Lectures” above.

5 units, Aut (Friedman)
COMMUNICATION

1. Mass Communication in Society
   5 units, Aut (Glasser)

110. Communication and Law
   5 units, Win (Cohen)

125. Perspectives on Journalism — Prerequisite: 1 or junior standing.
   4 units, Aut (Glasser)

POLITICAL SCIENCE

1. Major Issues of American Public Policy
   5 units, Win (Brady)

10. American National Government
   5 units, Aut (Maisel)

60. The American Dream
   5 units, Win (Manley)

61. American Political Thought
   5 units, Win (Manley)

101P. Politics and Public Policy — (Same as Public Policy 101.)
   5 units, Spr (Brady)

   5 units, Aut (Fraga)

170. Judicial Politics and Constitutional Law:
      Interpreting the Constitution
   5 units, Aut (Tunick)

171. Judicial Politics and Constitutional Law:
      Civil Liberties
   5 units, Win (Barker)

186K. American Education and Public Policy —
      (Same as Education 105, History 158B.)
   3 units, Aut (Kirst, Tyack)

292A. Seminar: American Political Institutions
      — Fulfills the “second seminar” requirement.
   5 units, Aut (Rivers)

292B. Seminar: Introduction to Political Behavior
      — Fulfills the “second seminar” requirement.
   5 units, Win (Sniderman)

292C. Seminar: American Political Institutions
      — Fulfills the “second seminar” requirement.
   5 units, Spr (Moe)

INDIVIDUAL WORK

195. Directed Research
   3-5 units (Staff) by arrangement

199. Directed Reading
   2-5 units (Staff) by arrangement

250. Honors Project — Prerequisite: consent of department chair.
   5-15 units, any quarter (Staff)

ANTHROPOLOGY


Chair: George A. Collier


Associate Professors: James A. Fox, Joan H. Fujimura, John W. Rick

Assistant Professors: Carol L. Delaney, Paulla Ebron, Akhil Gupta (on leave), Purnima Mankekar (Spring)

Lecturers: Hill Gates, Andrea Klimento, Joel Strecker

Acting Assistant Professors: Maidie R. Golan, Lori D. Hager

Consulting Assistant Professor: Dominique Irvine

Visiting Assistant Professor: Smadar Lavie

Affiliated Faculty: Shirley Brice Heath (English), Susan Cashion (Dance Division), Raymond McDermott (School of Education), Thomas P. Rohlen (School of Education), Eduardo J. Viola (Latin American Studies)

Teaching Fellows: Deborah Amory, Jared Braiterman, Susan Charnley, Donald Moore

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 programmatic 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. Course work 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 and should be available by the end of Autumn Quarter.

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. Keessing 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 (e.g., classics) are advised to petition for an Individualy Designed Major.

To declare the major a student must fill out the Declaration of Major form in the Registrar's Office, 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 fulfillment of 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 sopho-

more 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 (15, 102-126); (2) Social and Cultural Anthropology (7-18, 128-169); (3) Linguistic Anthropology (4, 5, 16, 171-178); (4) Archaeology (3, 182A, 185, 187); (5) Biological Anthropology (6, 16, 180B, 180C, 181, 194). 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 socio-cultural anthropology such as health and nutrition, gender studies, economic development, symbolic systems, or a particular culture area. Students must have their areas of concentration approved by their advisers. Finally, anthropology majors are urged to take a field work course in archaeology, socio-cultural anthropology, or museum methods and to
enroll in at least one departmental 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 bi-weekly 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 “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 “Degrees" section of this bulletin and consult with the student program coordinator in the department. Other prospective students should request application materials from the Graduate Admission Section, 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 and are considered for matriculation only in Autumn Quarter.

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. degree should apply directly to the Ph.D. program.

Graduate enrollment at Stanford for at least three quarters of full tuition is required of all candidates for the master’s degree, including coterminal students. A.M. students in anthropology must take a minimum of 45 quarter units in anthropology beyond the undergraduate degree with a letter grade indicator (LGI) of ‘B’ or better in each course. Thirty-six of those units, which comprise the University minimum for the A.M. degree, must be at or above the 100-level, and 18 of the 36 must be in courses designated primarily for graduate students (typically at least at the 200 level). The Department of Anthropology further requires at least 15 additional units of anthropology, taken at Stanford or elsewhere, constituting a minimum total of 60 units in anthropology. At the discretion of the department, the 15 additional units may have been taken in fulfillment of the undergraduate degree. Within the 45 units taken at Stanford, students must take one quarter (5 units) of History of Anthropological Theory, 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 the Graduate Admission Section, Registrar’s Office. Applicants must file a report of their scores on the Graduate Record Examination and submit a writing sample in English which demonstrates 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. requirements for students matriculating beginning 1992 are as follows (those matriculating earlier should consult the departmental Guide through the Ph.D. Program for their cohort):

1. Pass within the first year, at an acceptable graduate level:
   a) three of the graduate-level courses in Anthropology designated by the faculty as evaluation courses, including History of Anthropological Theory;
   b) Anthropological Research Methods (Anthropology 289, Winter); and
   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, 2 units per quarter).

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 courses in the department;
   b) the Proposal Writing Seminar (Anthropology 294, Spring); 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 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 upon 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 programmatic area under the degree guidelines described in previous sections above. Guidelines and curriculum for the doctoral program will be available for prospective applicants in Autumn, 1993-94. If the program is approved, applications will be accepted January 1, 1994 for doctoral study beginning in September 1994.
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 serving 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 fellowship, 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, Win (Befu) 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)

4. Language and Culture of Urban Youth — (Same as Linguistics 154, Urban Studies 161.) 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. Micro and case study approaches parallel macro-level methods for the study of urban youth (Public Policy/Urban Studies/Education 110X) given 1994-95.
   5 units, Win (Heath)

5. Biology and Evolution of Language — (Same as Human Biology 113, Linguistics 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 the vocal tract, ear, and brain, with associated disorders (stuttering, dyslexia, autism, schizophrenia) and therapies. Controversies over language "centers" in the brain and the innateness of language acquisition. Vision, color terminology, and biological explanation in linguistic theory.
   4-5 units (Fox) not given 1993-94
6. Human Origins — (Same as Human Biology 6.)
The human fossil record from the first nonhuman primates in the late Cretaceous or early Paleocene, 80-65 million years ago, to the anatomically modern people in the late Pleistocene, between 100,000 and 50,000 B.C. Emphasis is on the broad evolutionary trends and on the natural selective forces behind them. DR 5:(7)
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: 9t(5)
5 units (Delaney) not given 1993-94

8,9,10. Origins, Encounters, Identities — This sequence fulfills the Cultures, Ideas, and Values requirement. It explores how culture, language, and civilization have arisen, how peoples have understood and preserved insights from their past, how they have interacted in the context of imperial and colonial expansion, and how they have understood and construed nature, humankind, and their place within the cosmos as groups and individuals. Meets two hours per week in lectures and three hours per week in small group discussion. Ten units are applicable to the major in Anthropology. Enrollment limited, with priority to those applying the sequence to the Area 1 requirement.

8. Origins: Prehistory, Myth, and the Notion of the Primitive — Approaches to inferring human origins and interpreting people's explanations of their own and others' origins. Physical, linguistic, and comparative cultural evidence about the evolution and dispersion of humans in relation to the origins of Old and New World civilizations and the development and role of literacy in political and cultural systems. Myths and the narratives of origin, including evolution 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: 2t(*) or 9t(5)*
5 units, Win (Ebron)

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 shifted from 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)

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: 2t(*)
5 units, Win (Ebron)

12. Introduction to Feminist Studies: Issues and Methods — Understanding the creation and perpetuation of gender inequality. Topics: feminist theory, the family, gender and work, sexuality, the politics of reproduction, domestic violence, and women's culture. Examples from non-western societies illuminate the cultural and historical construction of gender in western society. DR: 2t(5)
5 units, Win (Ebron) not given 1993-94

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 1993-94

15. Anthropological Perspectives on American Culture — Convergence and divergence in values, lifestyles, and psychocultural attributes are analyzed for mainstream, minority, and variant cultural patterns. Processes of boundary maintenance and identity reference. Current social movements in the perspective of counter-culturalism, marginality, and cultural change. Field studies of relevant phenomena are encouraged. DR:3 or DR:9(5)

3-5 units (Staff) not given 1993-94

16. Living and Fossil Primates — The variety of living and fossil primates. Dietary strategies, locomotory patterns, and social structures of living primates. Evolutionary history of primates, e.g., the primate fossil record. Because nonhuman primate patterns are used to model the behavior of early humans, explores the gendered stereotypes present in the study of primates and how these data are used to promote similar stereotypes in our own evolutionary history. DR:5(7)

5 units (Hager) not given 1993-94

17. Astronomy and Culture — Cross-cultural historical examination of a variety of astronomical 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 1993-94

18. Writing and Literacy — (Same as Linguistics 16.) Introduction to the origins, evolution, and diffusion of writing, its relationship to speech, and its roles 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 1993-94

SPECIAL

71. Linguistic Field Methods — (Same as Linguistics 80.) 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 1993-94

73A, B, C. First-Year Spoken Yucatec Maya — For beginners. Introduction to the language of the Maya of Yucatán, Mexico. Emphasis on modern spoken Yucatec, with some attention to colonial and pre-Columbian writings.

3 units, Aut, Win, Spr (Fox) by arrangement

74. Intermediate Yucatec Maya

3 units (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. Concentrates on Karl Marx, Emile Durkheim, and Max Weber, along with particular anthropological analyses of nonwestern societies. Writing focus course. Enrollment limited to 20.

5 units, Win (Rosaldo) Spr (J. Collier)

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 (Yanagisako)

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 and 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 undergraduates at special needs, and showing capacity to do independent work. Prerequisite: 1 or consent of instructor.  
   any quarter (Staff) by arrangement

99/199. Honors/Masters Writing Workshop — (Graduate students register for 199.) For students in the process of writing honors 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 (Golan)

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 pre-contact situation, post-contact 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 1993-94

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, Spr (Barnett, Rick)

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 1993-94

105. Introduction to African and Afro-American Studies — (Same as African and Afro-American Studies 105.) Introduces African and Afro-American Studies as an inter-disciplinary 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 aspect of Afro-American literature and art. Possible readings: Maya Angelou, James Baldwin, Frederick Douglass, W. E. B. DuBois, Bell Hooks, Harriet Jacobs, Alice Walker, Booker T. Washington, Richard Wright, and Malcolm X. Focus of course may vary each year. DR:3(*)  
   5 units, not given 1993-94

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 1993-94

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, Aut (Gibbs)

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 1993-94

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)

110. Introduction to Chicano Life and Culture — (Same as English 124C, Political Science 92, Spanish 281, Chicano Fellows 110.) Interdisciplinary focus on the history and culture of Mexican Americans from the settling of the Spanish borderlands to the present. Historical perspectives are balanced with anthropological and literary views of the cultural diversity of Mexicans in the U.S. DR:3  
   5 units, Aut (Fraga, Saldívar)

114. Introduction to Chinese Society — (Same as East Asian Studies 14.) Introduces pre- and post-revolutionary Chinese society through selected top-
ics including marriage, ancestor worship, foot-binding, regional variation, collectivization, birth control, and rural development. Guest lectures. DR:2(*)
5 units, Aut (Wolf)

115. Peoples of Island Southeast Asia — Topics: prehistory, the process and impact of colonization, the contrast between hill and valley peoples, subsistence modes, social organization, religion, and aesthetics.
5 units (Rosaldo) not given 1993-94

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:2f(*) or 9f(*)
5 units (Gates) not given 1993-94

118A. 20th-Century Chinas — Open to graduate students and upper-level undergraduates. The variation 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(2*) or 9(*)
5 units, Spr (Gates) not given 1993-94

120. Modern India: History, Society, Cultures — (Enroll in History 186A.) Brief overview of India to the 16th century. The relationship between geography and society; traditional society, culture, and politics; Mughal India and its culture; the British Raj; Indian response and resistance; independence movements; the multi-ethnic Indian state; political culture and style; secularism and communalism; development and environment; the uses of Indian history. DR:2(*) or 9(5*)
5 units, Win (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 (Befu) not given 1993-94

5 units, (Befu) not given 1993-94

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 1993-94

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 1993-94

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 (Gibbs) not given 1993-94

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, Win (Gibbs)

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

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and Health”: development models, comparative national health, AIDS, control of wealth, India-China-Africa-America today. Speakers are from Stanford and other institutions and are experts who directly deal with world policy makers through research and advisory activities.

1-4 units, Aut, Win, Spr (Lusignan, Packenhem) 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 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.

4 units, Spr (McDermott)

138. Lesbian/Gay Identities and Representations — Interdisciplinary, situating lesbian and gay studies historically at its intersection with theories and politics of sex, gender, race, and class. Theories about sexuality, historical origins of lesbian and gay liberation movements in U.S., butch/femme and the politics of style, tensions between lesbianism and feminism, transgender and transsexual identities, the politics of liberation and assimilation, censorship and pornography, representation and spectatorship in film studies, academic representations of lesbians and gays.

5 units, Aut (Amory, Braiterman)

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? These questions are addressed through 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 (Barnett) not given 1993-94

144A. From Theory to Praxis — (Same as Feminist Studies 103D.) 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: 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 Change — (Same as Human Biology 182.) Until WWII, peasants were a majority of the population in all continents of the world. 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, Aut (Crow)

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 1993-94

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, Win (Delaney)
154. Creation/Procreation: A Comparative Study — (Same as Feminist Studies 147, Religious Studies 154.) 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 literature examines 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:8f(3)  
5 units, Spr (Delaney)

155. Food Production, Poverty, and Famines — Widespread and long-lasting famine in Africa has shown that new technologies for the production of food and modern transportation have not by themselves eradicated hunger in the world. The distribution of food in its complex relationship with production, focusing on the paradox of poverty amidst plenty, the long-term ecological consequences of new agricultural technology, and the factors that lead to famine. Materials from different areas, emphasizing Africa and South Asia. DR:9f(5)  
5 units (Gupta) not given 1993-94

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) given 1994-95

159. Urban Culture — Socio-cultural perspectives of urban culture. How social theories, literature, and film help to create categories of meaning of cities in cross-cultural contexts. Symbolic anthropology, social history, and cultural studies form theoretical frameworks of analysis.  
5 units, Win (Ebrom)

160. Gender and Science — (Same Feminist Studies 147A, History and Philosophy of Science 160; Human Biology 170; Science, Technology, and Society 144.) 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 vs. de-gendered science. DR:8f(3) or 9f(5)  
5 units, Spr (Fujimura)

161A. Indigenous Peoples and Forest Conservation — (Same as Human Biology 139.) Upper-division/graduate seminar focuses on the emerging role of indigenous people in forest conservation. Indigenous people offer distinct and diverse approaches to conservation, building on traditional management systems to develop new models for forest use. Case studies explore a range of indigenous approaches to conservation, the impact of Western conservation on indigenous people, and the role of different tenure regimes in the conservation of indigenous forest resources (including state forests, parks and protected areas, indigenous territories, and private property systems).  
5 units (Durham, Irvine) given 1994-95

161B. Darwin, Evolution, and Galapagos — (Same as Human Biology 161.) Seminar on the flora and fauna of the Galapagos Islands and what they reveal about pattern and process in organic evolution. Darwin's observations in the Galapagos, and their role in the formulation of his theory of evolution. Implications of recent research in the Galapagos for understanding evolutionary dynamics. Lectures/discussion optional field trip to Galapagos Islands (at extra expense, limited capacity). Limited to 25 sophomores and juniors. Prerequisites: Human Biology Core or consent of instructor.  
5 units, Spr (Durham)

163. Latin America in Global Environmental Politics — (Same as Human Biology 127, Latin American Studies 185, Political Science 113E.) From the international system to the global system; the environment-development nexus and the politics of sustainability; the main issues in global environmental politics (global warming, depletion of the ozone layer, loss of biodiversity and transboundary air and water pollution); the domestic-international nexus in environmental politics; case studies (Brazil, Chile, Columbia, Costa Rica, Mexico, Venezuela); Latin America and the incipient agenda of global governance.  
5 units, Win (Viola)

164. Ecological Anthropology — (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, evolution and adaptation, and population dynamics. Current direction within ecological anthropology: political ecology, property theory, indigenous systems of
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 traits, 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(5*)

3-5 units, Win (Charnley)

166. The Politics of Environmental Degradation in Latin America — (Same as Human Biology 147, Latin American Studies 136, Political Science 113V.) A typology of environmental problems in Latin America (urban, rural, and natural ecosystems); the main players in environmental politics in Latin America (the environmental movement, the state environment-natural-resources agencies, the sector of the social movements and the entrepreneurial sector oriented toward sustainability); the politics of urban-industrial pollution (Brazil, Chile, Mexico, Venezuela); the politics of topsoil depletion and rural pollution (Argentina, Brazil, Mexico); the politics of biodiversity (Brazil, Colombia, Costa Rica, Mexico); the participation of some Latin American countries in the UNCED process (Brazil, Colombia, Mexico, Venezuela.)

5 units, Spr (Viola)

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, Win (Heath)

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; explanation of the social and cultural correlates of physical and mental health and disease (social epidemiology). DR:2(*) or DR:9(5)

5 units, Aut (Barnett)

169. Indigenous Peoples and Environmental Problems — (Same as Human Biology 149.) 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.

3-5 units (Charnley, Durham) not given 1993-94

LINGUISTIC ANTHROPOLOGY

171. Language and Gender — (Same as Linguistics 154.) Synthesis of the 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. DR:9(4)

4 units (Heath) not given 1993-94

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, Spr (Fox)

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 1993-94

177. English Transplanted, English Transformed: Pidgins and Creoles — (Same as Linguistics 162.) The formation of simplified contact languages and their subsequent elaboration. Emphasis on the relationship between language structure and function, language universals, and the relevance of political power, ethnic identity, and social structure in the contact speech community. Other simplified languages and registers. Prerequisite: introductory course in linguistics or anthropology or consent of instructor. DR:2(*) or DR:9(4*)

4 units, not given 1993-94

178. Introduction to Language Change — (Same as Linguistics 60.) 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 the cultural origins of grammar. DR:9(4)

4 units (Fox) not given 1993-94
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 (Hager) not given 1993-94

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. This analysis includes morphometric measurements of various skeletal elements, and assessments of the age, sex, and pathological conditions of individual specimens. Prerequisite: 180B.

5 units (Hager) not given 1993-94

181. Evolutionary Anthropology — (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, Aut (Durham)

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 1993-94

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 (Barnett) not given 1993-94

183B. Women in Human Origins — (Same as Feminist Studies 183B, Human Biology 181.) Seminar on the role of women as agents of evolutionary change and as researchers in the field of paleoanthropology. Women in studies of early human fossils, primatology, archaeology, the interpretation of early hominid behaviors, and the earliest evidence of sexual division of labor in humans.

5 units, Win (Hager)

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, Win (Rick)

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 (Rick) not given 1993-94

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, Spr (Klein)

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

GRADUATE AND ADVANCED UNDERGRADUATE

203. Culture and Power: Mesoamerica and Beyond — Focuses on indigenous peoples, examining their articulation in contemporary states in relation to ethnic consciousness and cultural process. Limited enrollment, consent of instructor. Prerequisite: Spanish reading literacy.

5 units (G. Collier) not given 1993-94
5 units, Spr (Befu)

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, Win (Fujimura)

5 units (Gibbs) not given 1993-94

239. Cultural Approaches to Education and Development — (Same as Education 306C.) Education in the context of specific cultural and social environments. 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 are examined from an anthropological perspective. 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, Win (McDermott)

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, Spr (Ebron)

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, Spr (Ebron)

244A. Naturalizing Power: Kinship/Gender/Race/Sexuality — (Same as Feminist Studies 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. Prerequisite: graduate student or advanced undergraduate major in anthropology, or consent of instructor.
5 units (Yanagisako) given 1994-95

246. Anthropology and History — Seminar on cultural patterns and historical processes. Attention to historiography of oral tradition, written sources, and research methods in social science.
5 units (Rosaldo) not given 1993-94

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 1993-94

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, Win (Yanagisako)

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, Spr (Mankekar)

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, Win (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 1993-94

253. Religion — (Same as Religious Studies 287.) 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, Aut (Delaney)

254. Indigenous Knowledges — Indigenous systems of knowledge have sparked debates in the anthropological literature on the universality of western forms of rationality. The relationship of knowledge and power is questioned by examining indigenous theories of agronomy, medicine, ecology, and science from South Asia, Africa, and the Americas. What is the location of “indigenous knowledge” in the postcolonial world? What sort of resistance does this kind of knowledge provide? Readings from textual descriptive accounts of indigenous knowledges and from the Subaltern School of historians, third world critiques of western science and technology, and analyses of the discourse of development.

5 units (Gupta) not given 1993-94

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.

5 units (Ebron) not given 1993-94

258. Ideology and Cultural Nationalism — Ideology understood in 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 (Moore)

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 (Durham) not given 1993-94

264. Advanced Ecological Anthropology — Seminar on role of ecological models in the analysis of culture and social systems. Major monographs reviewed early efforts linking environments and social systems (multilinear evolution, neo-functionalism, adaptive radiation), and evaluate current theory and research trends. Case studies include social stratification in Polynesia, agricultural involution in Java, ritual regulation in New Guinea, acculturation and social change in Amazonia, demographic change in the Swiss Alps, and peasant ecology of Central America. Prerequisite: 164 or graduate standing.

5 units (Durham) not given 1993-94

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 1993-94

266. Cultural Transmission: Education in Cross-Cultural Perspective — (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)

267. Spatial Systems and Social Processes — (Same as Sociology 217.) Seminar on the differentiation of social processes through spatial systems in agrarian and commercial societies. The contingencies of human interaction in space and time. Some prob-
lems 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. Students’ research may utilize a geographic information system (GIS), available in the Regional Systems Laboratory, for analyzing and displaying quantitative data via computer generated maps.

268. Post Neo-Colonialism and Identity—How displaced and marginalized people express their changing relation to “indigenous” identity while delineating a difference from dominant, Eurocentric culture, and how the First and Third Worlds clash in such situations. Why postmodern theory is abandoning notions of community, history, and place, just as women, minorities, immigrants, and exiles are mobilizing around such issues. How Eurocentric concepts of postcolonialism and postmodernity are ruptured by redefinition of identity from the margins.

5 units, Spr (Lavie)

273. Seminar in Advanced Medical Anthropology—Students work on a previously chosen research problem of their choice in medical anthropology and as it progresses, present their work for supportive discussion and assistance. Prerequisite: 168 or consent of instructor.

5 units, Win (Barnett)

277. Linguistic Anthropology—(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 1993-94

278. Topics in Linguistic Anthropology—(Same as Linguistics 256.) Seminar on a key issue in the relationships between language and culture. Topic: discourse analysis (verbal art and conversation in cultural and grammatical perspective).

5 units (Fox) not given 1993-94

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 ethnographic 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, Win (Barnett)


5 units, Aut (Wolf)

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 (J. Collier, 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 (J. Collier)

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 (G. Collier, Klimt, Streicker)

299. A.M. Project — Research in connection with the master's paper.

any quarter (Staff) by arrangement

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


Associate Professor: Ahamon Kapiulnik

Assistant Professor: Zhi-Xun Shen

Professors (Research): Philip H. Scherrer, J. Gethyn Timothy, Helmut Wiedemann, Herman Winick

Courtesy Professor: Douglas D. Osheroff

Courtesy Associate Professor: Bruce M. Clemens

Acting Associate Professor: John D. Fox

Acting Assistant Professor: Christopher P. J. Barty

Consulting Professors: Richard G. Brewer, Bernardo A. Huberman, Robert M. White

Consulting Assistant Professor: Shoucheng Zhang

Affiliated Professors: Gordon S. Kino (Electrical Engineering), Anthony E. Siegman (Electrical Engineering)

The Department of Applied Physics offers to 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 to more general 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, 1994. 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 "Degrees" section in 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, physics, engineering, and mathematics. 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, but not including Directed Study (Applied Physics 290) nor 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 departmental 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, etc.) are discussed in the "Degrees" section in 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 201, 202, 203, 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), Dissertations Research (Applied Physics 390), and 1-unit seminar courses.
   d) A final average overall letter grade indicator (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 of 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, ‘1b’ requirements may be totally or partly satisfied with equivalent courses taken elsewhere and ‘1c’ requirements 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 the Graduate Admissions Support Section of the Registrar's Office.

**COURSES**

15. Cosmic Horizons — (Enroll in Physics 15.)
   3 units, Spr (Romani)
   Sum (Walker)

27. Evolution of the Cosmos — (Enroll in Physics 27.)
   3 units, Aut (Petrosian)

50. Astronomy Laboratory and Observational Astronomy — (Enroll in Physics 50.)
   3 units, Aut (Walker)

100. Introduction to Observational and Laboratory Astronomy — (Enroll in Physics 100.)
   4 units, Spr (Walker)

160. Introduction to Stellar and Galactic Astrophysics — (Enroll in Physics 160.)
   3 units, Aut (Romani)

161. Introduction to Extragalactic Astrophysics and Cosmology — (Enroll in Physics 161.)
   3 units, Win (Petrosian)

169A,B,C. Independent Study in Astrophysics and Honors Thesis — (Enroll in Astronomy 169A,B,C.)
   Aut, Win, Spr (Staff)

172. Physics of Solids — (Enroll in Physics 172.)
   3 units, Spr (Cabrera)

181. Intermediate Optics — (Enroll in Physics 181.)
   3 units, Aut (Light)

192. Introductory Biophysics — For undergraduate and graduate students who wish to learn about the physical basis underlying selected topics in contemporary molecular biology. Three-dimen-

3 units, Spr (Doniach)
alternate years, not given 1994-95


207. 3 units, Win (Fox)
208. 3 units, Spr (Fox)

210. Advanced Particle Mechanics — (Enroll in Physics 210.)

3 units, Aut (Peskin)

211. Continuum Mechanics — (Enroll in Physics 211.)

3 units, Win (Romani)

212. Statistical Mechanics — (Enroll in Physics 212.)

3 units, Spr (Susskind)


3 units, Aut (Shen)
alternate years, not given 1994-95

220, 221. Classical Electrodynamics — (Enroll in Physics 220, 221.)

220. 3 units, Aut (Kapitulnik)
221. 3 units, Win (Kapitulnik)


230. 3 units, Aut (Linde)
231. 3 units, Win (Linde)
232. 3 units, Spr (Linde)

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

301. Astrophysics Laboratory — (Enroll in Physics 301.) Offered occasionally.

3 units, Sum (Walker)


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)

307. Microstructures Fabrication Laboratory — (Enroll in Electrical Engineering 357.)

3 units, Sum (Bloom, Khuri-Yakub)

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 (Staff) given 1994-95

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, Win (Doniach) alternate years, not given 1994-95

320. Quantum Optics and Selected Topics in Atomic Physics — (Enroll in Physics 320.)

3 units (Chu) alternate years, given 1994-95

321. Laser Spectroscopy — (Enroll in Physics 321.)

3 units, Win (Kasevich) alternate years, not given 1994-95

324. Introduction to Accelerator Physics — Introduction to basic accelerator physics in linear and circular accelerators. Topics: acceleration, phase stability, transfer matrices, beam envelopes, emittance, and the effects of synchrotron radiation. Topics of current research, including nonlinearities and instabilities.

3 units, Aut (Siemann)

325. Collective Effects in Particle Accelerators — Topics: impedances, coasting beam instabilities, single bunch instabilities, multibunch instabilities, linear and circular accelerators, the Vlasov equation and few-particle models.

3 units, Win (Ruth)

326. Synchrotron Radiation — For graduate students with interest in the production and/or use of synchrotron radiation. Discussion of theory and characteristics of coherent and incoherent synchrotron radiation from an electron beam together with properties of insertion device radiation from undulators and wigglers. Coherent radiation from short particle pulses, FELs and backscattered lasers. Radiation properties, e.g., photon beam brightness, pulse duration, collimation, and polarization. Availability and limits of such radiation over the full spectrum from FIR to hard x-rays. Prerequisites: knowledge of classical electricity and magnetism.

3 units, Spr (Wiedemann)

330,331,332. Quantum Field Theory — (Enroll in Physics 330, 331, 332.)

330. 3 units, Aut (Kallosh)

331. 3 units, Win (Kallosh)

332. 3 units, Spr (Kallosh)

334. Superconducting Electronics — (Enroll in Electrical Engineering 334.)

3 units, Spr (Beasley)

360. Stellar Physics — (Enroll in Physics 360.)

3 units, Spr (Petrosian) alternate years, given 1994-95


3 units (Petrosian) alternate years, not given 1994-95

363. Solar Physics — Seminar on student elected advanced, selected topics in solar physics. Possible topics: internal structure (neutrino problem, convection and rotation, dynamo processes, global oscillations), atmospheric structures (photosphere, chromosphere, transition region, corona), activity (active regions, sunspots, flares, particle acceleration, radio, and x-ray emission). Prerequisites: 160 and Physics 221, or equivalents.

3 units, Win (Sturrock) alternate years, not given 1994-95

364. Advanced Gravitation — (Enroll in Physics 364.)

3 units, Spr (Wagoner)

365. Extragalactic Astrophysics and Cosmology — (Enroll in Physics 365.)

3 units (Wagoner) alternate years, given 1994-95

370. Theory of Many-Particle Systems — (Enroll in Physics 370.)

3 units, Win (Zhang) alternate years, not given 1994-95


3 units, Win (Harrison) MWF 10

3 units, Aut (Harrison) MWF 10


3 units (Harrison) alternate years, given 1994-95


3 units, Win (Beasley)

376. Superfluidity and Superconductivity — (Enroll in Physics 376.)

3 units (Fetter) alternate years, given 1994-95

378. Lasers I and II — (Enroll in Electrical Engineering 231, 232.)

380. 3 units, Aut (Siegman)

381. 3 units, Win (Siegman)

382. Introduction to Nonlinear Optics — (Enroll in Electrical Engineering 346.)

3 units, Spr (Harris)


3 units (Harris) alternate years, given 1994-95

384. The Fourier Transform and Its Applications — (Enroll in Electrical Engineering 261.)

3 units, Aut (Gray) Spr (Kazovsky)

385. Introduction to Fourier Optics — (Enroll in Electrical Engineering 366.)

3 units, Win (Hesselink)

386. Two- and Three-Dimensional Imaging — (Enroll in Electrical Engineering 362.)

3 units, Spr (Kino)

387. Quantum Optics I — The Heisenberg uncertainty relations as a source for lack of causality in measurement results and for uncontrollable disturbance of the measured object. Derivation of a generalized uncertainty relation for simultaneous measurement of two conjugate observables. Quantization of electromagnetic fields and atomic states; Bloch, Dicke, Fock, and Glauber states. Interaction between atoms and fields, vacuum Rabi flopping, Weisskopf-Wigner theory of spontaneous emission, and Dicke’s superradiance. Reservoir theory of open dissipative systems, by density-operator and noise-operator methods. Quantum fluctuations of a laser and parametric oscillator, quantization of an electrical circuit and connection to the quantum Langevin equation. Quantum theory of measurement; wavepacket reduction, unsharp measurement, and continuous measurement. Standard quantum limits on repeated measurements, with impact on optical communication, laser gyroscopes and gravitational-wave detection.

3 units, Win (Yamamoto)

388. Quantum Optics II — Properties of squeezed states and correlated photon twins; generation, detection, and application of such nonclassical light. Principle and realization of quantum nondemolition measurements. Modification of spontaneous emission by a cavity wall (cavity quantum electrodynamics) with application to lasers. Entangled quantum states and nonlocal quantum effects. Quantum fluctuations of electron transport and tunneling in mesoscopic systems, derived by quantum optic theory. Macroscopic and mesoscopic semiconductor lasers, optical solitons and excitons. Role of information in quantum optics in terms of quantum-mechanical channel capacity, minimum time-energy product per bit, Maxwell’s demon, Schrödinger’s cat, and reversible logic.

3 units, Spr (Yamamoto)

389. Noise in Electrical Systems and Devices — (Enroll in Electrical Engineering 292A. See Electrical Engineering course bulletin.)

3 units, Aut (Yamamoto)

390. Dissertation Research

any quarter (Staff) by arrangement
460. Astrophysics Seminar — (Enroll in Physics 460.)
1 unit, Aut, Win, Spr (Petrosian)

463. Special Topics in Astrophysics — (Enroll in Physics 463.)

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. Phenomenology of Type-II Superconductors — Quantized vortices in type-II superconductors: vortex lattice formation in two and three dimensions; Ginzburg-Landau treatment of high Tc materials — short coherence length and large anisotropy; disordering due to heat and pinning centers; vortex lattice melting, glass transition; transport in pinned systems; critical currents and relaxation of the Bean state.
3 units, Aut (Doniach)

473B. Advanced Seminar on Disordered Systems
1 unit, Spr (Kapitulnik)

473C. Correlation Effects in Condensed Matter: Survey — Basic concept of correlation effects: limits of the one-electron approach, Fermi-liquid approximation, configuration interaction and quantum-chemical calculations, the Hubbard model, Anderson lattice and impurity models. Role of correlation effects in magnetic materials and materials of low dimension. Experimental manifestation of correlation effects in transition-metal and rare-earth compounds: Mott insulators, high-temperature superconductors, heavy-fermion, and mixed-valence compounds. Experimental techniques sensitive to correlation effects: transport measurements, electron spectroscopies, neutron scattering.
3 units, Spr (Shen)

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
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 in order 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 insure 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, and 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 proficient 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.

The Department of Art offers A.M. and Ph.D. degrees. The A.M. is granted as a step toward fulfillment of 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 “Degrees” section in this bulletin.

Completion of the University’s requirements for a 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 tran-
scripts 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. Completion of a minimum of three full-tuition quarters or the equivalent in partial-tuition quarters of graduate registration.
2. Completion of a total of at least 36 units of graduate work in the history of art in courses at the 200 level. Students are also required to take a seminar in art historiography and methods of research.
3. 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. Submission for consideration by the faculty of two term papers from among those written during the year.
5. 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 “Degrees” section in this bulletin. The following are departmental requirements:

**Admission to Candidacy** — A graduate student’s progress is formally reviewed during Spring Quarter of the second year; by the end of Winter Quarter of the second year the applicant for candidacy must complete the requirements which govern the A.M. program in the History of Art (see above), and an additional 24 units. The graduate student does not become a formal candidate for the Ph.D. degree until he or she has fully satisfied these requirements and has been accepted as a candidate by the department.

**Residence** — In order to be eligible for the doctoral degree, the student must have completed three years of full-time graduate work in the history of art, at least two years of which must be in residence at Stanford.

**Dissertation Proposal** — Dissertation subjects are chosen in consultation with the candidate’s adviser. A concise written statement of the topic and a plan of research for the doctoral thesis must be submitted to the art history faculty for approval at the end of the third year.

**Collateral Studies** — The student should be prepared to take 15 units in one or, at most, two supporting fields of study (such as anthropology, classics, history, literature, or philosophy), determined in consultation with the departmental advisers. In cases where the student’s field of study requires competence in Greek and Latin or a third European language, or in the languages, institutions, thought, and literature of Asia, the permitted collateral units for the Ph.D. in the History of Art will be increased, with the adviser’s approval in each case, to 24 or 26 (excluding first-year Chinese and Japanese).

**Graduate Student Teaching** — As a required part of their training, all graduate students in art history, regardless of their source of funding, must participate in the department’s teaching program. At least two one-quarter assignments in Art 1, 2, or 3 are required. Students receiving financial aid are required to serve as a teaching assistant for a third quarter. In conjunction with this assignment, students must register for the Seminar in Teaching Praxis (Art 295). Further opportunities for teaching experience and other contexts are available.

**Dissertation** — A senior member of the department acts as the student’s dissertation adviser and as chair of his or her dissertation 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. Dissertations may not be submitted during the Summer Quarter. 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 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 departmental adviser.
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.

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, prior to declaring a major.

The art history requirement for all studio majors consists of Art 1, to be taken as the basic course prior to 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).
2. A letter grade indicator (LGI) of ‘B-’ in at least 65 units of undergraduate work in art.

3. Portfolio specifications:
   a) Painting and Sculpture: twelve or more 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. An accompanying slide list must be included indicating the size, date, and medium of each work. If applicants want portfolios returned, a stamped, self-addressed container must be included.
   b) Photography: 12 or more photographs. If applicants want portfolios returned, a stamped, self-addressed container must be included.

4. 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 applications for mid-year entrance are considered.

Requirements for the Degree — The requirements for M.F.A. degree in painting, sculpture, and photography are:

1. Completion of a minimum of two years (six full quarters) of graduate work in residence or its equivalent at Stanford.
2. Completion of 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, the student 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 micro-computers. 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 in design is based on:

1. The equivalent of a A.B. degree in Art at Stanford.
2. A letter grade indicator (LGI) of ‘B-’ in at least 65 units of undergraduate work in art.
3. Portfolio specifications: 12 or more 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 include 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. Completion of a minimum of two years (six full quarters) of graduate work in residence or its equivalent at Stanford.
2. Completion of the first year of 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. Participation 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.

COURSES
HISTORY OF ART
BASIC
1. Introduction to Art—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, Win (Lewis)
2. Ideas and Forms in Asian Art—The religious and philosophical ideas and social attitudes of India, China, and Japan and how they are expressed in the architecture, painting, woodblock prints and sculpture, and in such forms as garden design and urban planning. Discussion sections. DR:2(*) or 7(2*)
   5 units (Takeuchi) not given 1993-94
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, Spr (Turner)
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, Aut (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 1993-94
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, Aut (Takeuchi)

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 1993-94

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, Spr (Maxmin)
102/202. Greek Vase Painting—(Same as Classics 120.) 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 (Maximin) not given 1993-94
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 1993-94
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, Aut (Lewis)
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 envi-
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 1993-94

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, Strasbourg, Canterbury, London, Oxford, and Cambridge. DR:7(2)

4 units (Lewis) not given 1993-94

108/208. Age of Realism: 15th-Century French and Netherlandish Painting — Rediscovery of the visual world in the art of the Limbourg brothers, Van Eyck, Campin, Van der Weyden, Van der Goes, Fouquet, and Bosch. Focuses on the shift from court patronage to entrepreneurial 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. DR:7(2)

4 units (Lewis) not given 1993-94

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, Aut (Junkerman)

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 1993-94

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 1993-94

110D/210D. Venetian Renaissance Art — In-depth survey of the art of Renaissance Venice and the Veneto including painting, architecture, and sculpture. Emphasizes interpretation of works of art within a broad context of the social, institutional, and political structures of Venice and its artistic traditions.

4 units, Spr (Junkerman)

115A/215A. 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, Spr (Miller)

115B/215B. 17th-Century Art in the Low Countries: The Age of Rubens and Rembrandt — Major artistic developments in the Low Countries during the 17th century focused on the great personalities and important episodes during this period. The artist’s position in his society serves as the point of departure. DR:7(2)

4 units, Spr (Miller)

116/216. Six Great Artists of the Baroque Age: Caravaggio, Bernini, Rubens, Rembrandt, Poussin, Velazquez — An in-depth study of their artistic personalities. DR:7(2)

4 units, Win (Miller)

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 1993-94

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 1993-94

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
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. DR:7(2)
4 units (Marrinan)
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. DR:7(2)
4 units (Marrinan) not given 1993-94
4 units (Elsen) not given 1993-94
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, Aut (Marrinan)
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 1993-94
4 units (Elsen) not given 1993-94
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, Aut (Elsen)
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)
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 1993-94
124/224. Picasso — Lectures cover Picasso's work in all media.
4 units (Elsen) not given 1993-94
126A/226A. Introduction to Chinese Painting — Overview of Chinese painting from the Han dynasty to the 20th century. Emphasis on the interplay of painting and art theory, the social and institutional contexts of painting, pictorial genres, and pivotal artists and styles.
4 units (Vinograd) not given 1993-94
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 1993-94
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 1993-94
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 1993-94
126F/226F. Writing and Painting in China — Study of the correlations between word and image
in China as manifested in paintings from the 12th through 18th centuries. Topics: the habit of inscribing a painting, equivalence between poetry and painting sought by art theorists, nature of illustration and critical description, relationships between calligraphy and painting.

4 units, Win (Burkus)

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 1993-94

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, Win (Takeuchi)

130/230. Early American Art and Culture, 1670-1812 — Interdisciplinary study of major themes and genres in early American art. Focuses on art in relation to the French and Indian Wars, the American Revolution, and the invention of national identity, with attention also to 20th-century inventions, artistic and otherwise, of colonial America. Emphasis on close reading of works of art. Artists: Copley, West, Trumbull, Peale, Vanderlyn.

DR:7(2)

4 units (Nemerov) not given 1993-94


DR:7(2)

4 units (Nemerov) not given 1993-94

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, translaticent 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, Win (W. Corn)

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 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 1993-94

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, Spr (Nemerov)

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, Aut (Nemerov)

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, Win (Leivick)


4 units (Turner) not given 1993-94

175A,B/275A,B. Modern Architecture I, II — Two-quarter course tracing 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 1993-94

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.

DR:7(2)

4 units (Turner) not given 1993-94

176A/276A. American Architecture and Urbanism since 1945 — The developments in architecture and city and suburban planning from the end of WWII to the present. Emphasis is on typologies, the commercial strip, and the work of major architects,
including F. L. Wright, R. Venturi, and F. Gehry.
4 units, Win (Joncas)

190X. Readings in Art History — (Same as German Studies 52C.) For students with a knowledge of German (one year or equivalent) who want to acquire German reading proficiency in art.
3-4 units, Spr (Staff)

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 1993-94

202A. Seminar: Greek Art
4 units (Maxmin) not given 1993-94

202B. Seminar: Greek Vase Painting — For graduate students only.
4 units (Maxmin) not given 1993-94

202C. Undergraduate Colloquium on Ancient Art
4 units (Maxmin) not given 1993-94

202D. Colloquium: Greek Art
4 units, Aut (Maxmin)

206. Graduate Seminar in Medieval Art — The Early Middle Ages (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 and the Utrecht Psalter. How new modes of visual discourse emerge in a period of social upheaval and political fragmentation, and how remnants of the late classical tradition survive within larger ideological patterns of assimilation and change.
4 units (Lewis) not given 1993-94

206A. Undergraduate Seminar on Illuminated Manuscripts — Readings, discussion, and critical analyses centered on the production and consumption of the illustrated book in the Middle Ages within the framework of a textually generated concept of visual perception and experience. Explores a range of problematical genres of texts, literacy and reader response, semiotics, pictorial exegesis, ownership and patronage, codicology, paleography, and the role of the artist vs. the designer of the book.
4 units (Lewis) not given 1993-94

206B. Undergraduate Seminar on 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 1993-94

214A. Seminar: Mannerism
4 units (Nova) not given 1993-94

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 1993-94

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 1993-94

214D. Seminar: Italian Renaissance Drawings; Function, Form, and Collecting — Prerequisite: 110A, B, or C.
4 units (Nova) not given 1993-94

214F. Seminar: The Portrait in the Renaissance — The portrait, emphasizing individual identity, viewed as the defining genre for the art of the Renaissance. The major categories of the portrait of the 15th and 16th centuries, with an emphasis on Italy, considering the portrait as a mechanism for and a response to the problem of the construction of individual identities in the Renaissance. Functions of the portrait, the intersection of the portrait and the development of art theory, and gender distinctions.
4 units, Spr (Junkerman)

217. Connoisseurship in 17th-Century Italian Drawing
4 units (Miller) not given 1993-94

218. Colloquium: 18th-Century European Artistic Culture in Italy and England — Study of some of the principal artifacts of 18th-century collecting, practical aesthetics, and fashions of taste.
4 units (Miller) not given 1993-94

4 units, Spr (Miller)

219A. Colloquium: The Bolognese School of Painting, 16th-18th Centuries
4 units (Miller) not given 1993-94

219B. Colloquium: The History of Printmaking
4 units (Miller) not given 1993-94

219C. Colloquium: Nicholas Poussin and the Problem of 17th-Century Classicism
4 units (Miller) not given 1993-94
221. Seminar: 17th- to 20th-Century Master Drawings
   4 units (Eitner) not given 1993-94
221C. Seminar: Aspects of Realism in 19th-Century Painting
   4 units (Marrinan) not given 1993-94
221D. Undergraduate Colloquium: Construction of the 19th-Century Masterpiece
   4 units (Marrinan) not given 1993-94
221E. Seminar: The Vision of Art History
   4 units (Marrinan) not given 1993-94
221F. Seminar: Seurat
   4 units (Marrinan) not given 1993-94
221G. Seminar: Narrative Theory and Visual Forms — Preference given to graduate students. A forum for discussion and debate of current critical writing about the structure and operation of narratives. Questions concern how meaning is conveyed, how independent moments are enchainable, the roles and responsibility of narrators, reader/viewers, etc. Objective: relate this body of theory to the analysis of visual narrative forms. Participants work in small groups to lead class discussions; individuals write three short papers of a critical and interpretative nature. Prerequisite: consent of instructor.
   4 units, Win (Marrinan)
221H. Undergraduate Seminar: Paul Cezanne — The art of Paul Cezanne, focusing on aspects of his scholarship, historical interpretations of his work, and his importance for various avant-garde painters of the 20th century. Students present oral reports with slides on aspects of Cezanne's work (recurrent still-life themes, groups of related portraits, repeated landscape motifs, etc.) and prepare a 10-page interpretative essay. Prerequisites for juniors and seniors: at least one course in 19th-century art; consent of instructor.
   4 units, Spr (Marrinan)
222C. Seminar on Late 19th-Century Art: Rodin
   4 units (Elsen) not given 1993-94
222D. Colloquium: Modern Sculpture in Europe and America
   4 units (Elsen) not given 1993-94
222E. Colloquium: Perspectives on Modernism — Preference given to senior majors and graduate students. Views of what constituted modernism from painters and sculptors, critics, and historians. Enrollment limited. Prerequisite: consent of instructor.
   4 units, Aut (Elsen)
222A. Seminar: Picasso — Prerequisites: 224 and consent of instructor
   4 units (Elsen) not given 1993-94
222F. Colloquium: Psychological and Psychoanalytic Approaches to the Visual Arts — Issues of perception, illusions, representation, and interpretation presented in theory and as related to case studies of major monuments and artists.
   4 units (Vinograd) not given 1993-94
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. 227, 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 1993-94
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 1993-94
   4 units (Vinograd) not given 1993-94
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 1993-94
228. Seminar: Print Culture in 17th-Century China — The possible relations between words, pictures, printed texts, and modes of behavior in 17th-century Chinese society. The private publishing houses of the Ming and the publishing strategies of the early Qing government. Topics: illustrated fiction, manuals on painting and letter-writing papers, didactic booklets and political tracts, encyclopedias. Theoretical framework based on recent work of Roger Chartier and Robert Darnton. Prerequisites: some knowledge of Ming China (art historical, social, or economic). Recommended: knowledge of Chinese.
   4 units, Win (Burkus)
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 dictio-
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, Aut (Takeuchi) not given 1993-94

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 1993-94

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 heterosexuality; 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, Spr (Takeuchi)

231A. Undergraduate Seminar: Photographs as Historical Documents
5 units (J. Corn, W. Corn) not given 1993-94

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, Aut (Nemerov)

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, Win (Nemerov)

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 1993-94

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 1993-94

233A. Seminar: Race and Gender Politics in Contemporary Visual Culture — How our subjectivity and identity are formed by structures of power relations (gender, sexuality, race, class, and nationalism) within the institutions of artistic and art historical practices, shifts in feminist interventions in the visual arts from the 70s to the 90s, postcolonial discussion of race and ethnic heritages, and ethnic and sexual difference theories.
4 units, Aut (Bloom)

233B. Seminar: Primitivism and Modernism — Emphasis is on the relationship between modern art and the discourse primitivism. The construction of the "West" and "non-West" as organizing principles and sites of power within the areas of 19th- and 20th-century painting, photography, and film.
4 units, Spr (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, Spr (Lewis) not given 1993-94

235A. Seminar on Art History: Ideas and Ideology — Readings/discussion of contemporary art history 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 1993-94

235B. Graduate Seminar: Notions of "the Public" in Art Historical Discourse — Contemporary critical response to works of art has become a central concern of art historians working within several historical specialities (e.g., Clark, Crow, Fried, Baxandall) as a way of describing the historical observer. How "the public" is defined and used: forms of archival material mobilized to support a profile of "the public" to the isolation of individual, representative voices; the ways of negotiating issues of class, gender, and ideology when spotlighting those voices to the kinds of insights one might derive from their commentaries. Introductory relevant theoretical material. Class presentations and substantial critical essay on a topic that relates the seminar project to current research. Prerequisites consent of instructor and a working knowledge of French and German.
4 units, Win (Marrinan)

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, Aut (Ross)

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 (Elsen) not given 1993-94

239A. Colloquium: The Western Artist in the 20th Century — For art history majors or graduate students. Readings/discussion. Topics: the artist as apolitical and social critic, censorship, artists’ rights, the art world, and self-imposed limits on artistic freedom.

4 units (Elsen) not given 1993-94

240. Individual Work: Art History any quarter (Staff) by arrangement

277. Seminar: Le Corbusier and Problems in Modern Architecture — Prerequisites: 175, consent of instructor.

4 units (Turner)

278. Seminar: The Design of the American College Campus — Prerequisite: 175 or 176, consent of instructor.

4 units (Turner)

279. Seminar: Frank Lloyd Wright and Problems in American Architecture — Prerequisite: 175 or 176, consent of instructor.

4 units (Turner)

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

295. Teaching and Professional Work Experience

4 units, Aut, Win Spr (Staff) by arrangement

300. Research Project: Art History any quarter (Staff) by arrangement

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)

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, Win, Spr (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 1993-94

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, Volkering)
INTERMEDIATE

When available, students are encouraged to take intermediate and advanced design courses for 4-6 units.


4 units (Katz) not given 1993-94

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. Visits to the Achenbach Foundation collection and the Editions Press in San Francisco, and the Stanford Museum. May be repeated for credit. Prerequisite: 40 or 140.

3 units, Spr (Staff)

148A. Introduction to Printmaking

3 units, Aut (Staff)

148B. Printmaking: Artists’ Books

3 units, Win (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 1993-94

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 (Randell) not given 1993-94

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 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 1993-94

168A. Introduction to Urban Design—Urban design in theory and practice. Theoretical ideas of city form and image, from historical principles inherited from the cities of Western Europe to late 20th-century models exemplified by Los Angeles and the sunbelt cities. Case studies from urban design examples, projects, and controversies in N. America. Workshops on analysis of the image and physical characteristics of San Francisco neighborhoods.
5-week term urban design problem summarizes principles discussed in the readings, seminars, and workshops.
5 units, Win (Gast)

169. Professional Design Exploration — Six to eight mature projects stimulated by weekly field trips into significant areas of design activity or need.
3 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 upon return to Stanford campus. Prior consent of instructor required.
1 or more units, Aut, Win, Spr (Leivick, 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, Aut, Win, Spr (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) not given 1993-94

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. 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)

272A. Individual Work: Photography
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, Aut (Volkerding)

273B. Photography and Landscape — Changing attitudes toward nature and the environment are studied through slide lectures, museum study ses-
sions, 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)

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)

340. M.F.A. Seminar: Studio
Aut, Win, Spr (Staff) by arrangement

341. M.F.A. Concept Seminar — Prerequisite: consent of instructor.
Aut, Win, Spr (Staff) by arrangement

342. Master’s Project
any quarter (Staff) by arrangement

360A,B,C. Master’s Project (Seminar): Design
Aut, Win Spr (Kahn) by arrangement

RELATED TOPICS
Visual Thinking — (See Mechanical Engineering 101.)

Human Values in Design — (See Mechanical Engineering 115A.)

OVERSEAS STUDIES

The following courses are approved for the Art major and taught overseas at the campus indicated below. Students should discuss with their major advisors 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.
4 units, Win (Borsook)

120X. New Ways of Seeing — Berlin. DR:7(2)
4 units, Win (Neckenig)

120Y. Art and Society in Britain: 1730-1914 — Oxford.
4 units, Win (Tyack)

173Y. Industrial Revolution and Its Impact on Art, Architecture, and Theory — Berlin. DR:7(2)
5 units, Aut (Neckenig)

4-5 units, Aut (Legault)

ASIANAMERICAN STUDIES

Affiliated Faculty: Coordinator, David Palumbo-Liu (Comparative Literature, East Asian Studies, and Modern Thought and Literature), Rudy Busto (Religious Studies), Gordon Chang (History), Bill Ong Hing (Law), Karen Huang (Student Health Services), Sylvia Yanagisako (Anthropology and Feminist Studies, Modern Thought and Literature)

Postdoctoral Fellow: Susie 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.

At present, 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 coordinator at the beginning of the academic year for full listings.

COMPARATIVE LITERATURE

163. Introduction to Asian American Studies: Concepts and Contexts — Introduces key terms such as race, ethnicity, class, gender, culture, and national identity through an examination of the history of Asians in America as seen in historical, political, economic, sociological, and literary texts and in films. DR:3
(Palumbo-Liu) not given 1993-94

169B. Readings in the Asian American Novel — DR:3
Aut (Palumbo-Liu)

169D. Readings in Asian American Short Fiction and Drama — DR:3
(Palumbo-Liu) not given 1993-94

169E. The Exotic East — (Same as English 169E) Examination and critique of the construction of representations of the “Orient” that move beyond catalogue of common figures and characterizations to an analysis of the imaginative and ideological investments and contradictions of such aestheticizations. The trope of desire is read against the “absence” or “lack” felt in the West, emphasizing the constructedness of that notion. Readings inclu...
critical and theoretical treatments (Clifford, Kabbani, Lowe, Said) and fictional and autobiographical texts (Wilkie Collins, Forster, David Henry Hwang, Loti, Segalen, Chiang Yee.)

5 units, Win (Palumbo-Liu) MW 11:12:30

308. Hybridicity/Diaspora: Rationale and Critique — As a result of increased scrutiny, notions of multicultural, multiethnic identities have developed into complex internal conceptions (i.e., hybridicity) and transpositional conceptions (diaspora). Both have become keywords in cultural criticism. The critical usefulness of these terms and their problematic nature, especially as they generate themselves further elaborations of cultural critique.

4-5 units, Win (Palumbo-Liu)

HISTORY

159. Introduction to Asian American History — DR: 3
(Chang) not given 1993-94

265S. Senior Research Seminar: Asian-American History — Research and writing in Asian American history. Students conduct research into primary materials and complete an essay on a topic of their choice. Prerequisite: previous introduction to the study of the Asian American experience.
(Chang) not given 1993-94

SOCIOLOGY

147S. Women of Color: The Interaction 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 in cultural ideologies and self-perceptions.
Spr (Chow)

151S. 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. In-class interviews of Asian-Americans from local communities.
Win (Chow)

ASIAN LANGUAGES

Emeriti: (Professors) Albert E. Dien, David S. Nivison, Frederic Spiegelberg
Chair: Makoto Ueda
Professors: Makoto Ueda, John C. Y. Wang (on leave Autumn)

Associate Professors: Thomas W. Hare (Asian Languages and Comparative Literature, on leave Winter), William A. Lyell, Susan K. Matisoff
Assistant Professors: Yoshiko Matsumoto (on leave Autumn, Winter) Chao Fen Sun
Senior Lecturers: Kazuko M. Busbin, Yin Chuang, Kimie Nishimura Nebrig, Hiroshi Sakamoto, Dorothy Shou
Lecturers: Fumiko Aarao, Young-Mee Cho, Momoyo Kubo Lowdermilk, Yu-hwa Liao Rozelle, Youquin Wang, Yasuo Yagi
Visiting Professors: Wen-yueh Lin (Autumn), Yutaka Maekawa (Spring), Earl Miner (Spring)
Acting Assistant Professors: David Miller, Donna Storey

Chinese-Japanese Language and Area Studies Faculty:
Profsessors: Masahiko Aoki (Economics), Harumi Befu (Anthropology), Peter Duus (History), Harold L. Kahn (History), Lawrence Lau (Economics), John W. Lewis (Political Science), Jeffrey Mass (History), Daniel I. Okimoto (Political Science), Thomas P. Rohn (School of Education), Makoto Ueda (Asian Languages), Lyman P. Van Slyke (History), John C. Y. Wang (Asian Languages, on leave Autumn), Arthur P. Wolf (Anthropology), Lee H. Yearly (Religious Studies)

Associate Professors: Carl W. Bielefeldt (Religious Studies), Bernard Faure (Religious Studies), Thomas W. Hare (Asian Languages and Comparative Literature, on leave Autumn, Winter), William A. Lyell (Asian Languages), Susan K. Matisoff (Asian Languages), William Poser (Linguistics), Melinda Takeuchi (Art), Richard Vinograd (Art)

Assistant Professors: Nina Halpern (Political Science), Philip J. Ivanhoe (Philosophy and Religious Studies), James E. Ketelaar (History), Yoshiko Matsumoto (Asian Languages, on leave Autumn, Winter), 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 Program)

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 113, 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 adviser. 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 required 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 the 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 finished thesis.

COTERMINAL PROGRAMS

Students may elect to combine programs for the A.B. and A.M. degrees in Chinese or Japanese. 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 which houses 60 students and offers them a wide variety of opportunities to expand their knowledge, understanding, and appreciation of East Asia. Assignment is made through the regular Asian housing draw.

SUMMER PROGRAM OF INTENSIVE LANGUAGE COURSES

A nine-week program, which begins at the same time as the University's general summer program and continues one week beyond it, is held each summer. 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, 10, 25, 105, and 114 as described below.) For detailed information 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 creditable undergraduate record at Stanford or elsewhere. The applicant need not have majored in Chinese or Japanese as an undergraduate, but must have had the equivalent of at least three years of training in the language in which he or she intends to specialize, and must also demonstrate a command of English adequate for the pursuit of graduate study. Applicants should not wish merely to acquire or improve language skills, but to pursue study in one of the following fields: Chinese history (pre-modern), Chinese linguistics, Chinese literature, Chinese philosophy, Japanese cultural history, Japanese literature, and Japanese linguistics.

MASTER OF ARTS

The A.M. is granted in Chinese and in Japanese. The normal length of study for the degree is two years.

Applicants who wish to obtain only the A.M. and who do not intend to proceed to the Ph.D. will be considered only if no financial aid is requested.
Students who wish to spend the first year of graduate study at the Taipei or Yokohama centers must obtain departmental 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 “Degrees” section in this bulletin. Departmental 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 courses on the upper division or graduate level in fields such as Chinese anthropology, art, history, philosophy, and politics, as approved by the graduate adviser in consultation with the student’s individual adviser. Students may be exempted from 101, 102, 103, and 221, 222, 223 by passing examinations to demonstrate that they have attained equivalent language competence. Letter grades are mandatory for all required courses.

**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 “Degrees” section in this bulletin. Departmental 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., this will be conveyed 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 departmental faculty considers 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 completing Japanese 103. 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 completing Chinese 113 or by taking 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 follow-
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 “Degrees” section in this bulletin. The candidate is examined on questions related to the dissertation, after acceptable parts thereof have been completed in draft form.

_Dissertation_ — The candidate writes 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 in 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 which includes 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 “The Institute for International Studies” section in 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 _Courses and Degrees_ 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 (Ivanhoe) not given 1993-94

#### 51. An Introduction to Modern Japan —

For business persons and researchers: Japanese industrial and corporate structures, organizational hierarchies, interpersonal dynamics, decision-making, negotiating styles, and key socio-cultural concepts.

3 units, Sum (Dasher)

#### 91. Traditional East Asian Civilization: China —

Introduction to Chinese culture in a historical context. DR: 2(*) or 7(2*)

5 units, Aut (Miller) MWF 11

#### 92. Traditional East Asian Civilization: Japan —

Introduction to traditional Japanese culture, emphasizing the relation between intellectual currents and the arts from the 8th-18th centuries. DR: 2(*) or 7(2*)

5 units, Win (Storey) MWF 2:15-3:30

#### 113. Zhuang Zi — (Same as 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, L. Yearley, and David Wong. No knowledge of Chinese required. Separate readings for those who know Classical Chinese. Prerequisite: Religious Studies 55 or consent of instructor.

5 units, Spr (Ivanhoe)
114. Early Taoism: A Doctrine without Words — (Same as Religious Studies 114.) The history of Taoism through the Han Dynasty (up to 220 A.D.); emphasis on Huang Lao, the doctrines of the Yellow Emperor and the sage Laozi. Different approaches to reconcile the counter-intuitive precepts of early Taoism, such as ruling through non-action. Readings of the Daodejing and writings ascribed to the Yellow Emperor, with research paper on some aspect of early Taoist thought or its applications. Enrollment limited to 20. Recommended: 46 or Religious Studies 55.

4 units, Spr (Csikszentmihalyi)


4 units, Win (Staff)

131. Chinese Poetry in Translation — Readings in traditional poetry and poetics emphasizing genre, theme, and style. DR:7(2*)

4 units, Aut (Miller) 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 (Kelley) 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) 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 (Hare) not given 1993-94


4 units, Aut (Storey) TTh 11-12:15

137. Japanese Fiction in Translation — Introduction to major works of prose narrative from premodern 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 1993-94

138. Modern Japanese Literature in Translation — Introduction to Japanese poetry, drama, and fiction since 1868. Authors: Tanizaki, Kawabata, Mishima, etc. Knowledge of pre-modern Japanese literature not required. DR:2(*) or 7(2*)

4 units, Spr (Maekawa) MWF 1:15

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 1993-94

156. Chinese History from Earliest Times to the Mongols— (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, Aut (Neskar) MT 2:15-4:05

157. Chinese History from Earliest Times to the Mongols— (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, Aut (Neskar) MT 2:15-4:05

192A. Japanese Lives: Autobiography and History— (Same as History 292A.)

5 units, Win (Duus) T 2:15-4:05

192S. Senior Research 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, Aut (Kahn)


3 units (Ueda) not given 1993-94

225. Comparative Poetics: Theories and Practices of Literary History— (Same as Comparative Literature 225.) Open to those who read English and one other language. Intercultural study of theories and practices of literatures, histories, and literary histories. Rival conceptions, historically and theoretically of the three topics discussed in terms of literary examples and historical issues. Issues prior
to, posterior to, other than, and of “theory.” Significant reference to traditional Chinese and Japanese texts.

5 units, Spr (Miner)

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.

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) MTWThF 10, 11 or 1:15
2. 5 units, Win (Shou) MTWThF 10, 11 or 1:15
3. 5 units, Spr (Show) MTWThF 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 and improves conversation.
1B. 3 units, Aut (Rozelle) MWF 10, 1:15, or 2:15
2B. 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.
12 units, Sum (Staff) MTWThF 8-12

7. 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

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

21B,22B,23B. Second-Year Modern Chinese for Bilingual Students — For students with advanced comprehension and speaking skills, but lacking equivalent knowledge of grammar, reading, and writing Chinese characters. Equivalent to 21, 22, 23.
21B. 3 units, Aut (Y. Wang) MWF 12 or 2:15
22B. 3 units, Win (Y. Wang) MWF 12 or 2:15
23B. 3 units, Spr (Y. Wang) MWF 12 or 2:15

25. Intensive Second-Year Modern Chinese — Equivalent to 21, 22, 23 combined. Prerequisite: 3 or equivalent.
12 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 Chinese (Modern) — Introduction (using annotated texts) to newspapers, documents, motion pictures, and belles-lettres. Prerequisite: 23 or equivalent.
101. 5 units, Aut (Chuang) MTWThF 11
102. 5 units, Win (Lyell) MTWThF 11
103. 5 units, Spr (Chuang) MTWThF 11

105. Intensive Modern Chinese — Equivalent to 101, 102, 103 combined. Prerequisite: 23 or equivalent.
12 units, Sum (Staff) MTWThF 9-12

111,112,113. Third-Year Chinese (Classical) — Prerequisite: 23 or equivalent.
111. 5 units, Aut (Sun) TTh 2:15-4:05
112. 5 units, Win (Sun) TTh 2:15-4:05
113. 5 units, Spr (Staff) TTh 2:15-4:05

121,122,123. Advanced Chinese Conversation — Prerequisite: 23 or equivalent.
121. 2 units, Aut (Chuang) W2:15-4:05
122. 2 units, Win (Chuang) W2:15-4:05
123. 2 units, Spr (Chuang) W2:15-4:05

131. 3 units, Aut (Staff) by arrangement
132. 3 units, Win (Staff) by arrangement
133. 3 units, Spr (Staff) by arrangement

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: 113 or equivalent.
5 units, Aut (Lin) W 2:15-4:05

208. Teaching Asian Languages — (Same as Asian Languages/Japanese 208; Linguistics 188.) Le
tures on teaching methods, class visitations, and in-class teaching exercises to prepare students for a career in teaching. May be repeated for credit. Prerequisite: consent of mentor teacher.

2 units, Win (Sun) 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) M 1, F 2:15-4:15
212. 5 units, Win (Chuang) M 1, F 2:15-4:15
213. 5 units, Spr (Chuang) M 1, F 2:15-4:15

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) M 1, F 2:15-4:15
212. 5 units, Win (Chuang) M 1, F 2:15-4:15
213. 5 units, Spr (Chuang) M 1, F 2:15-4:15

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) M 1, F 2:15-4:15
212. 5 units, Win (Chuang) M 1, F 2:15-4:15
213. 5 units, Spr (Chuang) M 1, F 2:15-4:15

221. Philosophical Texts
5 units, Aut (Ivanhoe) MWF 1:15

222. Historical Narration
5 units, Win (Wang) TTh 11-12:15

223. Literary Essays
5 units, Spr (Miller) MWF 1:15

230. Interpreting Confucian Texts—(Same as Philosophy 212, 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 (Ivanhoe) not given 1993-94

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: 46.

4 units, Win (Ivanhoe)

232. Philosophical Texts of the Ming Dynasty—(Same as Philosophy 211, Religious Studies 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: 231.

5 units (Ivanhoe) not given 1993-94

241. The Short Story
5 units, Aut (Lyell)

242. Essay
5 units, Win (Chuang) MWF 11

243. The Novel
5 units (Lyell) not given 1993-94

261. Shi-ching and Ch'u-tzu—Selected readings in the two earliest anthologies of Chinese poetry. Prerequisite: 260 or consent of instructor.

4 units, not given 1993-94

263. Lyric (shih) I—Selected readings in the early history of the lyric (shih), Han through Sui dynasties.

4 units, Win (Miller)

264. Lyric (shih) II—Selected readings in the T'ang dynasty lyric (shih). Prerequisite: 260 or consent of instructor.

4 units, not given 1993-94

266. Songs and san-ch'u—Selected readings of songs (tsu) and san-ch'ü, Tang through Ming. Prerequisite: 260 or consent of instructor.

4 units, not given 1993-94

268. The Poetry of T'ao Ch'ien (365-427) and Hsie Ling-yüan (385-433)—Prerequisite: 223 or consent of instructor.

4 units, Aut (Lin) Th 10-12

271, 272. Traditional Chinese Fiction—Selected readings in short stories and novels from early times to Ch'ing. Prerequisite: 113 or consent of instructor.

271. 4 units (J. Wang) not given 1993-94
272. 4 units (J. Wang) not given 1993-94

273. Chinese Drama—Selected readings in dramatic works of the Yuan, Ming, and Ch'ing periods emphasizing literary, not theatrical qualities. Prerequisite: 113 or consent of instructor.

4 units, Spr (J. Wang) TTh 11-12:15

291. The Structure of Modern Chinese—(Same as Linguistics 291.) Introduction to the structure of Modern Mandarin Chinese. Emphasis on syntax and semantics; the relationship between the tone sandhi rules and syntactic structure. Prerequisite: good knowledge of Chinese or consent of instructor.

4 units (Sun) not given 1993-94

292. The History of Chinese—(Same as Linguistics 292.) Historical changes of the Chinese language in the last 2,000 years with emphasis on syntax. Prerequisites: 113 and 291, or consent of instructor.

4 units (Sun) 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 (Lyell) MW 2:15-3:30

361. Seminar on T'zu Poetry of the Tang and Song
   5 units, not given 1993-94

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, Spr (J. Wang) TTh 2:15-4:05

   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 in this bulletin.
   75 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.

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

7/107, 8/108, 9/109. First-Year Japanese for Professionals — Beginning Japanese to provide students the basic language skills to be reasonably comfortable and effective in meeting Japanese professionally and simply getting around in Japan. To fulfill the language requirement for the Stanford Center in Technology and Innovation (SCTI) at Kyoto, students must complete five quarters of Japanese for Professionals, the equivalent of Japanese 1 and 2.
   7/107. 3 units, Aut (Busbin) MW 9, 10, or 11
   8/108. 3 units, Win (Busbin) MW 9, 10, or 11
   9/109. 3 units, Spr (Busbin) MW 9, 10, or 11

10/110. Intensive First-Year Japanese for Professionals — Equivalent to 7, 8, and 9 combined.
   7 units, Sum (Staff) MWF 4-7

17/117, 18/118, 19/119. Second-Year Japanese for Professionals — Continuation of 7, 8, 9 to build functional language skills. Prerequisite: 9/109 or equivalent.
   17/117. 3 units, Aut (Yagi) MWF 9 or 10
   18/118. 3 units, Win (Yagi) MWF 9 or 10
   19/119. 3 units, Spr (Yagi) MWF 9 or 10

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

27,28,29. Intermediate Japanese Conversation — Development of oral proficiency through practice of simple sentence patterns, use of audiotapes, oral presentations, vocabulary building exercises, discussions. Limited enrollment. Prerequisite: 3 or consent of instructor.
   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. Reading Technical Japanese — Prerequisite: four quarters of Japanese or equivalent.
   1-3 units, Sum (Dasher) MW 4-6

ADVANCED

101,102,103. Third-Year Modern Japanese — Conducted entirely in Japanese. Designed to achieve high-level proficiency in written and oral Japanese. Representative styles of modern writing read and analyzed. Short writing assignments focus on grammar points, idiomatic usage, advanced vocabulary. Sequence course. Prerequisite: 23 or equivalent.
   101. 5 units, Aut (Arao) MWF 11-12:20
   102. 5 units, Win (Arao) MWF 11-12:20
   103. 5 units, Spr (Arao) MWF 11-12:20
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) TTh 12:45-2:05
112. 3 units, Win (Yagi) TTh 12:45-2:05
113. 3 units, Spr (Yagi) TTh 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 — Focuses on improvement in fluency and listening comprehension. Use of audiotapes, oral presentations, discussions. Prerequisite: 23, 29, or consent of instructor.

121. 2 units, Aut (Arao) TTh 1:15
122. 2 units, Win (Arao) TTh 1:15
123. 2 units, Spr (Arao) TTh 1:15

177. The Structure of Japanese — (Same as Linguistics 177.) 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, Spr (Matsumoto)

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. 5 units, Aut (Matisoff) T 2:15-4:05

208. Teaching Asian Languages — (Same as Asian Languages/Chinese 208; 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. 4 units, Spr (Matsumoto) by arrangement

211, 212, 213. Advanced Modern Japanese — Goal: improve proficiency in reading and writing modern Japanese; listening and speaking ability are emphasized. Increases ability to understand the structure of the Japanese language, become familiar with writings in different genres and styles, utilize such knowledge in writing, and to discuss and express verbally questions and opinions on a variety of topics. Original writings, including fiction, essays, newspaper and journal articles, and discussions on grammatical points and various styles in different genres. Recommended taken in sequence.

211. Issues in Language, Society, and Culture 5 units, Aut (Dashner)
212. Focus on Society and Economy 5 units, Win (Kubo)
213. Focus on Fiction and Essays 5 units, Spr (Kubo)

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 (Staff) by arrangement

247, 248. Readings in Classical Japanese — Selected readings of texts in classical Japanese from Nara through Tokugawa periods. Attention to literary analysis, rhetoric, and poetics (Japanese and Western). Courses are offered alternate years and can be taken independently. Prerequisite: 246; 247 is not a prerequisite to 248.

247. 5 units, Spr (Matisoff) TTh 2:15-3:30
248. 5 units (Hare) not given 1993-94

250. Introduction to Kambun — Selected readings from a variety of Japanese works written in Kambun, ranging from Kaifuso to Yoshida Shoin’s diary. Offered when there is sufficient demand. Prerequisite: basic knowledge of classical Japanese. 4 units (Ueda) not given 1993-94

251. Graduate Seminar: Japanese Historical Texts — (Same as History 498.) Medieval historical sources and research methods. Reading of documents in Kambun. 5 units, Win (Mass) by arrangement

256. Readings in Japanese Culture — Reading/discussion of articles on the identity of Japanese culture. Works of prominent essayists, social critics, anthropologists, sociologists, and scholars in a wide variety of other fields. Taught in Japanese. 4 units (Staff) not given 1993-94

258. Japanese Buddhist Texts — (Same as Religious Studies 258.) Readings in medieval Japanese Buddhist materials; may be repeated for credit.
Prerequisite: background in Japanese and/or Chinese.

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 1993-94

277. The Structure of Japanese — (Same as Linguistics 177.) 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, Spr (Matsumoto)

279. 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 (Matisoff) not given 1993-94

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. Prerequisite: one year of Japanese and one course in linguistics, or two years of Japanese, or consent of instructor.

4 units (Matsumoto) not given 1993-94


4 units (Matsumoto) not given 1993-94

294. Major Haiku Poets — Reading/discussion of selected haiku by Basho, Buson, Issa, and others. Prerequisite: 103 or equivalent.

4 units, Win (Ueda) TTh 2:15-3:30

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, Win, Spr (Cho) MTWThF 2:15-3:30

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 1993-94

298. Translation Workshop — Discussion of problems involved in translating Japanese into English. Students produce an original translation of a literary or documentary work from their major field of interest.

4 units (Ueda) not given 1993-94

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 1993-94

300. 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, Spr (Hare)

396. Seminar in Modern Japanese Literature — May be repeated for credit.

5 units (Ueda) not given 1993-94


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 in 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) MTWThF 2:15

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
ASTRONOMY COURSE PROGRAM

200. Directed Reading in Korean — Prerequisite: 103 or consent of instructor.

units by arrangement, Aut, Win, Spr (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: Vahé Petrosian (Chair), Ronald N. Bracewell, 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 in 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).

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 in this bulletin, or contact the Stanford-Ames Institute for Space Research.

The following courses are recommended for students planning to conduct research in astronomy and astrophysics: 262, Introduction to Gravitation and Astrophysics; 301, Astrophysics Laboratory; 312, Basic Plasma Physics; 360, Stellar Physics; 363, Solar 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 more than one of the courses.
15A. The Nature of the Universe — (Enroll in Physics 15.) For undergraduates without scientific background. The structure, origin, and evolution of the universe and our growing knowledge of the objects which make it up; galaxies, stars, planets, etc. Discussion of some enigmas of modern astronomy; quasars, x-ray sources, black holes, and pulsars. Presentation is non-mathematical. DR:5(7)

3 units, Sum (Walker) MW 2:15-3:30

15B. Cosmic Horizons — (Enroll in Physics 15.) For the non-science student. Possible topics: the physical laws that govern the universe, its evolution from the initial primeval fireball through the formation of galaxies, stars, and planets to the development of life. Also, exotic astronomical objects, quasars, pulsars, and black holes. Some algebra is used. DR:5(7)

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

27. Evolution of the Cosmos — (Enroll in Physics 27.) Origin and evolution of astronomical objects, e.g., planets, stars, galaxies, and the universe at large, emphasizing modern development in astronomy and elementary particle physics relevant to the subject matter. The development of life and position of intelligent beings in the universe. Algebra used. Offered occasionally. Recommended: knowledge at the level of high school physics and calculus. DR:5(7)

3 units, Aut (Petrosian) TTh 11-12:15 discussion by arrangement

50. Astronomy Laboratory and Observational Astronomy — (Enroll in Physics 50.) Theory and use of an optical telescope and the interpretation of basic observational data to determine the physical properties of planets, stars, and galactic systems. Individual observations with a 16-inch Cassegrain telescope are supplemented by lectures which include discussions of basic observational techniques, astronomical catalogs and coordinate systems, and the relation of observations to astrophysical models. DR:5(7)

3-4 units, Aut (Walker) lecture M 4:15 lab by arrangement

100. Introduction to Observational and Laboratory Astronomy — (Enroll in Physics 100.) Introduction to observational techniques in astronomy for physical science or engineering students. Emphasis on measurement of fundamental astronomical parameters, e.g., 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 or prior or concurrent registration in Physics 25, 65, or 70; consent of instructor. DR:5(7)

4 units, Spr (Walker) M 3:15-5 lab by arrangement

106. Planetary Exploration — (Enroll in Electrical Engineering 106.) The other worlds of our solar system as revealed by recent space missions. Comparative properties of the terrestrial and Jovian planets; planetary atmospheres, surface, interiors; rings of Saturn; 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 (nuclear winter, runaway greenhouse, collision with an asteroid or large comet). Origin and evolution of planetary systems. Remote sensing from spacecraft at radio, infra-red, light, and ultraviolet wavelengths. U.S. and Soviet space programs and their comparative engineering and scientific aspects. Prerequisite: one year of college engineering, mathematics, or physics. DR:5(7)

3 units, Spr (Eshleman) MWF 9

160. Introduction to Stellar and Galactic Astrophysics — (Enroll in Physics 160.) 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 (Romani)

161. Introduction to Extragalactic Astrophysics and Cosmology — (Enroll in Physics 161.) 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 Physics 50 series or equivalent.

3 units, Win (Petrosian)

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

195. Terrestrial Planets — (Enroll in Geophysics 195.)
3 units (Sleep) alternate years, given 1994-95

262. Introduction to Gravitation and Astrophysics — (Enroll in Physics 262.)
3 units, Win (Wagoner) TTh 9:30-10:50

301. Astrophysics Laboratory — (Enroll in Physics 301.) Offered occasionally.
3 units, Sum (Walker)

312. Basic Plasma Physics — (Enroll in Applied Physics 312.)
3 units (Staff) alternate years, given 1994-95

360. Stellar Physics — (Enroll in Physics 360.)
3 units, Spr (Petrosian) alternate years, not given 1994-95

362. High Energy Astrophysics — (Enroll in Physics 362.)
3 units, Spr (Petrosian) alternate years, given 1994-95

3 units, Win (Sturrock) alternate years, not given 1994-95

364. Advanced Gravitation — (Enroll in Physics 364.)
3 units, Spr (Wagoner) alternate years, not given 1994-95

365. Extragalactic Astrophysics and Cosmology — (Enroll in Physics 365.)
3 units (Wagoner) alternate years, given 1994-95

450. Early Universe — (Enroll in Physics 450.)
3 units, Aut (Dimopoulos)

451. Inflation — (Enroll in Physics 451.)
3 units, Win (Suskind)

460. Astrophysics Seminar — (Enroll in Physics 460.) Discussion of current research and literature in astrophysics. Offered by faculty, students, and outside specialists.
1 unit, Aut, Win, Spr (Petrosian)

463. Special Topics in Astrophysics — (Enroll in Physics 463.) 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.

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
Senior Associate Athletic Director: Cheryl Levick
Associate Director: Thomas Beckett
Associate Athletic Director, Development: Jon Denney
Director, Major Gifts: John R. Kates
Associate Director, Financial Planning: Karen Bennett
Assistant Director, Marketing and Promotions: Jim Brungard
Assistant Director, Club Sports, Recreation, and Education Programs: Shirley H. Schoof
Student Services Officer: Susan Burk
Director, Physical Education: Elizabeth P. Weeks
Chair of Dance Division: Susan Cashion
Senior Lecturers: Susan Cashion, Anne Gould, Tony Morris-Kramer, Elizabeth Weeks

Lecturers: Halifu Osumare, Janice Ross

Sports Directors: Tim Baldwin (Golf, women), Steve Bourdow (Sailing), Frank Brennan (Tennis, women), Dante Dettamanti (Water Polo), Wallace Goodwin (Golf, men), Richard Gould (Tennis, men), Breck Greenwood (Gymnastics, women), Sadao Hamada (Gymnastics, men), Chris Horpel (Wrestling), Skip Kenney (Swimming, men), Wieslaw Kujda (Crew, men), Vin Lananna (Track and Field), Colin Lindores (Soccer, men), Mark Marquess (Baseball), Mike Montgomery (Basketball, men), Ruben Nieves (Volleyball, men), Sandy Pearce (Softball), Sherry Posthumus (Fencing, women), Richard Quick (Swimming, women), Richard Schavone (Diving), Don Shaw (Volleyball, women), Zoran Tulum (Fencing, men), Tara VanDerveer (Basketball, women), Bill Walsh (Football)

Sport Assistant Coaches: John Brenner (Crew, men), Monte Clark (Football), Denise Corlett (Volleyball, women), David Esquer (Baseball), Lele Forood (Tennis, women), Ross Gerry (Swimming, men), Tom Holmoe (Football), Jeff Jackson (Basketball, men), Carolyn Jenkins (Basketball, women), Ted Knapp (Swimming, men), John Kosty (Volleyball, men), Keith Larsen (Basketball, men), Lisa Mittel-Izzi (Gymnastics, women), Kim Oden (Volleyball, women), Doug Oliver (Basketball, men), Julie Plank (Basketball, women), Betsy Riccardi (Track and Field), Terry Shea (Assistant Head Coach, Foot-
Ross should consult with Dance Degree Adviser, Janice Ross. Bachelor's degree program. At the undergraduate level, students may design an independent, interdisciplinary major through the Dance Division. Teaching Specialists: Kate Coughlin, (Aerobics), Blake Middleton (Sailing), Jim Miller (Golf). Undergraduates may elect an Individually Designed Major in Dance. The Dance Division and/or Undergraduate Advising Center offers specific counseling for designing such a major. Undergraduates may also enter a coterminal degree program during their eighth quarter, permitting them to study simultaneously for the Master of Arts in Education/Dance Specialization degree and a bachelor's degree of their choice. The A.M. degree in Education/Dance Specialization addresses fundamental issues of how to nurture effective educational leadership. One of the major emphases 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 which 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.

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. At the undergraduate level, students may design an independent, interdisciplinary major through the Dance Division. Undergraduate students interested in such a major should consult with Dance Degree Adviser, Janice Ross.

DANCE DIVISION

The dance program focuses on the union of the physical and theoretical qualities of dance as aspects of human behavior and knowledge. Dancers learn the technical skills and communicative function of dance as an art form through theoretical and practical classes in a diversity of dance forms including: modern, ballet, jazz, social, and non-Western forms.

Dancers are encouraged to develop their own creative potential by choreographing and performing in works created by students, faculty, or visiting artists. The undergraduate classes, in particular, stress dance as a theatrical form. The emphasis is on enhancing a general appreciation of the performing arts and in offering students creative performing opportunities in modern dance and Ballet Folklorico de Stanford.

Undergraduates may elect an Individually Designed Major in Dance. The Dance Division and/or Undergraduate Advising Center offers specific counseling for designing such a major. Undergraduates may also enter a coterminal degree program during their eighth quarter, permitting them to study simultaneously for the Master of Arts in Education Dance Specialization degree and a bachelor's degree of their choice.

The A.M. degree in Education/Dance Specialization addresses fundamental issues of how to nurture effective educational leadership. One of the major emphases 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 which 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 by 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: basketball, baseball, crew, cross country, diving, fencing, football, golf, gymnastics, sailing, soccer, swimming, tennis, track and field, volleyball, water polo and wrestling; for women: basketball, baseball, crew, cross country, fencing, field hockey, golf, gymnastics, sailing, soccer, softball, swimming, diving, 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 which 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 aquatic, 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, the Encina Gym weight room, many intramural fields, outdoor volleyball courts, and tennis courts. Multipurpose rooms for aerobics, badminton, basketball, gymnastics, martial arts, volleyball, and wrestling 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 broadly based 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 which are exempt from this University policy are identified as (PE:X); no limit is placed on PE:X units counting toward graduation.

Units for satisfactory completion of a lower skill level class in the same sport or activity in which units have been received previously do not count 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 00 units. Zero-unit enrollment is allowed on a space-available basis,
Faculty and staff may take an activity class on a space-available basis with instructor consent after student enrollment is completed.

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. Cash is not acceptable. Checks or money orders should be made payable to "Stanford University". Fees are payable at the first class meeting 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 racket for badminton and tennis. Specific information on equipment and recommended class attire is available from the department or instructor.

Lockers — Lockers are available to rent (faculty/staff and students) from the equipment managers at Encina and Roble Gyms. 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.

Towels and Swim Caps — Towels may be purchased at the Encina and Roble Gym locker-rooms and subsequently exchanged, without charge, for clean towels. Swim caps are not required at either Roble or DeGuerre pools.

COURSES

DANCE ACTIVITY AND THEORY REGISTRATION FOR CLASSES

Registration for classes is held in Roble Gym on the day before instruction begins. Registration information is printed in the Time Schedule each quarter. Class sizes are limited; registration is required.

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 "Appendix" in the back of this bulletin.)
directed studies. Prerequisites: two quarters of 61 or equivalent. (PE:X)

2 units, Aut, Win, Spr (Morris-Kramer, Staff)


2 units, Aut, Spr (Frank, Staff)

165. Dance Heritage: History and Styles — Workshop/seminar on the origins of movement forms that have influenced Western contemporary dance, e.g., Duncan, Graham, Horton, Limón, Ailey, Cunningham. Specific approaches and techniques utilize cross-cultural and historical perspectives; studio work is amplified by lectures, films, and readings. (PE:X)

3 units, Win (Ross, Staff)

166. Public Performance — For students participating in movement oriented performance. (PE:X)

1 unit, Aut, Win, Spr (Morris-Kramer)

by arrangement

168. Performance Workshop — Workshop designed to explore and develop composition and performance skills. Required for participation in certain faculty and/or student-directed productions. (PE:X)

2 units, Aut, Win, Spr (Morris-Kramer, Frank)

169. Faculty Choreography — Rehearsal and performance of faculty choreography. Selection by audition. (PE:X)

1 unit, Aut, Win, Spr (Morris-Kramer)

170. 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 (Delmar)

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 — Designed for the intermediate dancer. Taught for increased technical skill and deeper cultural understanding.

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)

178. Mexican Dance Performance — Regional material of Mexico taught and rehearsed for rhythmic, stylistic, and technical proficiency. Performances on and off campus are planned and executed by students. Prerequisites: Mexican Dance and Folklore series or consent of instructor. (PE:X)

2 units, Aut, Win, Spr (Cashion)

179. Intermediate Mexican Dance — Regional material of Mexico taught and rehearsed for rhythmic, stylistic, and technical proficiency. Prerequisite: consent of instructor. (PE:X)

1 unit, Aut, Win, Spr (Cashion)

182. Jazz Dance II — Intermediate level emphasizing alignment, control, rhythmic coordination, and the learning of movement combinations. Prerequisite: 81 or equivalent.

1 unit, Aut, Win, Spr (Osumare)

183. Jazz Dance III — Advanced level of technical proficiency. Focuses on advancing performance skills of projection and movement quality. Prerequisite: consent of instructor.

1 unit, Win (Osumare)

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, Aut (Osumare)

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 (Osumare)

187. Improvisation Plus — Development of improvisation skills as a creative process for the craft of choreography, emphasizing concepts of design, form, and content. (PE:X)

2 units, Aut (Morris-Kramer)

196. Social Dances of North America II — Accelerated survey of partner dances found in American popular culture: foxtrot, quickstep, swing, tango, waltz. Prerequisite: some dance experience.

1 unit, Aut, Spr (Powers)

197. Argentine Tango and Swing — In-depth instruction of two dance forms that share common dynamics of partnering and improvisation. Advanced variations supplement foundation movements of each form.

1 unit, Win (Powers)

format. A variety of performance experiences including Viennese and Ragtime Balls.
2 units, Aut, Win, Spr (Powers)

ADVANCED

Designed for advanced undergraduates and graduates in the A.M. program.

100/200. Individual Study — Administrative internship or in-depth study of topics directly related to the discipline of dance. (PE:X)
1-3 units, Aut, Win, Spr (Ross)
by arrangement

267. Dance Teaching Internship — Methodologies of teaching dance and using music resources within a variety of classroom situations. Instruction and guided practice in the preparation of lesson plans, developing sequence and progression in class setting, and using accompaniment. (PE:X)
1-3 units, Aut, Win, Spr (Frank, Staff)
by arrangement

268. Society, Education, and Dance — (Same as Education 218.) 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. (PE:X)
DR:7(2)
3-5 units, Aut (Cashion, Ross)

269. Graduate Design Project — Three part, individually designed creative project required for completion of the master's degree. (PE:X)
5 units (Ross) by arrangement

290. Directed Research — Individual project in work of any choreographer, period, genre, or dance-related topic. Thesis work need not be exclusively in Dance Division. (PE:X)
1-4 units (Ross) by arrangement

PHYSICAL EDUCATION AND SPORTS THEORY

PE:X indicates that the course is exempt from the 12-unit policy.

190. Analysis of Human Movement — Overview of skeletal and muscular anatomy and 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

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)
by arrangement

142. Teacher Training: Student Assistant — Directed observation, individual and small 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/coaching 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.
2 units, 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, 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 back stroke. Additional strokes introduced as ability warrants.
1 unit, Aut, Spr (Dettamanti, Weeks)

131. Swimming II: Advanced Beginning — For those with limited swimming ability and safety skills who are not fully comfortable in the 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, Kenney)

132. Swimming III: Intermediate — Continued work on crawl, elementary backstroke, and backstroke. Safety skill work as needed. Introduction to or review of breaststroke, sidestroke, and open turns. Introduction to conditioning. Prerequisites: fair technique in crawl, elementary backstroke, breaststroke, and sidestroke; ability to swim approximately 100-200 yards continuously by mixing strokes.
1 unit, Aut, Win, Spr (Weeks, Kenney, Quick, Gerry)

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 400-500 yards continuously.
1 unit, Aut, Win, Spr (Kenney, 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 (Kenney, Dettamanti, Quick, Knapp)

138. Swimming Officiating — Rules, scoring records, responsibilities of officials. Practical experience in organizing meets as well as development of officiating skill and technique in meet situation.
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. Prerequisites: 17 years of age, swimming skills at Red Cross Learn to Swim Level VI (pass test) and pass Emergency 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)

5. Aerobics Instructor — Designed to prepare potential teachers to lead a safe, effective, and creative aerobics class. Comprehensive study of structure and function of body. Includes complete study of "Instructor's Manual" and prepares student to pass IDEA Teacher’s Certification exam. Prerequisites: 3 or 4 or equivalent, and consent of instructor. (PE:X)
3 units, Win (Coughlin)

1 unit, Aut, Win, Spr (Dettamanti, Corlett)

9. Badminton: Intermediate/Advanced — Review of all fundamental strokes with emphasis on refine-

1 unit, Aut, Win, Spr (Schavone, Corlett)

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 (Schavone, Corlett)

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 (Schavone, Corlett)

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1 unit, Aut, Win, Spr (Schavone, Corlett)

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1 unit, Aut, Win, Spr (Schavone, Corlett)

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1 unit, Aut, Win, Spr (Schavone, Corlett)

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 (Schavone, Corlett)

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1 unit, Aut, Win, Spr (Schavone, Corlett)

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 (Schavone, Corlett)

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 (Schavone, Corlett)
148. **Tennis: Beginning** — Covers fundamental strokes (forehand, backhand, serve, and net play), rules, and scoring. Fee.
   1 unit, Aut, Win, Spr (A. Gould, D. Gould, Forood, Whitlinger)

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. Fee.
   1 unit, Aut, Win, Spr (A. Gould, Whitlinger)

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. Fee.
   1 unit, Aut, Win, Spr (A. Gould, Schavone, Horpel, Forood)

151. **Tennis: Advanced** — Review of fundamental strokes. Drills to emphasize footwork, serve and return, approach shot and volley, lob, and overhead. Strategy for competition in singles and doubles. Prerequisites: well above average stroking and game playing ability. Fee.
   1 unit, Aut, Win, Spr (Brennan, A. Gould, Horpel, Whitlinger, Forood)

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, A. Gould, Whitlinger)

   1 unit, Aut, Win, Spr (Staff)

154. **Weight Training: Intermediate** — Review of basic exercises and techniques. Emphasis on individualized programs and learning use of all available machines and free weights. Further discussion on exercise physiology. Prerequisite: 174 or thorough knowledge of basic weight training principles. Fee.
   1 unit, Aut, Win, Spr (Staff)

155. **Weight Training for Women** — Introduction to techniques and equipment for weight training, especially Universal Gym. 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 (Riccardi, Mitzel-Izzi, A. Gould, Johnson)

156. **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.
   1 unit, Spr (Horpel)

**MARTIAL ARTS**

All classes below are subject to the 12-unit limitation policy.

85. **Aikido** — A Japanese martial "way" or harmony with the principles and forces of nature. 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)

88. **Kenpo Karate: Beginning** — Fundamental stretching and conditioning. Introduction to basic moves, self-defense techniques, forms, light sparring. Emphasis on physical/mental control. Simple


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.

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.

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 45 of the 81 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.

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 Shaolin postures used to develop more flexibility and leg strength. Fee.

98. Tai Chi Chuan: Advanced — Refine and study in greater detail the postures of the Slow Yang style of Tai Chi Chuan learned in 96 and 97. Related Tai Chi practices such as Fast-Tai Chi, Tai Chi Sword, and Tai Chi Broadsword. Fee.

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 (Davis) women’s team
Aut, MTWThF 3:15-6
Win, MTWThF 3:15-6, S 7-10
Spr, MTWThF 6-8:30, 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, epee, and saber teams and women’s foil team.
1-2 units (Tulum, Posthumus)
Aut, Win, MTWThF 3-5:30

46V. Field Hockey: Varsity (women’s team)
1-2 units (Johnson)
Aut, MTWThF 3-5:30
Win, MWF 8-10
Spr, MTWThF 3:30-5:30

49V. Football: Varsity (men’s team)
1-2 units (Walsh, Staff)
Aut, TWTTh 4-6, F 4-4:30
Win, MTWThF 3:30-5
Spr, MWF 4-6, S 9:30-11:30

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, Spr, SuMTThF 2-5:30
Win, SuMTThFS 2-5:30

110V. Sailing: Varsity (coed and women's teams)
1-2 units (Bourdow)
Aut, TThF 2:30-6
Win, Spr, WF 2:30-6

124V. Soccer: Varsity (men's and women's teams)
1-2 units (Lindores) men's team
Aut, MTWThFS 3:30-5:30
Win, Spr, TWTThF 3:30-5:15
1-2 units (Staff) women's team
Aut, MTWTThF 3:15-5:15

127V. Softball: Varsity (women's team)
1-2 units, Aut, Win, Spr (Pearce)
MTWTThF 3:30-5:30

136V. Synchronized Swimming Team (women)
1-2 units, Aut, Win, Spr (Weir)
MTh 6-8, T 6-8 p.m., Su 8:30-12

137V. Swimming: Varsity (men's and women's teams)
1-2 units, Aut, Win, Spr
(Kenney) men's team
MTWTThF 6-8, 2:15-4:30, S 7-10
(Quick) women's team
MTWTThF 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
MTWTThF 2:30-5:30
(Brennan) women's team
MTWTThF 2:30-5:30

157V. Track and Field: Varsity (men's and women's teams)
1-2 units, Aut, Win, Spr
(Lananna) MTWTThF 2-5

166V. Volleyball: Varsity (men's and women's teams)
1-2 units (Nieves) men's team
Aut, MTWTThF 1-4
Win, Spr, MTWTThF 4-7
1-2 units (Shaw) women's team
Aut, MTWTThF 4-7
Win, Spr, MTWTThF 1-4

184V. Wrestling: Varsity (men's team)
1-2 units (Horpel)
Aut, MTWTThF 3:15-5:30, S 10-12
Win, MTWTThF 3:15-5:30, M 10-11 p.m.,
W 8-8:30, S 10-12
Spr, MW 4-5:30, TTh 3-4

CLUB SPORTS
All classes below are subject to the 12-unit limitation policy.

The Stanford Club Sports Program is affiliated with the department but is initiated, organized, and conducted by students. All clubs are coeducational except as specified. Clubs, whose instructional classes meet the criteria for academic credit, are scheduled for meeting times as published each quarter in the Time Schedule. For additional information, contact Club Sports Director Shirley Schoof.

11C. Badminton Club Team
1 unit, Aut, Win, Spr

32C. Cycling Club Team
1 unit, Aut, Win, Spr

36C. Equestrian Club Team
1 unit, Aut, Win, Spr

70C. Horse Polo Club Team
1 unit, Aut, Win, Spr

72C. Ice Hockey Club Team (men)
1 unit, Aut, Win

75C. Lacrosse Club Teams (men's and women's teams)
1 unit, Aut, Win, Spr

88C. Judo Club Team
1 unit, Aut, Win, Spr

104C. Rugby Club Teams (men's and women's teams)
1 unit, Aut, Win

118C. Ski Club Team
1 unit, Win

Additional clubs (Bowling, Cricket, Racquetball, Squash, Ultimate Frisbee, and Women's Water Polo) schedule activities each quarter for no credit.

BIOLOGICAL SCIENCES

Emeriti: (Professors) Arthur C. Giese, Daniel Mazia, David D. Perkins, Colin S. Pittendrigh, John H. Phillips, Jr., David C. Regnery, Dow O. Woodward; (by courtesy) C. Stacy French

Chair: Robert D. Simoni
Associate Chair: Patricia P. Jones

Professors: Bruce S. Baker, Winslow R. Briggs, Allan M. Campbell, Paul R. Ehrlich, David Epel, Marcus W. Feldman, Paul B. Green, Philip C. Hanawalt (on leave Autumn), H. Craig Heller,
The facilities and personnel of the Department of Biological Sciences are housed in the Gilbert Building, Herrin Laboratories, Herrin Hall, and 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 non-major; (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 conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities" as stated in the back 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. Many courses use the preserve. Stanford-based research at Jasper Ridge presently 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 systematics of these groups. Entomological collections, restricted to those being used in particular research projects, are housed in the Herrin Laboratories. No general collections are maintained except for teaching purposes.

The Falconer Biology Library in Herrin Hall contains over 1200 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 many 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 departmental 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>
</tr>
</thead>
<tbody>
<tr>
<td>Biology 31</td>
<td>5</td>
</tr>
<tr>
<td>Biology 32</td>
<td>5</td>
</tr>
<tr>
<td>Biology 33</td>
<td>5</td>
</tr>
</tbody>
</table>
Biology 44X 4
Biology 44Y (may be replaced by 4 units of 175H) 4
Total ................................................. 23
Electives ............................................. 21

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. 141 or beyond; Biology 175H. 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 21 elective unit requirement.

Responding 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 1993 and beyond.

The program for the junior and senior year should include a total of 21 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 remainder of the 21 units can include more courses from this central menu, or courses available in diverse areas directly after the core, and/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
   Molecular Biology: Bio. 119
   Genetics: Bio. 118 (may be used to satisfy either area I or II requirement)

2. Cell/Developmental
   Cell Biology: Bio. 121
   Developmental Biology: Bio. 208

   Genetics: Bio. 118 (may be used to satisfy either area I or II requirement)

3. Organismal
   General Botany: Bio. 120 or Plant Physiology: Bio. 156
   Human Physiology: Bio. 112
   Introduction to the Nervous System: Bio. 153
   Problems in Marine Biology: Bio. 175H
   Viruses: Bio. 213 or Introductory Microbiology: Microbio. & Immunology 101
   Problems in Marine Biology: Bio. 175H
   Vertebrate Biology: Bio. 110

4. Population
   Evolutionary Genetics: Bio. 111
   Principles of Ecology: Bio. 176
   Behavioral Ecology: Bio. 181

   No more than 6 units from any combination of individual instruction courses (175H, 178, 194, 195, 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, specific needs.

   Additionally, even though only two or three quarters of physics are required, students should be aware that many graduate and professional schools (e.g., medicine and education) require a year of general physics with a lab. Biological Sciences majors are therefore advised to take the year-long physics sequence Physics 21, 22, 23, 24, 25, 26 (or Physics 51, 52, 53, 54, 55, 56, 57, 58).

   For students considering the 15-unit research course at Hopkins Marine Station during Spring Quarter (175H), 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

   Course No. and Subject  Qtr. & Units
   ------------------------  --------  ----
   Chem. 31, 33, 35, 36  4  4  7
   Math. 19, 20, 21. Calculus and Analytic Geometry  3  3  4
Freshman Requirements or Electives | 8 | 8 | 6
Totals ........................................... | 15 | 15 | 17

SECOND YEAR

A | W | S

Biology 31. Principles of Biology | 5
Biology 32. Principles of Biology | 5
Biology 33. Principles of Biology | 5
Biology 44. Core Experimental Laboratory | 4 | 4
Chem. 130 or 132; 131; 135 (or 171) Organic and Physical Chemistry | 8 | 3
Distribution Requirements or Electives | 3 | 5 | 8
Totals ........................................... | 16 | 17 | 17

THIRD YEAR

A | W | S

Physics 21, 22, 23, 24 Introductory Physics | 4 | 4
Distribution Requirements or Electives | 11 | 11 | 15
Totals ........................................... | 15 | 15 | 15

FOURTH YEAR

A | W | S

Electives | 15 | 15 | 15

TRANSFER STUDENTS

Due to 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 adviser soon after arrival.

All transfer courses intended to fulfill department requirements must be evaluated on Evaluation of Transfer Course Content forms (available in the Student Services office) which will be kept in the student's file. This is a departmental procedure that is separate from the process of having units earned at other institutions transferred for Stanford credit and which will appear on the Stanford transcript.

HONORS PROGRAM

In order 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 a 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 14 if graduating Spring Quarter and by mid-quarter prior to graduation in any other quarter; (4) if graduating in June, participate in the Achauer 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. de-
Prospective graduate students should request a foreign language is recommended. Mathematics through calculus. Reading knowledge through organic chemistry, general physics, and background training during the first year of graduate work include courses in chemistry courses in biology, it is recommended that prepare 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.

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 in 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 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 the Graduate Admissions Section of the Registrar's Office. The deadline for receipt of 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 are normally 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 "Degrees" section in 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 the departmental advising committee. All first-year graduate students in the Ph.D. program are required to take Biology 301 in the first year.

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 departmental 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.
The Advising Committee — At the time of admission, each incoming graduate student is assigned an advising committee consisting of three faculty members. The advising committees meet with each student before the first quarter to plan an integrated first-year program, taking into consideration the student's needs in an area of specialization and deficiencies both in and out of the specialty. At the end of the first quarter, the advising committee meets with the student to review and approve three research proposal topics to be developed during the Winter, Spring, and Summer Quarters of the student's first year. The research proposal topics should be presented in a format similar to that of NSF grant proposals and should be 8-12 pages in length. At least two of three concentration areas (Cell/Molecular Biology, Integrative Biology, Population Biology, and Ecology) must be represented. The review process for one of three research proposal topics includes an oral presentation and an oral examination in the area of the proposal. The evaluation of the three research proposals by the faculty is one of the major components of the first-year evaluation process. The advising committee continues to function until a dissertation committee (including the prospective major professor) has been chosen. This choice should be completed no later than the beginning of the second year. The prospective major professor should ordinarily be a member of the Department of Biological Sciences. The selection of a major professor elsewhere in the University requires special permission from the chair of the department and the chair of the Graduate Studies Committee.

The Dissertation Committee and the Departmental Oral Examination — No later than the end of the Spring Quarter of the second year, the student, in consultation with the dissertation committee, submits a dissertation proposal describing an area of specialization and a general outline of proposed research. The student then defends the dissertation proposal in an oral examination administered by the dissertation committee. The exam covers the proposed dissertation and the area of specialization. Success in the departmental oral examination is followed by advancement to candidacy. The dissertation committee remains active for advice and guidance during the remainder of the student's graduate training, including the period of dissertation preparation and oral defense. Work should be planned so as to complete the entire Ph.D. program within four to five years.

The dissertation is a contribution to knowledge which is the result of independent work expressed in satisfactory form. Abstracts of Ph.D. theses are published in Dissertation Abstracts.

The University oral examination consists of a formal seminar open to the public, followed by a closed session for questioning. The examination is taken after the dissertation is completed in draft form and approved by all members of the reading committee. More information on oral examination procedures is available at the Student Services office.

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 vs. other needs, and decide whether further study of a foreign language should be undertaken.

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. Enrollment limited to 50. 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, Win, Spr (Staff) Th 12:15

8S. Introduction to Human Physiology — Preparation for the college premedical curriculum through an overview of human physiology. Topics: biochemistry, the nervous system, respiratory system,
major organs, metabolism, and disease. Prerequisites: 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) MTWThF 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 adapting organisms to different environments. A major theme is the mechanisms by which the functions of each system are controlled and regulated. Prerequisites: see above.

5 units, Win (Jones, McConnell, Heller, Sapolsky) MTWThF 10 plus optional discussion sections

33. Plant and Population Biology — Core lecture covering plant physiology and development, biological diversity, evolution, and ecology. Topics: control and transmission of 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 4:30-9:30 p.m., W, Th, or F 12:30-5:30

44Y. 4 units, Spr (Staff) lab T 4:30-9:30 p.m., W, Th, or F 12:30-5:30

50. Biology and the Oceans — Lectures introduce life in the sea, aspects of organismal diversity, ecology, biogeography, biological oceanography, and physical oceanography. Two weekend field trips to Hopkins Marine Station provide "hands on" experience with the marine world: may include collecting trips; whale observations; a tour of the Monterey Bay Aquarium; lab dealing with fertilization of sea urchin eggs, octopus behavior, wave dynamics, etc. Accommodations provided by Hopkins Marine Station. Enrollment limited to 40 by consent of instructors. DR:5(7)

4 units, Win (Denny, Staff) TTh 1:15-2:30 alternate years, not given 1994-95

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

ADVANCED UNDERGRADUATE AND GRADUATE

105H. Subtidal Communities — For course description, see Hopkins Marine Station section.

6 units, Sum (Staff) by arrangement

110. Vertebrate Biology and Lab — (Same as Human Biology 110.) The evolution, form, function, and behavior of the vertebrates, from primitive fishes to birds and mammals, including humans.

5 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.

4 units, Win (Watt, Feldman, Ehrlich) MWF 9 discussion by arrangement

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 physiol-
ogy, respiration, salt and water balance, exercise and gastrointestinal physiology. Lectures/discussion. Prerequisite: Biology or Human Biology core.

4 units, Win (Heller, Staff) MWF 9

113H. Introduction to Oceanic Biology—For course description, see Hopkins Marine Station section.

6 units, Sum (Staff) by arrangement

115. Evolutionary Ecology— (Same as Human Biology 102.) Basic concepts of evolutionary ecology, including population growth, foraging, reproductive and life history strategies, predator/prey, and competitive and mutualistic interactions among species. Prerequisites: Human Biology 2A, or Biology 33, or equivalent; Math. 20 or 41, or equivalent; or consent of instructor.

4 units (Boggs) not given 1993-94

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 on understanding experimental design and interpretation. Prerequisite: Biology core.

3 units, Win (Schimke, Yanofsky) MWF 11 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, Spr (Kopito, Cyert) TTh 9-10:30

122. Experimental Molecular Biology—Lab covering fundamental methods in modern molecular biology. Most topics are performed as part of a research project in which the students characterize differentially expressed Drosophila genes. Provides familiarity and competence in handling and manipulation of DNA, RNA, and proteins. Limited enrollment; by petition only. Prerequisites: Biology Core, 44X, 44Y, and consent of instructor.

5 units (Macdonald) not given 1993-94

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, Spr (Macdonald) TTh 1:15-2:30

124. Plant Adaptations in the Changing World—The physiological ecology of plants of diverse environments. Prerequisites: 32, 33; or consent of instructor.

4 units, Win (Mooney, Berry, Field) TTh 11 alternate years, not given 1994-95

125. Ecosystems of California—Principles of ecosystem function with emphasis on vegetation components and on California systems. Prerequisite: 33 or Human Biology 2A.

3 or 4 units, Spr (Mooney) TTh 11

128. Systematics and Ecology of Vascular Plants—Lectures, lab, field studies. Prerequisite: consent of instructor.

4 or 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 (Fultz, Grossman) alternate years, given 1994-95

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 (J. Thomas) alternate years, given 1994-95

132. Seed Plants—Structure, development, and evolutionary relationships of seed plants. Lectures,
lab, field trips. Prerequisites: 32, 33; or consent of
instructor.

5 units, Win (J. Thomas) TTh 1:15
alternate years, not given 1994-95

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. Prereq-
uisites: Biology or Human Biology core, or consent
of instructor. DR:5(7)

4 units, Win (J. Thomas) MWF 11
alternate years, not given 1994-95

134. Replication of DNA — Modes of DNA repli-
cation and their control in prokaryotic and eukary-
otic 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 (Hanawalt)
alternate years, given 1994-95

136H. Cell and Molecular Biology of Early De-
v elopment — For course description, see Hopkins
Marine Station section.

6 units, Sum (Epel) by arrangement

137. Plant Genetics — Gene analysis, mutagenesis,
and transposable elements; developmental genetics
of flowering and embryo development; biochemi-
cal genetics of plant metabolism; and lessons from
transgenic plant studies. Prerequisite: 118 or con-
sent of the instructor.

3 units (Walbot)
alternate years, given 1994-95

138H. Biomechanics of Intertidal Organisms —
For course description, see Hopkins Marine Station
section.

6 units (Denny) alternate years, given 1994-95

140. Biostatistics — Introduction to the statistical
analysis of biological data. Lectures, discussion,
and student exercises. DR:4(6)

4-5 units, Win (Feldman) MWF 1:15

149. Neural Basis of Sleep and Circadian
Rhythms — (Same as Human Biology 124.) Re-
view of current research. The phenomenon of sleep
from neuropsychiological, neurochemical, and neu-
roendocrinological 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 (Heller, Miller) not given 1993-94

153. Cellular Neuroscience: Cell Signaling and
Behavior — (Same as Psychology 107.) Survey of
neural mechanisms and interactions underlying be-
havior. Recommended: 32 or Human Biology 4A.

4 units, Aut (Wine) TTh 1:15-2:30

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, Win (Ray) MWF 10 discussion TTh 10
alternate years, not given 1994-95

157. Plant Biochemistry — Biochemical basis of
plant structure and function: mechanisms of photo-
synthesis and plant respiration; mineral metabo-
lism, including N2 fixation; special features of plant
nuclear and organelle genomes; cell wall polymers;
protein and polysaccharide biosynthesis and its regu-
lation; formation and mobilization of storage re-
erves; biosynthetic pathways for hormones, pig-
m ents, and other secondary products. Prerequisites:
Biology core or consent of instructor. Recom-
manded: 120, Biochemistry 200.

3 units (Ray, Grossman, Berry)
alternate years, given 1994-95

158/258. Developmental Neurobiology — (Gradu-
ate 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 (McConnell)
alternate years, given 1994-95

160H. Problems in Subtidal Ecology — For course
description, see Hopkins Marine Station section.

6 units, Sum (Staff) by arrangement

163/263. Human Behavioral Biology — (Graduate
students register for 263; 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 multidis-
iciplinary way. Relevant disparate disciplines: so-
ciobiology, ethology, neuroscience, and endocri-
nology are integrated in examining behaviors such
as aggression, sexual behavior, language use, men-
tal illness.

5 units, Spr (Sapolsky) MWF 1-2:30 plus
optional discussion section by arrangement
alternate years, not given 1994-95
168. Vegetation and Fire — 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 (J. Thomas) alternate years, given 1994–95

170. Microscopy for Biologists — (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

175H. Problems in Marine Biology — For course description, see Hopkins Marine Station section.

15 units, Spr (Block, Denny, Epel, Gilly, Levine, Powers, S. Thompson) by arrangement


3 units, Aut (Roughgarden) TTh 10


4 units, Spr (Gordon, Chiariello, Mooney) by arrangement

180. Conservation Biology — (Same as Human Biology 119.) Introduction to the science of preserving biological diversity, its principles, policy, and application. Topics: biology of small populations, extinction, minimum viable population analysis, habitat fragmentation, reserve design and management, the Endangered Species Act, and conflict mediation. Case studies and local field trips illustrate topics. Prerequisites: 33, Human Biology 2A, or consent of instructor.

4 units (Boggs, Launer) not given 1993–94

181/281. Behavioral Ecology — (Graduate students register for 281.) 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.

4 units, Win (Gordon) TTh 10 discussion by arrangement

183. Colloquium on Population Studies — (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

184. Biology of Insects — Introduction to the functional biology of insects. Insect anatomy, biochemistry, behavior, ecology, physiology and systematics, and specialized topics illustrating emphasizing unusual features of insects which make them useful in research. Prerequisite: Biology core or consent of instructor.

3-5 units (Watt) not given 1993–94

185. Colloquium on Biosystematics and Evolution — Panel discussion and outside speakers covering diverse topics of current interest in the systematics and evolution of living diversity; sponsored jointly with the California Academy of Sciences.

1 unit (Watt) alternate years, given 1994–95

189. Biology of Birds — Ways birds interact with their environments and each other, emphasizing studies that had impact in the fields of population biology, community ecology, and evolution. Students become familiar with local bird communities; emphasis is on field research. Two three-hour lecture/lab/field trips per week. Enrollment limited to 20. Prerequisites: 33 or equivalent, birding experience, and consent of instructor.

3 units (Ehrlich) alternate years, given 1994–95

190. Population Biology of Butterflies — 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. Students must register both quarters for field work credit. Prerequisites: 33 and consent of instructor.

2-5 units (Ehrlich) alternate years, given 1994–95

191. Research in Bird Biology — Semi-independent field research in ornithology, emphasizing ecological relationships. Projects complement ongoing research, planned and carried out by the student in consultation with the instructor. Results are written in publication format. Enrollment limited. Prerequisites: 33 or 115, concurrent or subsequent enrollment in 189, and consent of instructor.

3 units, Win, Spr (Ehrlich) by arrangement
194. Practical Research Experience — Students obtain summer internships in relevant industrial or research activities. Extensive report on the experience is required. Restricted to Biological Sciences majors; requires departmental approval. No more than 10 cumulative units.

1-10 units, Aut (Staff) by arrangement

195. Applied Ecology — Independent studies at the Jasper Ridge Biological Preserve. Directed research on the application of ecological principles to the management of natural systems. Prerequisite: consent of instructor.

1-3 units, Aut, Win, Spr (J. Thomas, Field, Vitousek) 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 departmental approval.

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 departmental approval. Completion of 10 units of 199 required for graduation with departmental honors. See description of honors program above.

199H. Undergraduate Research — For undergraduate research done under supervision of Hopkins Marine Station faculty.

PRIMARILY FOR GRADUATE STUDENTS

205. DNA Repair and Mutagenesis — Interactions of mutagens and carcinogens with DNA. Response of living systems to damaged genetic material, including molecular mechanisms for DNA repair. Inducible repair responses and "error-prone" mechanisms. Human hereditary deficiencies in DNA repair. Relationships of DNA repair to mutagenesis and carcinogenesis. Prerequisites: 31, 118, and 119, or consent of instructor.

3 units (Hanawalt) alternate years, given 1994-95

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). Aquaints graduate students and advanced undergraduates with important current developmental biology. Small groups of students and faculty discuss current papers in depth, augmenting lectures. Team taught by department faculty. Undergraduate prerequisite: consent of instructor. Recommended: familiarity with basic techniques and experimental rationales of molecular biology, biochemistry, and genetics.

5 units, Spr (Baker, Clayton, Fuller, Hogness, Kaiser, Kim, Nusse, Scott, Shapiro, Spudich, Weissman) MWF 9-10:50

209. Advanced Neurosciences Laboratory — 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, Win (Heller) W 1:15-5:05 and by arrangement

213. Viruses — Principles of virus growth, genetics, architecture, and assembly. Relation of temperature 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 genetics; macromolecular phylogeny and protein clocks. Prerequisites: Biology core or substantial equivalent.

3 units, Aut (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 ecosystem; land-water and biosphere-atmosphere interactions; global element cycles and their regulation; human effects on bio-
geochemical 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 — Review of various 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 and math through differential equations, or consent of instructor. 3 units, Win (Schneider) alternate years, not given 1994-95

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, and 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 biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences and engineering. 3 units (Boxer, Goochee, Kornberg, Yanofsky) alternate years, given 1994-95

248. Regulatory Biochemistry in Higher Eukaryotes — Lecture/discussion on aspects of the regulation of protein synthesis and degradation in higher organisms, emphasizing molecular mechanisms involved in developmental processes and actions of hormones. Prerequisites: Biochemistry 201, 202. Recommended: 252. 4 units, Win (Schimke) TTh 4:15 alternate years, not given 1994-95

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 1994-95

271. Techniques in Electron Microscopy — Practical training in use of transmission and scanning microscopes. Specimen preparation, sectioning, microscope operation, photography, and interpretation. Recommended: general theory as in 170. 3-4 units, Win (F. Thomas) by arrangement

279. Mathematical Models in Population Biology — (Same as Math. 126/226.) For advanced undergraduates and beginning graduate students in biology and mathematics. Topics: elements of population genetics and ecology, models of the evolution of behavioral traits (kin, altruism, group selection), theoretical studies of mating patterns in natural populations, problems of optimality of population sex ratio, population, growth model, age structure, and life histories. Prerequisites: Math. 43, 103. Recommended: Math. 130. 3 units (Feldman, Karlin) not given 1993-94

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

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-de-
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.
   1-3 units, Aut (Staff) MWF 9

302. Seminar in Plant Ecology — Discussions of current research in plant ecology. Prerequisite: consent of instructor.
   1-3 units, Aut, Win, Spr (Mooney) by arrangement

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 consent of instructor.
   1-2 units, Aut, Win, Spr (Jones) M 12:15

   3 units, Aut (Green, Walbot) MWF 9 alternate years, not given 1994-95

342. Plant Biology Seminar — Topics announced at the beginning of each quarter. In-depth coverage of the current literature.
   1 unit, Spr (Berry, Bjorkman, Briggs, Grossman, 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, Spr (Walbot, Hoffman, Somerville, Grossman) MWF 1:15 alternate years, not given 1994-95

345. Seminar in Genetics and Molecular Biology — 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

346. Seminar in Regulatory Biology — Literature review of selected topics in eukaryotic regulatory biology. Prerequisite: consent of instructor.
   1-3 units, Aut, Win, Spr (Schimke) M 2:15

349. Seminar in Population Ecology — Prerequisite: consent of instructor.
   1-3 units, Aut, Win, Spr (Ehrlich) by arrangement

354. Seminar in Population Biology — Prerequisite: consent of instructor.
   1-3 units, Aut, Win, Spr (Ehrlich, Roughgarden, J. Thomas, Vitousek, Watt) 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

381. Seminar in Behavioral Ecology — 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

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

384. Seminar in Theoretical Ecology — (Same as Geophysics 385Y.) Discussions of recent and classical research papers in ecology, and presentation of
work in progress by seminar participants. Prerequisite: consent of instructor.

1-3 units, Spr (Roughgarden) by arrangement

DIVISION OF MARINE BIOLOGY HOPKINS MARINE STATION

Emeriti: (Professors) Arthur C. Giese, Daniel Mazia, John H. Phillips, Jr., Colin S. Pittendrigh

Director: Dennis A. Powers
Professors: David Epel, Dennis A. Powers, Jonathan Roughgarden
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 good 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.

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.

COURSES

AUTUMN, WINTER, AND SPRING

175H. Problems in Marine Biology — Designed primarily to engage advanced undergraduates in research. Lectures, lab work, field studies, and individual problems. Spring Quarter is in residence at the Marine Station, Pacific Grove. Prerequisites: junior or senior standing in biology, and consent of instructors.

15 units, Spr (Block, Denny, Epel, Gilly, Levine, Powers, Thompson) by arrangement

199H. Undergraduate Research — For experience in biological research, qualified undergraduate students may undertake individual work in the fields listed under 300H. Preference to Stanford students who have already completed 175H and wish to continue their studies, and to Stanford biology students enrolled in the c terminal M.S. program. Arrangements must be made by consultation or correspondence.

(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.

SUMMER

FIRST TERM

105H. 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

113H. 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

136H. Cell Biology of Early Development — Postgraduate 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

138H. 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) alternate years, given 1994-95

199H. Undergraduate Research — (See 199H above, Autumn, Winter, and Spring Quarters.)

300H. Research — (See above 300H, Autumn, Winter, and Spring Quarters.)

SECOND TERM

160H. 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

199H. Undergraduate Research — (See 199H above, Autumn, Winter, and Spring Quarters.)

300H. Research — (See above 300H, Autumn, Winter, and Spring Quarters.)

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

Committee on Biophysics: Steven G. Boxer, Chair (Chemistry); Robert Baldwin (Biochemistry), Oleg Jardetzky (Pharmacology), Roger Kornberg (Cell Biology), Harden M. McConnell (Chemistry)

Professors: Richard W. Aldrich (Molecular and Cellular Physiology), Robert L. Baldwin (Biochemistry), Martin J. Brown (Radiology), David A. Clayton (Developmental Biology), Sebastian Doniach (Applied Physics), Amato Giaccia (Radiation Oncology), John Griffin (Chemistry), Philip C. Hanawalt (Biological Sciences), Keith O. Hodgson (Chemistry), Wray H. Huestis (Chemistry), Oleg Jardetzky (Pharmacology), Daniel Herschlag (Biochemistry), Norbert Pelc (Radiology), 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):
   a) Biophysics 250
   b) Biochemistry 200, 201
   c) Chemistry 131, 171, 173, and 175
   d) Additional courses as required for the individually tailored program.
3. Proficiency in one or more foreign languages and/or a computer language may be required at the discretion of the major professor.
4. Opportunities for teaching are available during the first nine quarters, at the discretion of the advising committee.
5. Passing of a comprehensive qualifying examination in biophysics is required for admission to Ph.D. candidacy. This examination is normally taken early in the second year of study, and it emphasizes the area of specialization in biophysics.
6. Preparation of a Dissertation Proposal defining the research to be undertaken, including methods of procedure. This proposal should be submitted by Spring Quarter of the second year, and it must be approved by a committee of at least three members including the principal research adviser and at least one member from the Committee on Biophysics. The candidate must defend the dissertation proposal in an oral examination. The Dissertation Reading Committee normally evolves from the Dissertation Proposal Review Committee.
7. Presentation of a Ph.D. dissertation as the result of independent investigation and expressing a contribution to knowledge in the field of biophysics.
8. Passing of the University oral examination, taken only after the student has substantially completed the research. The examination is preceded by a public seminar in which the research is presented by the candidate.

COURSES


3 units (Hanawalt) given 1994-95

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 1993-94

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 1993-94

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)

225. Molecular Motors and the Cytoskeleton — (Enroll in Biochemistry 225, Developmental Biology 225.) The molecular basis of energy transduction that leads to movements generated by microfilament-based and micro-tubule-based motors. Molecular motors include forms of myosin, dynein, and kinesin. 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 1993-94
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; 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 (Levitt)

3 units, Win (Weis, 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)

250. Seminar in Biophysics—All graduate students in Biophysics must participate. Presentation of current research projects and results by all faculty in the Biophysics Program.
1 unit, Aut, Win (Staff)

289. Biophysical Chemistry —(Enroll in Chemistry 289.) Experimental methods in biophysics. Emphasis on spectroscopic techniques including magnetic resonance and optical methods.
3 units (Staff) not given 1993-94

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)

297. Biophysical Chemistry —(Enroll in Chemistry 297.) 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 biochemistry not necessary. Group theory and a basic understanding of quantum mechanics and molecular orbital theory is assumed.
3 units, Win (Solomon) MW 9-11

300. Research (Staff) by arrangement

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), Cherie Burgess (Student), Shannon Dade (Student), Sally Dickson (Office of Multicultural Development), Horace Porter (English, African and Afro-American Studies), Rob Robinson (Student, Drama), Anna Deveare Smith (Drama), Victor Walker (Drama), Judith Williams (Student, Drama)
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.

**29. Theater Performance: Acting**—(Enroll in Drama 29.) Students cast in departmental productions receive credit for participation in Graduate Directing Workshop projects and major productions (units determined by instructor). Prerequisite: consent of instructor.
1-3 units, any quarter (Staff) by arrangement

**39A,B,C. Theater Performance: Crew**—(Enroll in Drama 39A,B,C.) Students receive credit for participation in the design and technical areas of departmental productions.
1-3 units, any quarter (Staff)

**59A,B,C. Dance Theater Production**—(Enroll in African and Afro-American Studies 59.) Students may receive credit for technical and dance performance in committee productions.
1-5 units, Aut, Win, Spr (Staff)

**105. Introduction to African and Afro-American Studies**—(Enroll in African and Afro-American Studies 105, Anthropology 105.) Lectures explore interdisciplinary interpretations of several representative aspects of African and Afro-American social and cultural institutions. Possible topics: retained Africanisms, slavery, the Black family, Afro-American artists, and Afro-American identity. DR:3(*)

5 units (Staff) not given 1993-94

**182. Jazz Dance II**—(Enroll in Dance 182.) Intermediate level; emphasizes alignment, control, rhythmic coordination, and the learning of movement combinations. Prerequisite: 81 or equivalent.
1 unit, Aut, Win, Spr (Osumare)

**183. Jazz Dance III**—(Enroll in Dance 183.) Advanced; emphasizes jazz performance techniques. Prerequisite: audition second day of class.
1 unit, Win (Osumare)

**185. African-Caribbean Roots of American Jazz Dance**—(Enroll in Dance 185.) 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.
2 units, Aut (Osumare)

**186. African-Caribbean Dance Techniques**—(Enroll in Dance 186.) Based on the Katherine Dunham technique, which utilizes traditional African diasporic dance forms and contemporary modern dance. Warmups include Dunham barre exercises and across-the-floor progressions. Traditional dances are taught as part of the anthropological source material for the technique. Four lecture classes and reading materials are required.
2 units, Spr (Osumare)

**221. Crossing the Gender Boundaries—A Performance Course**—(Enroll in Drama 221.) The use of play and media scripts in performance to investigate issues of gender. Non-actors involved in the study of gender and actors at all levels of experience are encouraged to participate.
3 units, Spr (Smith)

**357. Seminar: The Past as Present—Contemporary Black Drama**—(Enroll in Drama 357.) The themes of the past as they echo in contemporary Black drama by August Wilson, George C. Wolfe, and others.
3-5 units, Spr (Elam)

**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. Huestis, Harden M. McConnell, Robert Pecora, John Ross, Edward I. Solomon, Barry Trost, Paul A. Wender, Richard N. Zare
Associate Professor: Christopher E. D. Chidsey

* The curriculum leading to the B.S. degree in Chemical Engineering is described in the “School of Engineering” section in this bulletin.
Assistant Professors: Dale G. Drueckhammer, John H. Griffin, T. Daniel P. Stack, Robert M. Waymouth

Courtesy Professors: Michael J. Boudart, Robert J. Madix

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

ENTRANCE PREPARATION

Students who intend to major in chemistry are expected to offer 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 the foregoing 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 desirable.

MINIMUM REQUIREMENTS

University writing and distribution requirements: Math. 19, 20, 21, or Math. 41, 42, 43; Physics 51, 53, 54, 55, 56, 57, 58; 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 to substitute other courses relevant to their programs in consultation with their faculty advisers. Students interested in attending overseas campuses should consult their advisers as early as possible in order to avoid scheduling problems. Note that it is particularly convenient to attend an overseas campus during spring and summer of the second year, since the courses listed in these quarters may be delayed to subsequent years without disadvantage. No required course may be taken on a Satisfactory/No Credit basis.

TYPICAL SCHEDULE

FOUR-YEAR PROGRAM

FIRST YEAR

<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>4</td>
</tr>
<tr>
<td>Chem. 33. Structure and Reactivity</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 35. Monofunctional Compounds</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 36. Chemical Separations</td>
<td>3</td>
</tr>
<tr>
<td>Math. 19, 20, 21. Calculus and Analytic Geometry</td>
<td>3 3 3</td>
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</tbody>
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Writing and Distribution Requirements or Electives (see note below) | 8 8 8 |
Totals | 15 15 15 |

SECOND YEAR

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<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
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<tbody>
<tr>
<td>Chem. 131. Polyfunctional Compounds</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 132. Qualitative Organic Analysis</td>
<td>5</td>
</tr>
<tr>
<td>Chem. 133. Special Topics in Organic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 134. Theory and Practice of Quantitative Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>Chem. 136. Synthesis Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>Math. 43. Analytic Geometry and Calculus</td>
<td>5</td>
</tr>
<tr>
<td>Physics 51-54, Mechanics, Sound, Electricity</td>
<td>4 5</td>
</tr>
<tr>
<td>Electives (see note below)</td>
<td>3 6 7</td>
</tr>
</tbody>
</table>
Totals | 16 18 15 |

THIRD YEAR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
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<tbody>
<tr>
<td>Chem. 151, 153. Inorganic Chemistry</td>
<td>3 3</td>
</tr>
<tr>
<td>Chem. 171, 173, 175. Physical Chemistry</td>
<td>3 3 3</td>
</tr>
<tr>
<td>Chem. 176. Physical Chemistry Laboratory</td>
<td>3</td>
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<tr>
<td>Physics 55, 56</td>
<td>5</td>
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</table>
Totals | 8 6 9 |

FOURTH YEAR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
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</thead>
<tbody>
<tr>
<td>Chem. 174</td>
<td>4</td>
</tr>
<tr>
<td>Physics 70</td>
<td>3</td>
</tr>
<tr>
<td>Electives (see note below)</td>
<td>12 11 15</td>
</tr>
</tbody>
</table>

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 non-science 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; Geol. 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: Chem-
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; Geology 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 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 “School of Education” in 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 three or four calendar years. 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 under 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 departmental approval. In addition to departmental requirements, candidates for advanced degrees must meet the general University regulations as stated in the “Degrees” section in 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, 1993 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 course work as well as 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 A.M. degree in Teaching (Chemistry). This degree is for candidates who have a teaching credential and who 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...
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 10 members of the Chemistry faculty about their research. Students then file an Application to Start Research form with the Department of Chemistry Graduate Program 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 in German. The foreign language requirement in physical, biophysical, or inorganic chemistry may be met in either 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 receipt of a passing grade in a college level intensive reading course (e.g., German 10), or by successful completion of 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 departmental 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 of other work along advanced lines by qualified students. Information concerning staff members with lists of their recent research publications is found in 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, etc.), 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 a minor in chemistry must complete, with an LGI of 'B' or better, 20 units, including those that meet the minimum requirements for a bachelor's degree in chemistry.

FELLOWSHIPS AND SCHOLARSHIPS

In addition to school fellowships and scholarships that are open to properly qualified students, there are several departmental fellowships in chemistry. The Edna Croft Fellowship, Edward Curtis Franklin Fellowship, Florence Thompson Kress Fellowship, Evelyn McBain Fellowship, James W. McBain Memorial Fellowship, Franklin Veatch Fellowship, Frederick P. Whitaker Fellowship, Robert M. and Katherine F. Loeser Scholarship, David L. and Lavinia E. Sloan Memorial Scholarship, William H. and Myrtle B. Sloan Scholarship, John Maxon Stillman Scholarship are granted only to graduate students. The William H. Nichols Scholarships are open to graduates and undergraduates; the Frank Gard Scholarship is for undergraduates only. Undergraduate scholarships are administered through the Financial Aid Office. Teaching assistantships and research assistantships are open to graduate students. 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.

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) W 7 p.m.; sec MWF 9, W 7 p.m.; Win (Waymouth) MWFl:15
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

33. Structure and Reactivity — Organic chemistry, functional groups, hydrocarbons, stereochemistry, thermochernistry, kinetics, chemical equilibria. Pre-register in Department of Chemistry. Prerequisite: 31, 32, or an AP Chemistry score of 4 or 5. DR:5(7)
4 units, Win (Brauman, Kluge)
sec (1) MWF 9; sec (2) MWF 11
one recitation by arrangement
Spr (Wender) MWF 1:15

35. Organic Monofunctional Compounds — Organic chemistry of oxygen, nitrogen aliphatic and aromatic compounds. Prerequisite: 33; pre-register in Department of Chemistry.
4 units, Aut (Waymouth) MWF 1:15
Spr (Huestis) W 7 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; preregister in Department of Chemistry.
3 units, Spr (Hodgson) lec T 1:15
lab T 2:15-6:05 or MWF or F 1:15-5:05

100L. Laser Methods in Chemistry — 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) by arrangement

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 (Druerkhammer, Moxness)
lec TTh 9, lab MTW or Th 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) Th 11-12:15
Win (Griffin) TTh 1:15-2:30

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 (Druerkhammer, Moxness)
lec TTh 8, lab MW 1:15-5:05 or TTh 1:15-5:05

Prerequisites: 131 and calculus.
3 units, Win (Staff) MWF 11

5 units, Win (Stack) TTh 8:30-9:50
lab MW or TTh 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, an
colloidal dispersions. Prerequisites: 31 and calculus.

3 units, Win (Boxer) TTh 11-12:15

136. Synthesis Laboratory — Advanced synthetic methods in organic and inorganic laboratory chemistry. Prerequisites: 130 or 132, and 131.

3 units, Spr (Griffin) 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) MW 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); and Physics 51, 53, 54; and previous or concurrent registration in Physics 55.

3 units, Aut (Ross) MWF 11

174. Physical Chemistry Laboratory — Molecular spectroscopy. Experiments include rotational-vibrational, laser Raman, and visible spectroscopy; an introduction to integrated circuit electronics; and computer data acquisition of chemiluminescence in stopped-flow kinetic studies. Lectures treat theory pertaining to molecular spectroscopy: laser systems, group theory, the quantum mechanics of vibration and rotation of diatomic and polyatomic molecules, the interaction of radiation and matter, selection rules, and transition probabilities. Prerequisites: 173 or concurrent registration in 173 and Math. 43; taken prior to or following Chemistry 176. Recommended: familiarity with linear algebra on the level of Math. 113.

4 units, Win (Chidsey) TTh 10-11:15
lab MW 2:35-3:25 or TF 1:15-4:05


3 units, Spr (Boxer) 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 and previous or concurrent enrollment in 175.

3 units, Spr (McConnell) TTh 9
lab T or W 1:15-4:05

GRADUATE

Undergraduates may register for chemistry courses numbered 200 and above only if admitted to the honors program or if special permission has been granted by the instructor.


3 units, Aut (Kluge) 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) TTh 11-12:15

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 (Kluge) 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. 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 biochromolecules. Prerequisites: graduate student or upper-division undergraduate in the sciences and engineering. 3 units (Boxer, Goochee, Kornberg, Yanofsky) alternate years, given 1994-95

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

255. Advanced Inorganic Chemistry — Chemical reactions of organotransition metal complexes and their role in homogeneous catalysis. Analogous patterns among reactions of transition metal complexes in lower oxidation states. Physical methods of structure determination. Prerequisite: one year of physical chemistry. 3 units (Staff) not given 1993-94

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 criticized. 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) T4
biology. Prerequisites: previous or concurrent registration in 171 and 173, or the equivalent.
3 units (Staff) not given 1993-94.

289. Biophysical Chemistry — Experimental methods in biophysics. Emphasis on spectroscopic techniques including magnetic resonance and optical methods. Prerequisite: 287.
3 units (Staff) not given 1993-94

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, Win (Solomon) TTh 9-11

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 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

299. Teaching of Chemistry — All teaching assistants in chemistry are required to register. Techniques of teaching chemistry by means of lectures and labs.
1-3 units, Aut, Win, Spr (Staff) by arrangement

300. Department Seminar — Attendance required of all graduate students, and all undergraduates registered for 190.
1 unit, Aut, Win, Spr (Staff) Th 4

301. Research in Chemistry — Registration 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.
2 units, Aut, Win Spr (Staff) by arrangement

RESEARCH AND SPECIAL ADVANCED WORK

190. Introduction to Methods of Investigation — For general character and scope, see 200. Limited to undergraduate students admitted under the honors program or by special arrangement with a member

3 units (Staff) not given 1993-94

200. Research and Special Advanced Work — Properly qualified students are encouraged to undertake research, or advanced lab work along lines not covered by listed courses, under the direction of a member of the teaching staff. For research and special work, students register for 200 (or 190 if in undergraduate standing), giving name of staff member under whom work is carried on and number of units agreed upon.
(Staff) by arrangement

CHICANO/A FELLOWS PROGRAM

UNDERGRADUATE STUDIES ON MEXICAN SOCIETY AND CULTURE IN THE UNITED STATES

Director: Luis R. Fraga (Associate Professor, Political Science)
Visiting Professor: Fernando I. Soriano
Teaching Fellows: Carrie Tirado Braman, Ben V. Olguín

Recognition of the growing social importance and size of the Mexican-origin population of the United States has led many leading American universities to establish Chicano studies programs. By sponsoring the Chicano/a Fellows Program, the School of Humanities and Sciences at Stanford has affirmed the educational necessity of providing academic opportunities for undergraduates to learn about Mexican society and culture in the U.S.

Since its inception, the Chicano Fellows Program has had a dual purpose: to offer courses on the Mexican experience in this country; and to provide a teaching-mentorship opportunity to advanced Stanford graduate students. The program also offers courses designed especially for undergraduates, which are taught by visiting faculty and graduate fellows in various disciplines. These offerings are often innovative and experimental; they are usually given as seminars rather than as lecture courses.

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 minority, a minority which by the year 2030 is expected to become the largest population 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 U.S. taught by regular members of the Stanford faculty.
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COURSES

The 1993-94 Chicano Fellows Courses pamphlet may be obtained from the Program Administrator, Chicano Fellows Program, Bldg. 590, Rm. L (El Centro); telephone (415) 723-3091.

107. Gangs and Violence: Application to Chicanos -- (Same as Education 187S, Psychology 187.) Chicano populations, their cultures and their violence and gangs. Social-psychological theoretical approaches and perspectives, focusing on prevention, intervention models and efforts addressing gangs and violence. Required participation in community service. Limited enrollment.

3-4 units, Win (Soriano) MW 1:15-2:30

108. Social Psychology of Social Problems: A Focus on Chicanos -- (Same as Education 186S, Psychology 186.) Develops cultural sensitivity and familiarity with Chicano populations and their cultures, providing understanding of salient social problems affecting Chicanos and other populations, namely, violence, delinquency, substance abuse, poor education, and health challenges. Social-psychological theoretical models and perspectives are used to explain the development of these dominant social problems. Critiques existing prevention and intervention models and programs developed to address these social problems. Required participation in community service. Limited enrollment.

3-4 units, Aut (Soriano) TTh 3:15-4:30

110. Introduction to Chicano Life and Culture -- (Same as Anthropology 110, English 124C, Spanish 281, Political Science 92.) Interdisciplinary focus on the history and culture of Mexican Americans from the settling of the Spanish borderlands to today. Historical perspectives are balanced with anthropological and literary views of the cultural diversity of Mexicans in the U.S. DR:3

5 units, Aut (Fraga, Saldivar) TTh 11:15-12:30

129. 20th-Century American Fiction -- (Same as English 126, Comparative Literature 126.) Offers readings from the traditional masters of modern American literature (Faulkner, Fitzgerald), and from its revisionists: African American (Hurston, Toomer) and Chicano (Paredes). The post-WWII period, including African American (Toni Morrison), Asian American (Maxine Hong Kingston), Native American (Louise Erdrich), Chicana writers (Sandra Cisneros, Helena Maria Viramontes), and Anglo American writers (Don DeLillo, E. L. Doctorow, Thomas Pynchon). Aim is to see these American authors in their contemporary, multicultural context. DR:3 or 77T(2)

5 units, Win (Saldivar) TTh 11:15-12:30

163. Chicana Writers and Feminist Theory -- (Same as English 163C, Spanish 183.) Works by contemporary Mexican-American women writing (mostly) in English in a variety of genres (autobiography, novel, short story, poetry, and film). Discussions combine readings of primary texts with consideration of the theoretical issues raised. Secondary works that theorize race, class, gender, power, resistance, and sexuality are applied as theoretical concepts to primary texts. The applicability of Anglo-European theory to texts written by Chicanas and the status of Chicana texts in Chicano Studies and Women's Studies programs. Recommended: reading knowledge of Spanish.

5 units, Spr (Romero) MW 11-12:30

164. An 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 (Cammarillo, Fredrickson) MTWTh 11-12

198. Modern Chicano/a Fiction -- (Same as English 163D, Comparative Literature 196.) Readings of novels and short fiction by novelists such as Rudolfo Anaya, Thomás Rivera, José Antonio Villareal, and texts of more recently recognized authors, i.e., Ana Castillo, Denise Chávez, Sandra Cisneros, Roberta Fernández, and Arturo Islas. Discussions on the evolution of Chicano/a literature; aspects of the Chicano/a historical and literary experience; the importance of such themes as the search for identity, problems of language use and choice, invisibility, silence, and blindness. The question of gender as it relates to issues of ethnicity and class. Students add to this list their own observations and discoveries.

4-5 units, Aut (Espinosa) MW 11-12:30

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

130B,131B,132B. Cultural Perspectives -- (Same as Spanish 130B, 131B, 132B.) For non-major bilingual students, and others interested in the culture of Spanish speakers. Art, current events, folklore, history, language, and literature. Spanish Cultural Perspectives (130B), Hispanic American Cultural Perspectives (131B), and Mexican and Chicano Cultural Perspectives (132B). Lectures supple
mented by slides, movies, tapes, and occasional field trips. Need not be taken in sequence.

3 units, Aut, Win, Spr (Haro, Sandoval)

206. Spanish use in Chicano Communities — (Same as Spanish 206.) Examines 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, Aut (Valdes)

CHILDREN AND SOCIETY CURRICULUM

Curriculum Committee: Sanford M. Dornbusch, Director, (Human Biology, Sociology, Education); Roland Ciaranello (Psychiatry and Behavioral Sciences), Lee J. Cronbach (Education, emeritus), Rafael M. Diaz (Education), S. Shirley Feldman (Psychiatry, Human Biology), Anne Fernald (Psychology), Shirley B. Heath (English, Linguistics), Margo Horn (History), Janet R. Johnston (Sociology), Michael W. Kirst (Education), Milbrey W. McLaughlin (Education), Fernando S. Mendoza (Pediatrics), Roger G. Noll (Economics, Public Policy), Susan M. Okin (Political Science), Amado M. Padilla (Education), Denis C. Phillips (Education, Philosophy), Alberta E. Siegel (Psychiatry and Behavioral Sciences, Education), Timothy Stanton (Haas Center for Public Service, Public Policy), James Steyer (Education), Myra H. Strober (Education), David B. Tyack (Education, History), Victor Vaughn (Pediatrics), Michael S. Wald (Law), Arthur P. Wolf (Anthropology)

The Stanford Center for the Study of Families, Children, and Youth, an interdisciplinary research center, is committed to undergraduate education through the Children and Society curriculum. For current information, call (415) 723-1706.

UNDERGRADUATE STUDY

The Children and Society curriculum focuses on the study of children and society from diverse points of view, including international, historical, ethnic, and developmental perspectives. Emphasis is on policy implications, and the curriculum is intended to serve students who plan to pursue careers in law, government, education, medicine, social sciences, and social services, as well as those concerned with raising children. The curriculum includes research and field experiences with organizations that serve children and with those that 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 Anthropology, Feminist Studies, Human Biology, Psychology, Public Policy, or Sociology. Students who fulfill the Children in Society curriculum's requirements receive a certificate upon graduation. These requirements are:

1. Sociology 155.
2. One of four policy courses: Education 105, 141X, 323A, or Public Policy 173.
3. A research experience to be met in one of three ways:
   a) A data interpretation and evaluation course (to be developed),
   b) individual research work with a faculty member, or
   c) a group research project.
4. A policy-related internship.

Interested students should contact the Family Studies Center in Building 460 at (415) 723-1706. For questions regarding internships, contact the Haas Center for Public Service or the curriculum coordinator.

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, Margaret Jacks Hall, Building 460, rm. 150.

COURSES

EDUCATION


3 units, Aut (Kirst, Tyack) MW 2:15-3:05 and by arrangement

141X. America's Children and Public Policy: Strategies for Change — (Enroll in Education 141X.) Topics: analysis of children and family policy issues in the U.S. and California, the role of agencies and institutions in policy-making and service delivery for children, and political and social consequences of decision-making and in the area of children's and educational policy. Guest speakers. Field placements in children's service are provided
and required. Enrollment limited to 15. Prerequisite: consent of instructor.

5 units, Spr (Steyer)

323A. Federal and State Policy: Education and Children—(Enroll in Education 323A.) The formulation and implementation of federal and state education policies. Key current policy issues and trends in past policies. Prerequisite: senior honors student, co-term, APA student, or consent of instructor. (APA)

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

SOCIOLOGY


5 units, Win (Dornbusch)

RELATED MATERIAL

The following courses related to children and/or policy do not count toward curriculum certification.

COMMUNICATION

170. Communication and Children I
Roberts

171. Communication and Children II: Research Practicum
Roberts

EDUCATION

107X. Linguistic Foundations of Racial Strife in American Education
Baugh

210. Problems in Sociology of Education
Cohen

220A. The Social Sciences and Educational Analysis: Introduction to the Economics of Education
Strober

220B. The Social Sciences and Educational Analysis: Introduction to the Politics of Education
Kirst

221. Issues in Policy Analysis
McLaughlin

236. The Social Context of Cognitive Development
Diaz

239. Contemporary Social Issues in Child and Adolescent Development
Padilla

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

121. Introduction to Social Psychology
Steele, Zimbardo

130. Developmental in Infancy
A. Fernald

PUBLIC POLICY

182. Policy Making and Problem Solving at the Local and Regional Level
Stanton

SOCIOLOGY

130. Education and Society
Meyer

150. The Family
Herting

222. Social Processes and Pathological Outcomes
Staff

CLASSICS

Chair: Susan Stephens

Professors: Andrew M. Devine, Wilbur Korn (Classics, Philosophy, and History and Philosophy of Science), Marsh H. McCall, Jr., Susan A. Stephens, Susan Treggiari (Classics and, by courtesy, History, on leave 1993-94)

Associate Professors: Jody Maxmin (Art History and Classics), Michael Wigodsky

Assistant Professors: W. Martin Bloomer, Andrea Wilson Nightingale, Daniel Selden (on leave 1993-94)

Professor (Teaching): Robert C. Gregg (Religious Studies)

Courtesy Professors: George Brown (English), C. Julius Moravcsik (Philosophy)
The Department of Classics offers work in the Greek and Latin languages and literatures (both in the original languages and in translation), in Greek and Roman history, in ancient philosophy, and in classical art and archaeology. The wide selection of non-language courses (see “General Courses” below) is intended both for those who currently are taking a Cultures, Ideas, and Values sequence and for those who have already taken one and who desire more thorough knowledge of various aspects of the ancient world.

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.

**UNDERGRADUATE PROGRAMS**

**ADMISSION**

Those considering a major in Greek and Latin (option 1) should enroll in the department as early as possible, since at least three years of work in Latin or Greek or both are generally required, and those with no previous knowledge of Latin or Greek should begin study of the language in the freshman year, or as early as possible in the sophomore year. Prospective majors in Classical Studies (option 3) normally enroll not later than the beginning of the junior year, but are urged to discuss their plans with a member of the department as early as possible.

**BACHELOR OF ARTS**

The A.B. degree in Classics may be taken in the following alternative ways:

1. Greek and Latin
2. Greek or Latin
3. Classical Studies

More detailed descriptions of the requirements follow. All major students are assigned a departmental adviser who will help them prepare a program of study; they should discuss their program with the adviser at regular intervals.

1. **Greek and Latin**: at least 27 units in Greek courses and the same number in Latin, all at the 100 level or higher. If possible, students should complete a third-year course (111, 112, 113) before taking courses in the fourth-year sequences (141-149, 151-159, 161-169, offered in successive years), and it is recommended that they include some work in Greek or Latin style and syntax (Greek or Latin 175). In addition, they should do some work in ancient history or art or some other aspect of classical civilization to make up a minimum of 60 units. A semester at the Rome Classical Center and a summer at Stanford-in-Greece are strongly advised.

   This is the most exacting course of study in the department, and it is normally elected by those students preparing to go on to graduate work in Classics. It is particularly recommended for students with good preparation in secondary school, but it is within the range of those who have had no previous training in Greek or Latin, if the elementary work is completed in the freshman or sophomore year, thus leaving time for the six courses at the level of 100 or above.

2. **Greek or Latin**
   
   a) **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 175), two courses in ancient history, of which one must be the introductory Greek history course 371-101, and one course in ancient art or archaeology. The introductory sequence (1, 2, 3, or 51, 52) or one 100-level course in Latin is highly recommended. The remaining courses to make up the total may be chosen from other departmental courses or (with consent of the adviser) from relevant courses in other departments such as Art, Philosophy, Humanities, or modern languages. Beginning courses in Greek, if required, may be counted towards the total of 55 units. A summer at Stanford-in-Greece is strongly recommended. (See Stanford-in-Greece below.)

   b) **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 175); two courses in ancient history, normally the two introductory courses in Roman history, department 371, courses 102 and 103, and one course in ancient art or archaeology. The introductory sequence (1, 2, 3, or 51, 52) or one 100-level course in Greek is highly recommended. The remaining courses to make up the total may be chosen from other departmental courses or (with
consent of the adviser) from relevant courses in other departments such as Art, Philosophy, Humanities, or in modern languages. Beginning courses in Latin, if required, may be counted towards the total of 55 units. A semester at the Rome Classical Center is strongly recommended. (See Rome Classical Center below.)

3. Classical Studies: at least 55 units including (a) 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; (b) at least one course in the department from each of the following groups: literature in translation; philosophy and political theory; ancient history; religion and mythology; art and archaeology. A second course in ancient history is strongly recommended. In some cases, courses in other departments may satisfy one or more of the above groups with the consent of the undergraduate adviser.

This major is recommended for students who wish to study the classical civilizations in depth as part of their general educational experience but do not want to study the languages to the extent required by options 1 or 2 above. The Classical Studies major is particularly suitable for students who plan to go to law, business, or medical school, or to graduate work in fields other than Classics. It is not suitable for those who may wish to teach Latin or Greek in high school or college, as the language work is insufficient for this purpose. Additional language work would be necessary before graduate school in Classics.

For all majors, a summer at Stanford-in-Greece or a semester at the Rome Classical Center is strongly recommended.

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 departmental 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

Students who wish to be considered for honors in Classics must complete the bachelor's degree program in one of the above ways. In addition, at the beginning of the senior year they must submit to the department a proposal for an honors essay of about 40-50 pages, which should normally arise from the subject-matter of a course previously taken within the department. The department will, in any case, wish to assure itself that at the time of application the student has a sufficient basis of knowledge derived from departmental course work in the general area (literature, history, philosophy, etc.) with which the essay is concerned. If the proposal is approved, the student takes Greek, Latin, or Classical Studies 199 during one or two quarters of the senior year for a maximum of 6 units per quarter, up to an overall total of 10 units, and writes the essay under the supervision of a member of the department. Honors are awarded on the basis of the essay and the student's entire program in the department.

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.

ROME CLASSICAL CENTER

Classics majors are urged to attend the Inter-collegiate Center for Classical Studies in Rome. The center is managed by Stanford University for about 50 constituent colleges and universities including Stanford. It is open to Stanford majors in the Departments of Classics, History, and in ancient literature. Competition is strong. All courses given in the center receive full credit at Stanford and may be applied to the respective major.

All students interested in this program should consult the chair of the department and the ICCS representative, who is a professor in the department, as early as possible in their time at Stanford in order to plan their preparation and application. There is strong competition for places at the center. Students planning to apply to the center should note that they are expected to have prepared themselves by taking an introductory course or courses in Roman history, which at Stanford will be department 371, courses 102 and 103, covering Republic and Principate. They are strongly advised to take also 372-25, The Archaeology of the Greeks and 372-26, Introduction to Roman Archaeology. The center's brochure is available at the department office.

STANFORD-IN-GREECE

The Department of Classics prepares and assists qualified students to study in Greece in the summer, both at the American School of Classical Studies and in a program operated by Stanford. Both programs are study tours, and the Stanford program usually includes archaeological fieldwork. The American School program is recommended principally for Classics majors. The Stanford program is open to both Classics and non-Classics majors.
All candidates for the Ph.D. degree in Classics must fulfill the following requirements:

1. Completion of at least three years (nine quarters) of full-time work, or equivalent, in study beyond the bachelor's degree. This must include the first-year graduate program (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.
   b) Translation examinations into English from Greek and Latin authors included in an approved list (drawn up by the department and available from the departmental academic specialist), and also from sight.
   c) Three general written examinations; a supplementary general oral examination.
   d) The University oral examination on the candidate's dissertation subject.

   The examinations in translation from Greek and Latin authors and from sight are normally taken in the second year of graduate work, the general written and oral examinations in the third year, and the University oral examination at the end of the dissertation. The period between the translation and general examinations is devoted largely to seminar work and to intensive preparation for the latter examinations, during the course of which candidates are expected to make full use of relevant secondary material in modern languages. They should therefore plan to satisfy the requirements in French and German as soon as possible, preferably before the translation examinations. Except in very special circumstances, candidates may not take the general examinations until the modern language requirements have been completed.

3. Each candidate (preferably before the end of the third year) should submit to the chair of the department a statement of the dissertation topic as approved by the dissertation committee. This committee is normally appointed (for each candidate) by the chair of the department at least one quarter before the student's dissertation topic is submitted. At the same time or earlier, a member of the department is appointed as the candidate's adviser and thereafter supervises writing of the dissertation. An acceptable dissertation must be a genuine contribution to classical scholarship.
and must be written in an acceptable style. All dissertations are to be written in English.

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 would be 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 possibly taken in June. One or both modern language exams taken.

Second Year — Course work, both in Classics and the minor field. Translation exams 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 CLASSICAL LINGUISTICS

This program is administered by the Department of Classics, and may be taken as a supplement to a Classics Ph.D. program. Interested students should contact Professor Devine of the Department of Classics.

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 in 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 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 series 101, 102, 103 forms a sequel to both Greek 3 and 52. During the first years some Xenophont or Plato is often read, so as to prepare the student in the following year for further reading of Plato, Euripides, and Homer. These courses all form part of a series, but qualified students may be admitted to the class in Winter or Spring Quarters by 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 departmental advisers to determine required courses, but most departments will be satisfied if part of the series 101, 102, 103 is completed.

The intensive Greek course (Greek 10) offered in Summer Quarter also prepares students to enter Greek 101 in Autumn Quarter. 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 (Vasunia) MTThF 9
2. First-Year Greek — Continuation of 1. 5 units, Win (Cohen) MTThF 9
3. First-Year Greek — Continuation of 2. 5 units, Spr (Hunt) MTThF 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 Testament Greek by the end of the Summer Quarter. Short readings in philosophical Greek are included. 8-9 units, Sum (Staff) MTWThF 9
51. First-Year Greek — Accelerated. 6 units, Win (Tenzer) MTWThF 1:15
52. First-Year Greek — Continuation of 51. 6 units, Spr (Tenzer) MTWThF 1:15

2 units, Win (Devine) T 2:15

INTERMEDIATE

Students are admitted to these courses by completing Greek 3 or 52 or on the basis of previous work done in secondary school or elsewhere. Usually two or three years of secondary school Greek qualifies a student for 101, three or four years for 111 or 113. New students should determine for which course they are best fitted by consultation with the department's undergraduate adviser.

101. Second-Year Greek — Reading of selections from Plato.
5 units, Aut (McCall)

102. Second-Year Greek — Euripides, one play.
5 units, Win (Maurizio)

103. Second-Year Greek — Homer, Odyssey.
5 units, Spr (Knorr)

104. New Testament Greek — Selected readings.
3 units, Win (Hamerton-Kelly)

111. Sophocles
4 units, Aut (Nightingale)

ADVANCED

The sequence of authors in undergraduate courses is intended to provide an initial acquaintance with the best of classical literature, and to meet each student's level of competence in the language. Modifications may be made to suit the needs and interest of each class.

160. Individual Work — For department majors only.
by arrangement

163. Thucydides
4 units, Win (Hunt)

166. Aristophanes
4 units, Spr (Wigodsky)

199. Undergraduate Thesis
by arrangement

UNDERGRADUATE AND GRADUATE

175. Greek Style and Syntax — Designed for the major and first-year graduate students, but all enrollees in Greek language courses are encouraged to take 175 as soon as possible after the completion of 103. 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 (Nightingale)

GRADUATE

202A,B. Tutorial in Greek Poetry
202A. 3 units, Win (Edwards)
202B. 3 units, Spr (McCall)

205. Greek Language and Style
4 units, Win (Gould)

The above courses are offered every year. Other courses alternate or vary each year. (See also seminars listed under ancient history, art and archaeology, classical linguistics, Latin, history of science, literature, philosophy, and religion and mythology.)

260. Directed Reading
by arrangement

360. Dissertation Research
1-15 units, any quarter (Staff) by arrangement

370. Greek Prose or Verse Composition
by arrangement

MODERN GREEK

31. Beginning Modern Greek
3 units, Spr (Prionas)

For other courses in Modern Greek, see the Department of Linguistics Special Language Program.

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 covers the same ground 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 series 101, 102, 103 forms a sequel to Latin 3 and 52. During the first year some Caesar or other simple Latin prose is often read to prepare the students for Cicero, Vergil, Ovid, and other authors in the following year. These courses all form part of a series, but qualified students may be admitted to the class in Winter or Spring Quarter by 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 departmental advisers to determine what courses are required, but most departments will be satisfied if part of the series 101, 102, 103 is completed.

The intensive Latin course (Latin 10) offered in Summer Quarter also prepares students to enter Latin 101 in Autumn Quarter.

All language courses at the 111 level and higher require a term paper.

Courses in Latin have department prefix 375.
1. First-Year Latin — For beginners.  
   5 units, Aut (Hedin) MTThF 9

2. First-Year Latin — Continuation of 1.  
   5 units, Win (Jones) MTThF 9

3. First-Year Latin — Continuation of 2.  
   5 units, Spr (S. Edwards) MTThF 9

10. Intensive First-Year Latin — Intensive beginning Latin equivalent to Latin 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 — Continuation of 51. 
   6 units, Spr (Devine) MTWThF 1:15

   2 units, Win (Devine) T 2:15

INTERMEDIATE

Students are admitted to these courses by completing Latin 3 or 52 or on the basis of previous work done in secondary school or elsewhere. Usually two or three years of secondary school Latin qualifies a student for 101, three or four years for 111 or 112. New students should determine for which course they are best fitted by consultation with the department's undergraduate adviser.

   5 units, Aut (Bloomer)

   5 units, Win (Wigodsky)

103. Second-Year Latin — Selections from Vergil, Aeneid.  
   5 units, Spr (Hersey)

ADVANCED

The sequence of authors in undergraduate courses is intended to provide an initial acquaintance with the best of classical literature and to meet each student's level of competence in the language. Modifications may be made to suit the needs and interests of each class.

154. Roman Comedy  
   4 units, Spr (Bloomer)

155. Cicero Pro Caelio  
   4 units, Win (Bell)

160. Individual Work — For department majors only.  
   by arrangement

199. Undergraduate Thesis  
   by arrangement

UNDERGRADUATE AND GRADUATE

175. Latin Style and Syntax — Designed for the major and for first-year graduate students, but all enrollees are encouraged to take 175 as soon as possible after the completion of 103. 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 (Bloomer)
   2 units, Win (Bloomer)

177. Introduction to Paleography and Codicology — (Same as English 209.) Introduction to late antique and medieval manuscripts in Latin, medieval Latin, and vernacular scripts, and the materials and composition of the medieval book.  
   4-5 units, Spr (Brown)

GRADUATE

202A,B. Tutorial in Latin Poetry  
   3 units, Aut, Win (Wigodsky)

205. Latin Language and Style  
   4 units, Spr (Hine)

The above courses are offered every year. Other courses alternate or vary each year. (See also seminars listed under ancient history, art and archaeology, classical linguistics, Greek, history of science, literature, philosophy, religion and mythology.)

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.

GENERAL

Knowledge of Greek or Latin is not required for these courses. All are suitable for students who have taken a Cultures, Ideas, and Values (CIV) sequence and desire more thorough knowledge of the ancient world, or for those currently enrolled in the CIV Program. General course listings are followed by detailed descriptions of the 1993-94 offering

NON-LANGUAGE UNDERGRADUATE CLASSES, HISTORY (371)

101. Society and Politics in Ancient Greece

102. Citizens of the Republic: Roman History

103. Peace and a Prince: Roman History II
104. Early Christianity
105. History and Culture of Egypt
107. Art, Religion, and Society in Late Antiquity
108. Pagans and Christians
109. Ancient Historiography
110. Introduction to New Testament Literature
120. Athenian Social History
125. The Body and Society: Figuring Gender, Sexuality, and Status in Ancient Greece and Rome
175. Athens 403-350 B.C.: Athens in the Age of Plato
176. Athens in the Age of Demosthenes and Alexander
178/378. Mycenean Greece
181. Roman Society in the Age of Cicero and Augustus
182. Rebuilding the Republic
183. Law and Life in Rome
190. The Family, Sex, and Marriage in the Late Roman Republic and Principate

CLASSICS, ART/ARCHAEOLOGY (372)
14. Classical Athletics
20. Introduction to Classical Archaeology
25. The Archaeology of the Greeks
26. Introduction to Roman Archaeology
100A. Ancient Art I: Archaic and Early Classical
100B. Ancient Art II: Classical and Hellenistic
100C. Ancient Art III: Roman Art
108. Topography and Monuments of Greece
120. Greek Vase Painting
127. Archaeological Practicum
128. Archaeological Drawing
201. Pots and Politics in 6th-Century Athens

CLASSICS, GENERAL (378)
3. Democracy and Imperialism
8. Political Philosophy in Classical Antiquity
11. Age of Heroes
12. Greek Tragedy
13. Love in Classical Poetry
18. Greek Mythology
19. Modern Greek Folklore and Ancient Greek Mythology
25. Greek Philosophy

100. Literature and the Institution of Literary Study
106. A New Testament Writing
115. Greek Attitudes, Values, Beliefs
116. Autobiography: Versions and Conversions of the Self from Augustine to Rousseau
117. Sacrifice, Violence, and Gender in Ancient Greece
118. Readings in Greco-Roman Religion
138A,B,C. Introduction to Cosmology
140. Topics in History of Mathematics
165. Hellenistic Philosophy
169. Ancient Greek Ethics: Socrates, Plato, Aristotle
172. Classical Influences in Modern Literature

ANCIENT HISTORY

These courses are accepted by the Department of History for credit toward a major in history. Courses in Ancient History have department prefix 371.

101. Society and Politics in Ancient Greece: Greek History I from Homer to the Macedonian Take-Over (8th-4th Century B.C.) — Surveys the major events from archaic times to the end of the classical era, emphasizing the relationship between society and political forms. DR:9(5)
4-5 units, Aut (Johnstone) MTWTh 1:15

102. Citizens of the Republic: Roman History I (510-44 B.C. with emphasis on 133-44) — How did Rome grow from a village to the capital of a Mediterranean empire? The underlying factors of culture, customs, and structures rather than detailed discussion of politico-military events. DR:9(5)
4-5 units, Win (Staff) MTWTh 1:15

103. Peace and a Prince: Roman History II (44 B.C.-A.D. 235, with emphasis on 27 B.C.-A.D. 180) — Surveys the Roman Empire from the dictatorship of Julius Caesar and the Principate of Augustus through the consolidation of the system and the brink of its later crisis. DR:9(5)
4-5 units, Spr (Bradley) MTWTh 1:15

110. Introduction to New Testament Literature — (Same at Religious Studies 25.) The more important writings in the New Testament (and several non-canonical early Christian works), and recent scholarly treatment of this literature.
5 units, Aut (Gregg)

120. Athenian Social History — Its economy, organization of space, agriculture and food supply, society and social structure, slavery, class and cul-
ture, gender and sexuality, family, civic ideology and ritual, and religion. DR:9(5)
4-5 units, Aut (Johnstone).

125. The Body and Society: Figuring Gender, Sexuality, and Status in Ancient Greece and Rome — By considering the modes and meanings of cosmetics, fashion, cross-dressing, diet, exercise, and sex, investigates the ways the body was eroticized and how it occasioned anxiety. Through primary texts (medical, comic, philosophical, funerary) and modern scholarship, examines the training, dispositions, treatment, adornment, and disposal of the ancient body and to what degree these practices created individual social identities.
3-4 units, Win (Johnstone)

160. Individual Work in Ancient History
by arrangement
Courses at the 200 level are mainly for graduate students.

261. Individual Work in Greek History
by arrangement
262. Individual Work in Roman History
by arrangement
263. Individual Work in Greek Epigraphy
1-15 units, Aut (Jameson)

360. Dissertation Research
1-15 units, any quarter (Staff) by arrangement

ART AND ARCHAEOLOGY
Classical Art and Archaeology have department prefix 372.
See also Art 5, 100A,B.

25. The Archaeology of the Greeks
4 units, Aut (Munn)

26. Introduction to Roman Archaeology
4 units, Win (Munn)

100A. Ancient Art I — (Same as Art 100A.) Archaic and early classical Greek. DR:7(2)
4 units, Aut (Maxmin)

100B. Ancient Art II — (Same as Art 100B.) Classical and Hellenistic. DR:7(2)
4 units, Win (Maxmin)

100C. Ancient Art III — (Same as Art 100C.) Roman Art
4 units, Spr (Maxmin)

160. Individual Work in Archaeology
by arrangement
Courses at the 200 level are mainly for graduate students.

260. Individual Work in Archaeology
by arrangement

360. Dissertation Research
1-15 units, any quarter (Staff) by arrangement

HISTORY OF SCIENCE
The Department of Classics participates in the History and Philosophy of Science Program, described in that program’s section in this bulletin.
Courses in this area have department prefix 378

138A. Ancient Period — DR:8(3); also satisfies Area 4(6) when taken in sequence with 138B or 138C.
4 units, Aut (Knorr)

138B. Science and Technology in the Scientific Revolution — DR:8(3); also satisfies Area 4(6) when taken in sequence with 138A.
4 units, Win (Knorr)

138C. Modern Period: Newton to Einstein — DR:8(3); also satisfies Area 4(6) when taken in sequence with 138A.
4 units, Spr (Knorr)

140. History of Math
4 units, Win (Knorr)

INTERDISCIPLINARY
Courses in this area have department prefix 378

206. Interdisciplinary Aspects of Research in Classics: Typological, Experimental, Clinical — Case studies of research topics that are better understood by accessing evidence from disciplines outside Classics as traditionally demarcated.
3 units, Spr (Devine)

CLASSICAL LINGUISTICS
Courses in this area have department prefix 378

312. Linguistics for Latin Teachers — Introduction to aspects of linguistics theory involved in teaching first-year Latin, including grammatical relations, case, agreement, gender, tense, aspect, voice, mood, word order, segmental phonology, prosody.
5 units, Win (Devine)

LITERATURE
Courses in this area have department prefix 378

12. Greek Tragedy: Aeschylus, Sophocles, Euripides — (Same as Drama 153.) Intensive reading of 12 to 15 tragedies. Emphasis is on placing the plays in their 5th-century Athenian context and on problems of staging and audience expectations.
DR:7(2)
3-5 units, Win (McCall)
117. Sacrifice, Violence, and Gender in Ancient Greece—Is violence, whether inflicted upon the self or other, the most sublime expression of devotion to the divine? Or can violence be understood as a simple consequence of human nature or a complex expression of a society’s values and ideologies? Discourse is about human violence in light of ancient Greek sacrificial practices in nearly every important event (oath-taking, the signing of contracts, theater-going, marriage, war, political assembly). Emphasis on the role gender plays in Greek sacrifice and in the recent scholarship on violence.

3-5 units, Aut (Maurizio)

160. Individual Work—For department majors only.
   by arrangement

176. Senior Seminar
   2 units, Spr, by arrangement

201. Introduction to Classical Scholarship
   1 unit, Win (Wigodsky)

260. Directed Reading
   1-15 units, by arrangement

PHILOSOPHY AND POLITICAL THEORY
Courses in this area have department prefix 378. See also Philosophy 117.

65. Greek Philosophy—(Same as Philosophy 100.)
The philosophies of Plato and Aristotle with some pre-Socratic background. DR:8(3)
4 units, Win (Segvic)

169. Ancient Greek Ethics: Socrates, Plato, Aristotle
   3-4 units, Spr (Nightingale)

RELIGION AND MYTHOLOGY
Courses in this area have department prefix 378.

18. Greek Mythology—The concept of the heroic and divine in the literature, mythology, and culture of archaic Greece. Interdisciplinary study of individual and society. Illustrated lectures. Selected readings, in translation, of Homer, Hesiod, Herodotus, the poets of lyric and tragedy. DR:8(3)
3-4 units, Spr (Maurizio)

GRADUATE SEMINARS
Graduate seminars vary each year. The following are given this year.

ANCIENT HISTORY (371)
304. Greek Epigraphy
404. Magic and Murder: Apuleius Apology

CLASSICS, GENERAL (378)
206. Interdisciplinary Aspects of Research in Classics: Typological, Experimental, and Clinical
302. Methods for Classical Scholarship
312. Linguistics for Latin Teachers
402. The Cynic Movement in Antiquity and Its Legacy for Europe
403. The Invention of Philosophy

GREEK (373)
438. Herodotus

LATIN (375)
405. Seneca’s Medea
431. Lucretius

COMMUNICATION

Emeriti: (Professors) Elie Abel, Lyle M. Nelson, William Rivers; (Professor Teaching) Ronald Alexander; (Adjunct Professor) Julian Blaustein
Chair: Donald F. Roberts
Director, Institute for Communication Research: Byron B. Reeves
Director, John S. Knight Fellowships for Professional Journalists: James V. Risser
Director, Journalism: Theodore L. Glasser
Director, Documentary 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: Jeremy Cohen, Theodore L. Glasser, Clifford I. Nash
Assistant Professors: June Flora (on leave Autumn)
Professors (Teaching): Jan Krawitz, Marion Lewenstein, James V. Risser, Kristine Samuelson
Courtesy Professors: Richard A. Brody, Michael L. Ray, Eugene J. Webb
Lecturers: James R. Bettinger, Dale Maharidge, Pam Walton
Consulting Professor: Jon Else
Visiting Professor: Louis Bosshart

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 non-degree 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 Admissions, Stanford University, Stanford, California 94305.

Prospective Graduate Students — Write to the Graduate Admissions Section of the Registrar’s Office, Stanford University, Stanford, CA 94305-3005.

The department requires that applicants for graduate admission submit verbal and quantitative scores from the Graduate Record Examination (GRE).

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 and one class in elementary computer science. A student may be exempt from the computer science course if the equivalent has been taken in high school.

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 and computer science which can be taken for Satisfactory/No Credit (S/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 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.
   c) Computer Science 105A or equivalent.

2. Majors must take courses in the following three areas as specified below:
   a) Area I — minimum of two courses from: 101, 110, 122, 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 Courses and Degrees.

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.

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 project
in two of the courses listed below. Communication 208, Theories of Mass Communication, is required of all students; a minimum of seven additional courses must be taken within the department from:

201. Film Aesthetics  
206. Communication Research Methods  
210. Communication Law  
216. Media Law  
225. Perspectives on Journalism  
231. Media Ethics and Responsibility  
239. Literature of the Press  
240. History of American Journalism  
241. History of Film  
243. Seminar in Communication Institutions  
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

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 Journalism  
240. History of American Journalism  
275. Reporting of Public Affairs  
291. Graduate Journalism Seminar  
290. A.M. Project

During their second year of residence, students are required to complete 292A,B,C, Documentary Film and Video A.M. Project Seminar (three quarters). Additional courses are selected from a list of courses within and outside the department, in consultation with an academic adviser.

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.

DOCTOR OF PHILOSOPHY

The department offers the Ph.D. in Communication Theory and Research. Students are required in their first year 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

277G. Social Issues Reporting  
280. Film Criticism  
Two of the following communication courses:  
201. Film Aesthetics  
206. Communication Research Methods  
208. Mass Communication Theory  
222. 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
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. Satisfactorily complete all departmental course requirements.
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, etc.
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, the first year primarily being devoted to "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 examinations, 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 re-examination.

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 Journalism. These are designed as pre-professional 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. Lectures, discussions, group projects, and individual writing assignments explore the actual and perceived effects of mass communication. Possible topics: freedom of expression, press ethics, economic media structures, children and tele-vision, political communication, cultural media effects, and the role of economic and government controls in determining what the mass media consumer receives. Lecture plus one-hour weekly sections. DR:9(5)

5 units, Win (Glasser)

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, Spr (Breitrose)

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.

3 units, Sum (Staff)

104. Reporting and Writing the News — A reporting and writing course emphasizing various forms of journalism: news, broadcast, interpretation, features, opinion. Detailed criticism of writing. Prerequisite: typing speed of 35 words per minute.

5 units, Aut, Win, Spr (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 (Chaffee)

108. Mass Communication Theory — (Graduate students register for 208.) Mass communication processes and effects. The relationship between media, individuals, and society.

4 units, Win (Roberts)

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 (Cohen)

111. Social Responses to Communication Technologies — The study of human responses to new communication media. Changes include new multimedia technologies, high definition television, virtual reality, new personal communication, and computing devices. Topics: the social and psychological effect of the new technologies; changes in private and public life; psychological responses to new media including attention, memory, emotional response, and decision-making. Social responses, including influences on interpersonal relationships, formal organizations, and the creation of telecommunities. Prerequisites: 1; sophomores only.

3 units, Spr (Reeves)

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 (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 (Gibbs)

alternate years, given 1994-95

122. Documentary Film — (Graduate students register for 222.) Analysis of the techniques and strategies of films designed to effect attitudinal and behavioral change. Prerequisite: consent of instructor.

4 units, Aut (Breitrose)

125. Perspectives on 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, 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 or 204.

4 units, Win (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, Win (Gibbs)

139. Literature of the Press — (Graduate students register for 239.) Readings from journalists, their lives and work. Several basic readings for all; additional readings by individual students for the purpose of leading seminar discussions: the journalist in historical perspective, as initiator or follower of political and social trends, as propagandist, as mediator of popular culture. Enrollment limited to 12. Prerequisite: consent of instructor.
4 units, Spr (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, Spr (Breitrose)

150. Magazine Writing — (Graduate students register for 250.) Practice in writing magazine articles, with emphasis on marketing manuscripts. Conferences. Prerequisite: 104.
4 units, Spr (Rivers)

152. European Media Systems in Turmoil — (Graduate students register for 252.) Impact of the European integration on national mass media systems. The implications of a global mass media market for national mass media systems.
3 units, Aut (Bosshart)

154. Television Entertainment Genera — (Graduate students register for 254.) Theories of different television entertainment genera. What differentiates genera? What is entertaining in what kind of context? Westerns, soap operas, quiz shows, etc.
3 units, Win (Bosshart)

156. Popular Culture: The Impact of Media-Related Entertainment on Every-Day-Life — (Graduate students register for 256.) Entertaining aspects of sports, advertising, political events (talk shows, debates). New tendencies: infotainment, infomercials, evangelitainment, etc. Recommended: 154.
3 units, Spr (Bosshart)

157. Public Information Programs — (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.
4 units, Win (Chaffee)

169. Communication, Technology, and Society — (Same as Sociology 133; Science, Technology, and Society 162; graduate students register for 269.) 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 I — (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 (Roberts)
alternate years, given 1994-95

171. Communication and Children II — (Graduate students register for 271.) Research practicum; limited enrollment; consent of instructor. Prerequisite: 170.
3 units (Roberts)
alternate years, given 1994-95

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)

173. Communication and Health — (Graduate students register for 273.) Seminar on campaigns designed to change health-related information attitudes and behavior.
4 units, Spr (Flora)

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 (Staff)

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 (Lewenstein)
alternate years, given 1994-95

177F. Feature and Analytical Writing — (Graduate students register for 277F.)
4 units, Spr (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 (Walton)

201. Film Aesthetics — Graduate section; see 101.

201S. Film Aesthetics — Graduate section; see 101S.

202. 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 includes editing copy, Associated Press style, news circulation, and page make-up.
4 units, Sum (Staff)

208. Mass Communication Theory — Graduate section; see 108.

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 (Cohen)

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 commer-
cial interests. Guest speakers from the industry and related fields. Does not replace Communication 1 for department majors.

3 units, Sum (Staff)

222. Documentary Film — Graduate section; see 122.

223A. Documentary Film/Video Directing I — For graduate students. Emphasis on conceptualizing and executing ideas for the production work done jointly with 224A. Covers all aspects of pre-production at an introductory level. Prerequisite: consent of instructor.

5 units, Aut (Samuelson)

223B. 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)

223C. Documentary Film/Video Directing III — For graduate students. Further examination of structure, emphasizing writing and directing the documentary. Practical training in fundraising and distribution. 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, Win (Krawitz)

224B. Documentary Film Production II — For graduate students. Produce a short 16mm film exercise in color utilizing synchronous sound, with emphasis on observational filming techniques. Prerequisite: successful completion of 223A and 224A, and 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 all skills acquired in 224A and 224B. Issues of documentary form and content. Prerequisites: successful completion of 224A and 224B and concurrent registration in 223C.

5 units, Spr (Krawitz)

225. Perspectives on Journalism — Graduate section; see 125.

231. Media Ethics and Responsibility — Graduate section; see 131.

236. Broadcast Journalism — Graduate section; see 136.

239. Literature of the Press — Graduate section; see 139.

240. History of American Journalism — Evolution of the democratic mass media in its social, political, economic, technological, and professional aspects.

4 units (Lewenstein) not given 1993-94

241. History of Film — Graduate section; see 141.

242. Broadcasting in America — Graduate section; see 142.


4 units (Breitrose) not given 1993-94
COMMUNICATION 347

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.
7 units, 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, Win, Spr (Staff)

294A,B. Seminar: Media and Politics—(Same as Political Science 294A,B) The intersection of media and politics in non-electoral settings. Winter Quarter: studies of the influence of government on the formation of media content, on the resistances and acquiescence of the media in this process, and the effects of media content on public opinion ending in a research plan for turning this political process into a research paper. Spring Quarter: the development of these papers.
5 units, Win, Spr (Brody)

299. Individual Work
1-4 units, any quarter (Staff) by arrangement

PRIMARILY FOR Ph.D. STUDENTS

2 units, Win (Cohen)

1-3 units, Aut (Chaffee)

310G. Seminar in Communication and Law—Limited to Ph.D. students. Advanced topics in communication and law. Prerequisite: 110/270 or consent of instructor.
1-3 units, Spr (Cohen)

311. Theory of Communication—Required of all communication doctoral students. Approaches to communication theory, seminar and tutorial meet-lings, and extensive reading and papers. Consent of instructor required for anyone not a Communication Ph.D. student.
4-5 units, Aut (Glasser, Roberts)

313. Introduction to the Use of the Computer—Specifically for science data analysis. A brief discussion of computing concepts, followed by use of Wybril 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 (Staff)

318. Doctoral Research Methods II—Continuation of 317. Sampling questionnaire design, attitude scale construction, survey administration, computer analysis of data.
4 units, Win (Staff)

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 Press Ethics and Responsibility—Limited to Ph.D. students. Advanced topics in press ethics and responsibility. Prerequisite: 131/231 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: 133/233 or consent of instructor.
3-4 units, Spr (Glasser)

357. Public Information Programs—Doctoral section; see 157.
3-4 units, Spr (Glasser)

357G. Seminar in Public Information Programs—Limited to Ph.D. students. Advanced topics in public information programs. Prerequisite: 157/257 or consent of instructor.
1-3 units (Flora)

360G. Seminar in Political Communication—Limited to Ph.D. students. Advanced topics in political communication. Prerequisite: 160/260 or consent of instructor.
1-3 units (Flora)

369G. Seminar in Communication, Technology, and Society—Limited to Ph.D. students. Advanced topics in communication, technology, and society. Prerequisite: 169/269 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: 170/270 or consent of instructor.
1-3 units (Roberts)

372C. 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 (Glasser)

372G. Seminar in Psychological Processing — Limited to Ph.D. students. Advanced topics in psychological processing. Prerequisite: 172/272 or consent of instructor.
1-3 units, Win (Reeves)

373G. Seminar in Communication and Health — Limited to Ph.D. students. Advanced topics in communication and health. Prerequisite: 173/273 or consent of instructor.
1-3 units, Aut (Flora)

374G. Seminar in Structure and Control of Communication — Limited to Ph.D. students. Advanced topics in structure and control of communication. Prerequisite: 173/273 or consent of instructor.
1-3 units (Glasser)

3 units (Staff) by arrangement

376G. Seminar in International Communication — Limited to Ph.D. students. Advanced topics in international communication. Prerequisite: 176/276 or consent of instructor.
1-3 units (Staff)

378. Advanced Seminar in Freedom of Expression — Research into selected topics of communication and law. Prerequisites: 210 or 216, consent of instructor.
3 units, Win (Cohen)

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)

400. Dissertation Research
6-10 units, Aut, Win, Spr (Staff) by arrangement

COMPARATIVE LITERATURE

Emeriti: (Professors) Joseph Frank (Slavic Languages and Comparative Literature), John Freccero (Italian and Comparative Literature)
Chair: Jeffrey T. Schnapp
Director of Admissions: Herbert Lindenberger
Graduate Adviser: John Bender
Professors: John Bender (English and Comparative Literature), Russell Berman (German Studies and Comparative Literature), René Girard (French and Comparative Literature), Hans Ulrich Gumbrecht (French and Italian, and Comparative Literature), Herbert Lindenberger (English and Comparative Literature), Patricia Parker (English and Comparative Literature), Mary Pratt (Spanish and Portuguese, and Comparative Literature), Jeffrey T. Schnapp (Italian and Comparative Literature), Ramon Saldivar (English and Comparative Literature)
Associate Professors: Thomas Hare (Japanese and Comparative Literature), Carolyn Springer (Italian and Comparative Literature)
Assistant Professor: David Palumbo-Liu (Comparative Literature)

Courtesy Professors: Gerald Gillespie (German Studies and Comparative Literature), David G. Halliburton (English and Comparative Literature), Charles R. Lyons (Drama and Comparative Literature), John Wang (Chinese and Comparative Literature)

Courtesy Associate Professor: Sandra E. Drake (English and Comparative Literature)

The interdisciplinary program in Comparative Literature 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 HONORS PROGRAM

The undergraduate program is designed for students who combine a strong commitment to literary study with the drive and the ability to master foreign languages. Students planning to concentrate in comparative literature must apply for admission to the Humanities honors program and for graduation with honors in Humanities.

Freshmen and sophomores interested in the program must first consult with the chair of the Humanities honors program. Because of the rigorous language requirements, the consultation should take place at the earliest opportunity, preferably during the freshman year. Students who have not started
a second foreign language by the sophomore year have little chance of fulfilling the program re-
mMents on schedule. No student may declare a ma-
ajor later than two weeks after the start of the junior
year. After admission to the program, the student
is assigned an adviser representing the Department
of Comparative Literature.

Comparative Literature as a major is one of the
options within the Humanities honors program
major. Students in the program do not need to com-
plete an additional major in another department but,
in order to satisfy the fourth requirement listed below,
they will normally have the equivalent of a major
in a single national literature. Requirements are as
follows:

1. Admission to Humanities honors program (see
"Humanities Special Programs" section in this
bulletin).
2. Humanities 90 — 5 units, sophomore year.
3. Two seminars drawn from the series Humani-
ties 191-198, of which one must be 194.
4. Course distribution should be designed so that
students develop an extensive background (six
courses covering a broad range of periods) in a
single national literature read in the original lan-
guage. This requirement is fulfilled through work
either in the Department of English or in one of
the language departments. If the student chooses
a foreign literature (six courses) as the main lit-
terature, and English as the second literature (three
courses), the student is still required to take at
least one advanced course, preferably a litera-
ture course, in a second foreign language.
5. Course distribution should also provide a back-
ground (at least three courses) in a second na-
tional literature read in the original language.
This requirement pertains whether the main lit-
terature (section 4) is English or foreign. When
the main literature is English, one additional
course — preferably a literature course — in a
second foreign language is also required. When
the main literature is a foreign one for which
conditions of linguistic preparation may be com-
plex (Asian languages, for example), students
should consult their advisers with regard to course
work in a second literature. If the student chooses
a foreign literature (six courses) as the main lit-
terature, and English as the second literature (three
courses), the student is still required to take at
least one advanced course, preferably a litera-
ture course, in a second foreign language.
6. One literature course, not necessarily in the origi-
nal language, drawn from a cultural tradition dis-
tant from that of the student's main areas of in-
terest.
7. Two additional literature courses drawn from
the following:
   a) Courses listed under Comparative Literature.
   b) Courses offered in translation by the foreign
      language departments in languages outside
      the student's two languages.
   c) Advanced literature courses offered at the
      overseas campuses.
8. Honors Essay: an essay in literary criticism (2
   units, Spring Quarter, junior year; 5 units, Au-
tumn Quarter, and 5 units, Winter Quarter, se-
   nior year). A letter grade indicator (LGI) of at
   least 'B' is required on the essay for graduation
   with honors in Humanities.
9. Two courses related to the student's total pro-
   gram, but drawn from disciplines outside litera-
ture.

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 prob-
lems 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. Stu-
dents take courses in at least three literatures (one
of which may be English), to be studied in the original
languages. The program is designed to encourage
familiarity with the major approaches to literary
study prevailing today.

Before starting graduate work at Stanford, stu-
dents should have completed an undergraduate
program with a strong background in one litera-
ture and some work in a second literature studied
in the original language. Since the program demands
an advanced knowledge of two foreign languages
and a reading knowledge of a third foreign lan-
guage, students should at the time of application
have a sufficiently advanced knowledge of one
foreign language to enable them to take graduate-
level courses in that language when they enter the
program. They should also be making sufficient
progress in the study of a second foreign language
so that they are able 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
foreign language before entrance.

A considerable part of a student's work consists
of individual study toward the Ph.D. examination,
for which each student uses his or her own reading
lists. The examination is centered not on national
lines but on the study of particular periods, genres,
and problems of literary study.

Students are admitted as Comparative Litera-
ture fellows under a plan which attempts to inte-
grate 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 teaching requirement is the same regardless of financial support. (For specific teaching requirements, see below.) Although financial support is limited to four years, the time-table for the completion of requirements allows work to be spread over 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 foreign 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. Foreign language preparation must be sufficient before entrance so that a graduate-level course in at least one language can be taken during the first year and in the second language during the second year. Students must demonstrate a reading knowledge of the third foreign language no later than the beginning of the third year.

Of the three literatures in which a student takes courses, no more than two may be in the same department at Stanford. Literatures written in the same language (such as Spanish and Latin American) are counted as one. One of the student's three literatures is designated as the primary field; the other two as secondary fields.

Teaching—All fellows, whatever their sources of financial support, are required to do three quarters of supervised teaching at half time and one quarter at quarter time. Fellows must complete whatever pedagogy courses are required by the departments in which they teach.

Minimum Course Requirements—

1. Comparative Literature 369 and three additional seminars (or courses that assign a long paper) of a primarily comparative nature; at least one of these additional seminars must be on literary theory or criticism.

2. At least three graduate courses in each of two literatures other than the student's native literature.

3. A sufficient number of courses in the student's primary field to assure knowledge of the basic works in one national literature from its beginnings until the present day.

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.

Examinations—Three examinations are required. The third and last section is the University oral examination. Each student's reading list for the examination must be approved by an examination committee. 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 area of the particular section:
1. 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. Literary criticism, 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 time designated for the latter.

3. A literary period, to consist of a knowledge of a period of at least a century in three or more literatures. The reading list will cover not only the major literary texts of this period but also 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. Students whose course work combines an ancient with a modern literature have the option of dividing the period sections into two wholly separate periods. The examination, which normally is taken during the last quarter of the student’s third year of graduate work serves as the University oral examination, which will also include a short section on the student’s plans for the dissertation.

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 (e.g., 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.

Dissertation — The student presents a dissertation proposal as part of the University oral examination. Successful completion of the examination constitutes approval of the proposal. Members of the dissertation reading committee ordinarily are drawn from the University oral examining committee.

Ph.D. MINOR

This minor is designed for students working toward the Ph.D. in the various foreign language departments. Students working toward the Ph.D. in English are directed to the program in English and Comparative Literature described among the Department of English offerings. Students must have:

1. A knowledge of at least two foreign languages, one of them sufficient to qualify for graduate-level courses in that language, the second sufficient to read a major author in the original language.

2. A minimum of six graduate courses, of which three must be in the department of the second literature and three in the Department of Comparative Literature, the latter to include a seminar in literary theory or criticism. At least two of the three courses in comparative literature should originate in a department other than the one in which the student is completing the degree. Except for students in the Asian languages, students must choose a second literature outside the department of their major literature.

COURSES

Courses primarily of a comparative nature are listed below.

30/130. The Novel — (Enroll in English 30/130.) 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.

3-5 units, Aut (Packer)

50/150. Poetry and Poetics — (Enroll in English 50; if taking 5 units register for 150.) Introduction to reading poetry through a variety of poems, emphasizing the ways the meanings are shaped through diction, imagery, figurative language, and technical elements of verse. DR:7(2)

3-5 units, Win (Lindenberger)
50G/150G. Poetry and Poetics—(Enroll in English 50G/150G.) 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)
3-5 units, Win (Middlebrook)

60/160. The Bible as Literature—(Enroll in English 60/160.)
3-5 units, Win (Lifschutz)

65A/165A. Introduction to Medieval Culture—(Enroll in English 65A/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)
3-5 units, Spr (Brown, Staff)

65B/165B. Arthurian Literature—(Enroll in English 65B/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)
3-5 units, Aut (Brown)

5 units, Spr (Ivanhoe)

114. Early Taoism: A Doctrine Without Words—(Enroll in Asian Languages 114.) The history of Taoism through the Han Dynasty (up to 220 A.D.); emphasis on *HuangLao*, the doctrines of the Yellow Emperor and the sage Laozi. Different approaches to reconcile the counter-intuitive precepts of early Taoism, such as ruling through non-action. Readings of the *DaoDejing* and writings ascribed to the Yellow Emperor, with research paper on some aspect of early Taoist thought or its applications. Enrollment limited to 20. Recommended: Asian Languages 46, Religious Studies 55.
4 units, Spr (Csikszentmihalyi)

115. Images of the Warrior in Japanese Literature—(Enroll in Asian Languages 115.) Literary treatment of the warrior and warrior ethic in Japan. Classical and modern works; concentration on literary construction of a warrior ethic within its historical context. Works in English translation.
4 units, Win (Staff)

124C. Introduction to Chicano Life and Culture—(Enroll in Chicano Studies 110, English 124C, Political Science 92, Spanish 281.) Interdisciplinary focus on the history and culture of Mexican Americans from the settling of the Spanish borderlands to today. Historical perspectives are balanced with anthropological and literary views of cultural diversity of Mexicans in the U.S. DR:3
5 units, Aut (Fraga, Salivar)

125A. The Epic Tradition—(Enroll in German Studies 125A.) Undergraduate workshop on the epic literature of ancient and medieval Europe, Japan, and Persia, emphasizing modern epic recordings of African and Turkic traditions. Texts read in translation.
3-5 units, Win (Andersson)

126. 20th-Century American Fictions—(Same as English 126, Chicano Studies 129.) Readings from the traditional masters of modern American literature (Fitzgerald, Faulkner), and from its revisionists: African American (Toomer, Hurston) and Chicano (Paredes). The post-WWII period, including African American (Toni Morrison), Anglo American (E. L. Doctorow, Thomas Pynchon, Don De Lillo), Asian American (Maxine Hong Kingston), Chicana (Helena Maria Viramontes, Sandra Cisneros), and Native American writers (Louise Erdrich). Aim is to see these American authors in their contemporary, multicultural context. DR:3† or 7†(2)
5 units, Win (Saldivar) TTh 11-12:30

129. The Economics of Gender—(Same as Education 131.) Economic policy issues concerning the role of gender. Topics: labor force participation and attachment, earnings, discrimination, occupational segregation, housework, childcare, affirmative action, comparable worth, and an introduction to the new feminist economics.
4 units, Win (Strober) MW 3:15-5:05

131. Chinese Poetry in Translation—(Enroll in Asian Languages 131.) Readings in traditional poetry and poets emphasizing genre, theme, and style. DR:7(*)
4 units, Aut (Miller) 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 (Kelly) MWF 11

133. Modern Chinese Literature in Translation—(Enroll in Asian Languages 133.) Readings in rep
resentative 20th-century works of fiction, drama, and poetry. DR:2(*) or 7(2*)
4 units, Spr (Lyell)

134A. Seminar: Thinking Difference I — Nietzsche — (Enroll in Philosophy 134A.)
3 units, Aut (Düttmann)

134B. Seminar: Thinking Difference II — Heidegger — (Enroll in Philosophy 134B.)
3 units, Win (Düttmann)

134C. Seminar: Thinking Difference III — Derrida — (Enroll in Philosophy 134C.)
3 units, Spr (Düttmann)

4 units, Aut (Storey) TTh 11-12:15

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. Knowledge of pre-modern Japanese literature not required. DR:2(*) or 7(2*)
4 units, Spr (Maekawa) MWF 1:15

143. Under the Dominion of Translation — (Same as Overseas Studies 143.) Oxford.
3-5 units, Aut (Hare)

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

158K. The Arts and Theater in 20th-Century Austria — (Enroll in Drama 158K.)
4 units, Spr (Kralj) TTh 3:15-5:05

160. Introduction to the Humanities Honors Program — (Enroll in Humanities 160.) Restricted to students in the Humanities honors program. Themes and issues of the humanities as treated in important works from various disciplines in the humanities. Prerequisites: completion of the CIV requirement and enrollment in the Humanities honors program.
5 units, Aut (Eisen)
Spr (Brooks)

161A. Afro-American Writings, 1950-1970 — (Enroll in English 161A.) Identifies central literary and intellectual concerns among Afro-American writers, emphasizing the historical and social contexts. The emergence of the Civil Rights movement in the 1950s and its development in the 1960s; the Black Power/Black Arts movement of the 1960s and the emergence of a large number of women writers in the second part of the period. Continuities and changes in the work of individual writers over time. The relation between literary style and the artist's conception of audience and relation to community. Readings, entire and excerpted, from novels, essays, poetry. Authors: James Baldwin, Amiri Baraka, Gwendolyn Brooks, Ralph Ellison, Lorraine Hansberry, Leroi Jones, Martin Luther King, Jr., Ann Petry, Malcolm X, Richard Wright.
5 units, Aut (Drake) MTWTh 1:15

163A. Literary Foremothers: African-American Literary History, 1830 to the Present — (Enroll in English 163A.)
5 units, Spr (Holland)

163C. Chicana Writers and Feminist Theory — (Enroll in English 163C, Chicano Studies 163, Spanish 163.) Works by contemporary Mexican-American women writing (mostly) in English in a variety of genres (autobiography, novel, short story, poetry, and film). Discussions, readings of primary texts with consideration of the theoretical issues. Secondary works theorize race, class, gender, power, resistance, and sexuality are applied as theoretical concepts to primary texts. The applicability of Anglo-European theory to texts written by Chicanas and the status of Chicana texts in Chicano Studies and Women's Studies programs. Recommended: some reading knowledge of Spanish.
5 units, Spr (Romero)

163H. Feminist Theory Across the Disciplines — (Same as English 163H, Feminist Studies 102E.) Impact of feminist theory on selected disciplines, including economics, law, literature, and political theory.
5 units, Win (Gagnier) TTh 11-12:30

3-5 units, Aut (Hare)

164A. Speaking Back to Scripture — (Enroll in English 164A.) A need to revise and still reclaim the Bible animates much modern poetry, from Dickenson and Whitman through Robert Lowell, Denise Levertov, Paul Celan, Yehuda Amichai, and others. Traces the biblical presence (people, places, narratives, prophecy, textual elements) in British, American, European, and Israeli poetry, art, and music.
5 units, Spr (Felstiner)

168A. 20th-Century American Indian Writings — (Enroll in English 168A.)
5 units, Win (Warrior)

169B. Readings in the Asian American Novel — (Same as English 169B.)
5 units, Aut (Palumbo-Liu) MW 11-12:30

169E. The Exotic East — (Same as English 169E.) Examination and critique of the construction of representations of the "Orient" that move beyond a
catalogue of common figures and characterization to an analysis of the imaginative and ideological investments and contradictions of such aestheticizations. The trope of desire is read against the "absence" or "lack" felt in the West, emphasizing the constructedness of that notion. Readings include critical and theoretical treatments (Clifford, Kabbani, Lowe, Said) and fictional and autobiographical texts (Wilkie Collins, Forster, David Henry Hwang, Loti, Segalen, Chiang Yee.)

3-5 units, Win (Palumbo-Liu) MW 11-12:30

178. Fiction and the Political Imagination: Latin American Novels in Translation — (Enroll in Spanish 178.) Over the last 25 years, Latin American novelists have produced some of the most interesting and profound reflections on the workings of power in the social world. The problem of imagining 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. (In English)

3-5 units, Spr (Pratt)

187A. Seminar: Poetry and Politics — Black Women Write — (Enroll in English 187A.)

5 units, Win (Holland)

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, Matakovsky, Tsvetaeva, Pasternak, S’vinskii, Kharns, and others). Prerequisite: 187 or consent of instructor.

4 units, Spr (Freidin) by arrangement

189A. Seminar: Representing Sappho — The Literature of Lesbianism, 1749-1936 — (Enroll in English 189A.)

5 units, Spr (Castle)

190. Modernism and the Humanities — (Enroll in Slavic Languages 190, Humanities 197.) Focusing on Tolstoy’s novel Anna Karenina, the seminar explores the phenomenon of modernity as it was emerging in 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 particular assumptions and codes. Conceptual framework is provided by pragmatic studies of society produced in Tolstoy’s lifetime (the 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, Aut (Freidin)

191. Lusophone African Literature in Translation: Angola — (Enroll in Portuguese 191.) Introduction to African culture and oral literature as developed in the Portuguese-speaking countries. The discourse of a transcultural society and the concepts of angolanidade, colonial vs. national literature, anticolonial resistance, urban/rural, post-independence, and the re-encounter of the traditional indigenous culture as shown in myth, humor, philosophy, and criticism.

3-5 units, Win (Carvalho)


3-5 units, Spr (Carvalho)

196. Modern Chicano/a Fiction — (Same as Chicano Studies 198, English 163D.) Readings of novels and short fiction by novelists such as Rudolfo Anaya, Thomás Rivera, Josef Antonio Villareal, and texts of more recently recognized authors, i.e., Ana Castillo, Denise Chávez, Sandra Cisneros, Roberta Fernández, and Arturo Islas. Discussions on the evolution of Chicano/a literature; aspects of the Chicano/a historical and literary experience; the importance of such themes as the search for identity, problems of language use and choice, invisibility, silence, and blindness. The question of gender as it relates to issues of ethnicity and class. Students add to this list their own observations and discoveries.

4-5 units, Aut (Espinosa) MW 11:12:30

206E. The Grail Legend in Modern Culture— (Same as French and Italian 206.) 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 inscriptions of those motifs in post-medieval culture with emphasis on films (e.g., Excalibur, Monty Python and the Holy Grail, Indiana Jones and the Last Crusade, Apocalypse Now).

3-5 units, Spr (Cazelles)

208E. Female Saints— (Same as Feminist Studies 137, 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:8f(3)

3-5 units, Win (Cazelles)

209. Introduction to Paleography and Codicology — (Enroll in English 209, Classics 177.) Introduction to late antique and medieval manuscripts in Latin, medieval Latin, vernacular scripts, and the materials and composition of the medieval book.

4-5 units, Spr (Brown)

212. Psychiatry and Literature — (Same as Modern Thought and Literature 212.) Seminar uses psychology as a tool in literary criticism and literature as a tool in developmental theory. Authors: Barrie, Erikson, Joyce, Mann, Shakespeare, Tolstoy.

3 units, Spr (Van Natta)


3-5 units, Spr (Dhillon) MW 3:15-4:45

227. Boris Pasternak and the Poetry of the Russian Avant Garde — (Enroll in Slavic Languages 227.) Pasternak's work examined within a broad cultural context to identify and analyze characteristic features of the Russian avant garde poetics.

4 units, Win (Fleishman)

229A. Death and the Grotesque in Native and African-American Literature — (Enroll in English 229A.)

4-5 units, Spr (Holland)

233. Dante's Divine Comedy — (Same as Italian 233.) Intensive study of Dante's poem in relation to the culture and history of Medieval Europe. Topics: concepts of modernity and antiquity in the Middle Ages; gender and genre in Dante's Christian poetics; medieval and ancient theories/theologies of history; writing as rewriting in the Comedy; Dante and the natural sciences; Dante's Christianization of classical epic (Virgil, Ovid, Lucan, Statius); the Comedy and the theory of universal monarchy.

5 units, Win (Schnapp)

234. Introduction to Discourse Analysis — (Enroll in Linguistics 234.) Survey of approaches to discourse analysis. Readings include functional intra-sentential analysis, narrative, oral vs. literate style, and conversational analysis.

4 units, Win (Traugott)

237/337. 1800: The Invention of Aesthetic Modernism in Early German Romanticism — (Enroll in German Studies 237/337.) Its philosophy, poetiches, hermeneutics, and literary discourse in relation to contemporary theory. Writings by Fichte, Novalis, Schelling, A.W. and F. Schlegel, Tieck, and Wackenroder Taught in English.

3-5 units, Spr (Mueller-Vollmer)

240. Foundations of Soviet Civilization — (Enroll in Slavic Languages 240.) Revolution in Russia. Socialism as religion. New utopia: theory and practice. Lenin (the scientific state), Stalin (the ecclesiastical state). The Soviet empire and ethnic questions. Attempts to reform Soviet civilization (Khruchchev's "thaw" and Gorbachev's "perestroika"). Prerequisite: knowledge of Russian.

3 units, Win (Freidin) by arrangement

241-243. The history of German thought from 1750 to the present and its significance for an understanding of modern culture. Authors: Herder, Hegel, Schiller, Marx, Nietzsche, Freud, Husserl, Wittgenstein, Marcuse, and Adorno. (In English)

241. Deutsche Geistesgeschichte I — (Enroll in German Studies 241.) Language and thought from Leibniz to Humboldt.

3-5 units, Aut (Hullot-Kentor)

242. Deutsche Geistesgeschichte II — (Enroll in German Studies 242.) A study of key texts by Hegel, Marx, Nietzsche, and Weber.

3-5 units, Win (Gillespie)


3-5 units, Spr (Staff)

244. Italian Romanticism — (Same as Italian 244.) Intensive study of major works of romantic poetry and prose, focusing on Foscolo and Leopardi. Emphasis on the relationship between literature and the historical and political context of the Risorgimento. Texts in Italian. DR:7(2)

4 units, Win (Springer)

245. Survey of Russian Literature in English Translation I: The Age of Experiment — (Enroll in Slavic Languages 245.) Part I of a three-quarter survey of the Russian prose tradition covers the first 40 years of the 19th century, emphasizing the formative period of Russian prose, the lesser known contributions of poets, and Romantic and popular
writers. Recognized “classics,” Pushkin’s Eugene Onegin, The Belkin Tales, The Captain’s Daughter; Lermontov’s Hero of Our Time; Gogol’s Petersburg Tales and Dead Souls, are considered in the context of “local” literary and stylistic developments and of contemporary European trends.

4 units, Aut (Fleishman) MWF 10

246. Survey of Russian Literature in English Translation II: The Age of Realism — (Enroll in Slavic Languages 246.) A continuation of 245 but may be taken independently. Selected novels and short fictions by Turgenev, Dostoevsky, Tolstoy, and Chekhov. The dynamics of literary culture in the Age of Realism.

4 units, Win (Moeller-Sally) MWF 10

247. Survey of Russian Literature in English Translation after 1917: Invention of Tradition — (Enroll in Slavic Languages 247.) A continuation of 245 and 246, but may be taken independently. 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, Katacv, Mayakovsky, Nabokov, Olesha, Pasternak, Scholokhov, Siniavsky, Solzhenitsyn, Zoshchenko, etc.) Attention to the way poets and novelists have constituted the post-revolutionary “historical experience” of the Russians.

4 units, Spr (Greenleaf) MWF 10

253. Postmodernist Jews, Jewish Postmodernisms: An Inquiry into Difference, Marginality, and Exile — (Same as Jewish Studies 253.) Postmodernist theories of Judaism and recent constructions of “the Jew,” examining critical sites of convergence and tension between the (curiously ubiquitous but slippery) trope of Jewishness and post-structuralist, feminist, and post-colonialist discourses. Readings from Arendt, Benjamin, Boyarin, Celan, Derrida, Handelman, Heidegger, Jases, Kristeva, Levinas, and Lyotard.

4-5 units, Aut (Seidman) Th 4:30-7:30

253E. Italian Renaissance Epic — (Same as Italian 253E.) Intensive study of Ariosto’s Orlando furioso and Tasso’s Gerusalemme liberata, against the background of the high Renaissance and Counter-Reformation. Topics: the representation of gender, the tension between epic and romance traditions, Renaissance epic and political legitimation. Texts in Italian.

4 units, Spr (Gillespie)


4-5 units, Win (Seidman) F 10-1

265. Comparative Poetics: Theories and Practices of Literary History — (Same as Asian Languages 265.) Open to those who read English and one other language. Intercultural study of theories and practices of literatures, histories, and literary histories. Rival conceptions, historically and theoretically, of the three topics discussed in terms of literary examples and historical issues. Issues prior to, posterior to, other than, and of “theory.” Significant reference to traditional Chinese and Japanese texts.

3 units, Spr (Miner)

266E. Women’s Voices in Contemporary Italian Fiction — (Same as French and Italian 266E.) Introduction to women’s writing in Italy during this century, from Sibilla Aleramo’s A Woman to the narrative experiments of the 1980s. Readings from: Aleramo, Deldedda, Duranti, Ginzburg, Manzini, Maraini, Morante, Ramondino.

4 units, Spr (Springer)

270E. European Fiction — (Same as French and Italian 270E.) Nine masterpieces from the early Middle Ages to WWII. Discussions emphasize relationships of desire and conflict. Chretien de Troyes (Yvain Le Chevalier au Lion), Cervantes (Don Quixote), Voltaire (Candide), Flaubert (Mme Bovary), Dostoevski (Notes from the Underground), Proust (Combray), Franz Kafka (The Trial), Thomas Mann (Mario and the Magician), Virginia Woolf (The Waves).

3-5 units, Aut (Girard)

277A. European Novel of Sentiment and Education — (Same as German Studies 277A.) The emergence of psychological and confessional models from Mme de LaFayette to Goethe; the novel as a vehicle for the concept of Bildung (formation, education) in such major authors as Fielding; attacks on 18th-century norms by radicals such as de Sade; pre-Romantic anxieties as experienced by Rousseau and others; and the revolution of fiction in Sterne.

3-5 units, Win (Gillespie)

277E. Theory of Literature — (Same as French and Italian 277E.)

3-5 units, Aut (Apostolidès)

279. García Márquez in International Cinema — (Enroll in Spanish 279.) Can Magical Realism be expressed in film as well as in literature? Does the transportation from one medium to another detract from or add to the issues presented by the author? What challenges are overcome in the transition from novel to script? Márquez’s original works and

4-5 units, Spr (Dupuy)

300A. Graduate Seminar: Russian Literature as Institutions—(Enroll in Slavic Languages 300A.)

4 units, Win (Moeller-Sally)

301. Colloquium: Literacy, Education, and the Medieval Book—(Enroll in English 301.)

4-5 units, Spr (Brown)

302. Gender and Identity in Renaissance Literature—(Enroll in English 302.) Writings about gender and identity in 16th- and 17th-century England when the family, the state, and religion were being continually, and, often violently redefined. The understanding of private and public identity was in flux; gender became a central concern of cultural and intellectual life. Did the debate on women reflect social realities, was it just an academic controversy, or did it distort the "real" issues at stake? Issues: witchcraft, female rulers, cross-dressing, education, family politics, and state patriarchalism as represented in literary and non-literary materials (e.g., the plays of Shakespeare and relatively unknown writings of women) contrasted against contemporary debates about femininity, sexuality, the family, and feminist politics. The legacy of the "Renaissance" and its continuing centrality for, and difference from, contemporary Western culture.

4-5 units, Aut (Loomba) F 9-12
304A. Colloquium: Romanticism Psychoanalyzed — (Enroll in English 304A.) Lacan Romanticized. Considers parallels between Lacanian discourse on such topics as psychoanalytic technique, the split between Imaginary and Symbolic realms, and the omnipresence of guilt with salient Romantic themes and tropes.

4-5 units, Win (B. Gelpi)

305A. Colloquium: Aesthetics — From Kant to Bosanquet — (Enroll in English 305A.) Historical study of the discipline and practice of aesthetics, focusing on 19th-century Britain.

4-3 units, Aut (Gagnier) W 3:15-6:05

305C. Colloquium: Literature and Institutions — (Same as English 305C.) Theoretical investigation, with practical examples from various historical periods, of authorship, readership, evaluation, and the production and dissemination of literary texts.

4-5 units, Win (Lindenberger)

306A. Colloquium: American Indian Literature — (Enroll in English 306A.)

4-5 units, Aut (Warrior)

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 (McPherson)

308. Hybridicity/Diaspore: Rationale and Critique — As a result of increased scrutiny, notions of multicultural, multietnic identities have developed into complex internal conceptions (i.e., hybridity) and transpositional conceptions (diaspora). Both have become keywords in cultural criticism. The critical usefulness of these terms and their problematic nature, especially as they generate themselves further elaborations of cultural critique.

4-5 units, Win (Palumbo-Liu)

308A. Colloquium: 20th-Century Primitivisms in the United States — (Enroll in English 308A.) Interdisciplinary. 20th-century representations of the primitive in the U.S. The ways in which the modern Western self has incorporated into its construction what has been designated variously as the non-Western, the primitive, the indigenous, the primal, the atavistic, comparing different kinds of texts and different cultural-historical settings. Organized around a series of sites for the production of primitivist discourse: literary naturalism (Hopkins, London, Petry); early Hollywood film and popular culture (Burroughs, DeMille); intellectuals and New Mexico (Cather, Dodge, Lawrence, Luhan); anthropology (Boas, Mead); the Harlem Renaissance (Hurston); contemporary chicano/a writers (Anaya, Anzaldua, Chavez, Islas, Morales); cultural theory (Freud, Rubin Gates, Levi-Strauss).

4-5 units, Spr (Romero)

309A. Colloquium: Science and Representation in the 18th Century — (Same as English 309A, History and Philosophy of Science 253) Science and its practices and resources for cultural production and, conversely, of cultural manifestations (theater, narrative, reportage, graphic projection, painting) as resources for the construction of scientific argumentation.

4-5 units, Win (Bender, Lenoir) M 7-10 p.m.


4-5 units, Win (Halliburton)

309E. Colloquium: Modern/Postmodern — Race, Sexuality, Nation — (Enroll in English 309E.) The nature of subject formation in racial and sexual terms and its relation to the construction of an American national identity in the transition period prior to and preceding WWII. Readings in American fiction, non-fiction, drama, cultural history, theory, and other popular forms (art, music), frame a discussion of alternative narratives of nationalism. Primary readings: Gloria Anzaldúa, Ralph Ellison, Alain Locke (The New Negro), Rubén Martínez, Toni Morrison, Paredes (poetry), Luis Rodriguez, Luis Valdez, and Malcolm X. Also, Chabram, Fregoso, David Harvey, Jameson, Leroi Jones, Marble, and Michelle Wallace.

4-5 units, Win (Saldívar)

309F. Colloquium: Psychoanalysis and Literary Theory — (Same as English 309F.) The nature of subject formation in racial and sexual terms and its relation to the construction of an American national identity in the crucial transition period prior to and preceding WWII. Readings in American fiction, non-fiction, drama, cultural history, theory, and other popular forms (art, music), framing a discussion of alternative narratives of nationalism. Primary readings: Gloria Anzaldúa, Ralph Ellison, Alain Locke (The New Negro), Rubén Martínez, Toni Morrison, Paredes (poetry), Luis Rodriguez, Luis Valdez, and Malcolm X. Also, Chabram, Fregoso, David Harvey, Jameson, Leroi Jones, Marble, and Michelle Wallace.

4-5 units, Aut (Bender) MW 1:15-3:05
310. Facing the New Century: Music, the Arts, and Culture in the 1890s and 1990s — (Enroll in Music 310.) The nature of cultural change, examining issues faced by music and the arts in the 1890s and comparing them to their counterparts in the 1990s. How aesthetics and culture intertwine and how social, political, economic, and religious ideology can inform aesthetic expression, especially in times of transition. Comparison with France in the 1890s and France and the U.S. in the 1990s, but students choose their own focus.

4 units, Spr (Pasler)

349. Seminar: Text in Variance—Theories of Textuality and History of Text-Editing — (Enroll in French and Italian 349, German Studies 393A.) Achievements and prospects of text reconstruction and text editing, irrespective of the age and geographic origin of texts considered. Introductory survey of the operating concepts of textual criticism; delineation of the main stages of its historical evolution from Zenodotus to the present day.

3-5 units, Spr (Maurer)

350. Chicano/a Poetry — (Same as English 306D.) Traces the trajectory of Chicano/a poetry from its earliest appearance as part of the Hispanic-American oral tradition, through its publication in the Spanish language newspapers of the Southwest, and its modern evolution as an important component of the American poetic canon. Works of earlier Chicano/a writers (Alurista, Rodolfo “Corky” Gonzales, and José Montoya) and newer poets (Francisco Alarcón, Sandra Cisneros, Alicia Gaspar de Alba, and Benjamin Sáenz).

4-5 units, Win (Espinosa)

360. Modern Mass Intermedia Studies — (Enroll in English 360, Drama 354M, Modern Thought and Literature 360.) Guest lectures with seminar discussions and screenings in the study of major issues in modern mass culture and 20th-century media.

4-5 units, Spr (Marsh)


5 units (Pratt) not given 1993-94

361A. The Modern Tradition: Criticism and Colonialism — (Enroll in Spanish 309, Modern Thought and Literature 361.) Examines critical approaches to literature and the study of literature and culture in relation to colonialism, neocolonialism, and the postcolonial world. Topics: representations and hegemony, dynamics of transculturation, cultural dimensions of decolonization and resistance, psychoanalysis and colonial subjects, ideologies of masculinity and the feminine, the colonial discourse movement, 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, Win (Pratt)

362. Latin American Writing, 1960 to Present: Gender, Authoritarianism, and Resistance — (Enroll in Spanish 362.) 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 testimony; relations to 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, Garro, Ferré, Lispector, Menchú, Mercado, Murillo, Peri-Rossi, Poniatowska, Marta Traba, and Valenzuela, in conjunction with readings in history and social analysis.

Prerequisite: read and understand Spanish, but not necessarily speak it.

5 units, Spr (Pratt)

369. Seminar: Fragments of a Material History of Literature — (Same as English 369, French and Italian 369E, History and Philosophy of Science 270.) Introduction to literary studies viewed from the perspective of the material practices and constraints that have shaped Western ideas concerning “literature” and literary expression. Topics: rhetoric; mnemotechnics; the history of writing instruments, machines, surfaces, and supports; paleographic analysis; oral/written communications technologies; printing and textuality; modern/postmodern media permutations of “literature.”

Authors: Svembro, Zumbeth, Genette, Derrida.

5 units, Aut (Schnapp) M 3:15-6:05

370. The Anthropology of Speed — (Same as English 368, French and Italian 370E, History and Philosophy of Science 270.) Envisaged as a dialogue between the history of technology and cultural history (art, music, literature, film), seminar examines the formative impact of themes of speed, acceleration, intensification, and novelty on modern/postmodern ideas of experience, subjectivity, signification, rhythm, power, and production. Topics: exercise and hygiene from the fin de siècle to the present; scientific management and the world of work; bodies and machines; cognitive and perceptual ramifications of aviation, mechanized ground transportation, film, and video; velocity, addiction, entertainment, and ennui; mass media, mass culture, and the ethos of acceleration.

Authors: Baudrillard, Debord, Marinetti, Virilio.

5 units, Spr (Schnapp)
373C. Seminar: Shakespeare — (Enroll in Drama 395C, English 373C.) Consideration of the canon of Shakespeare in itself and against the backdrop of contemporary contexts, including history and ideology; gender identity and transvestite theater; domestic spying and Other World “discovery;” miscegenation and race; the body, social hierarchy and dramatic structure.

4-5 units, Win (Parker) Th 3:15-6:05

375. José Revueltas and Mexican Marxist Ideology and Aesthetics — (Enroll in Spanish 375.) 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)

383. Seminar: Foucault and Contemporary Critique — (Same as English 383, French and Italian 383E.) The work legacy of Michel Foucault in relation to developments in contemporary literary theory and cultural critique.

4-5 units, Spr (P. Parker) Th 6:16-9:05 p.m.

395A. Philosophical Reading Group — (Same as Modern Thought and Literature 365, English 395 A.) Reading Marx. Reading and discussion format on Marx and Engels’s writings.

2-3 units, Spr (Gagner)

396. Introduction to Graduate Study for Ph.D. Students — (Enroll in English 396.) Introduces incoming graduate students to literary criticism and theory in the context of 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 studies, ethnic studies) compared and contrasted with more traditional approaches (e.g., philology, hermeneutics).

4-5 units, Aut (Halliburton)

396L. Laboratory in Pedagogy — (Enroll in English 396L.) 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. Teacher’s Workshop I — (Enroll in English 397A.) Required for second-year graduate students in English, Modern Thought and Literature, and Comparative Literature teaching in the Freshmen English program. Each student is assigned as an apprentice to an experienced teacher and sits in on classes, conferences, tutorials; later given responsibility for conducting a class, grading papers, holding conferences. Class meetings are devoted to discussing rhetoric, theories of composition, and teaching of writing. Readings are assigned in rhetoric and pedagogy. Each student designs a two-quarter syllabus in preparation for teaching English 1 and 2.

1-5 units, Aut (Fields, Staff)

397B. Teacher’s 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.

1-5 units, Aut (Fields, Staff)

397C. Teacher’s Workshop III — (Enroll in English 397C.) See 397B.

1-5 units, Aut (Fields, Staff)

587. The History and Politics of Sexual Orientation — Investigates contemporary attempts to theorize sexuality and sexual orientation and examines the implications, if any, of diverse theories for social and legal policy, drawing on the social sciences, law, history, literary theory, and philosophy to study the phenomena of different sexualities across cultures and historical periods. Issues: the role of homosexuality in classical Greek culture and philosophy; the relationships between sexual orientation and gender (and between queer theory and feminism); the contemporary controversy between social constructivists and essentialists as to whether sexual orientation is a natural condition or a complex social artifact; the place of sexual orientation in defining individual identity and social roles; the legal, political, and ethical foundations between lesbian and gay male experience and theory. Policy discussions focus on: the Supreme Court’s decision and opinions on the constitutionality of sodomy laws in Bowers v. Hardwick and the response of diverse theories in law and literature to that text; and the social and legal status of lesbian and gay marriage, domestic partnerships, and family units. Texts: Plato’s Symposium; historical essays from Duberman, Vicinus and Chauncey, Hidden from History; theoretical work by Boswell, Butler, Foucault, Halperin, Rubin, Sedgewick and others; and relevant material from Posner, Sex and Reason.

4-5 units, Win (Kaplan) T 4:15-6:45

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 — (Enroll in Linguistics 625A.) 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. Fictional and non-fictional writings, deal with dominant cultural topics (nationalism, religion, women and gender, kinship, and social concepts, etc.) Texts
by Ghassan Kanafani, Neguib Mahfouz, Nizar Quabbani, Nawal El-Saadawi, and Tayeb Saleh. (Reading/discussion in English)

4-5 units, Aut (Barhoum)

**625B. Contemporary Arab Writers — (Enroll in Linguistics 625B.)** Samples of contemporary writings by selected influential Arab authors. Analysis of the 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. Readings: Emile Habiby’s The Secret Life of Saeed the Pessoptimist; Nawal El-Saadawi’s The Hidden Face of Eve and Death of an ex-Minister; excerpts from Edward Said’s Orientalism and Covering Islam; and Georges Tarabishi’s Woman against her Sex: A Critique of Nawal El-Saadawi. (Reading/discussion in English)

4-5 units, Win (Barhoum)

**625C. The Arab World through Travel Literature — (Enroll in Linguistics 625C.)** Early colonialist and post-colonialist portrayals of Arab culture in the west, considered with recent critical examinations of such stereotypical depictions. Readings: Margot Badran and Miriam Cooke’s Opening the Gates: A Century of Arab Feminist Writing; Lawrence Durrell’s The Alexandria Quartet; Elizabeth Fernea’s Guests of the Sheik; Edward Lane’s The Manners and Customs of Modern Egyptians; Billie Melman’s Women’s Orient; Lady Mary Wortley Montagu’s Letters; excerpts from Maxine Rodinson’s Europe and the Mystique of Islam; excerpts from Edward Said’s Covering Islam and the introduction to Orientalism; and Jack Shaheen’s The T.V. Arab. (Reading/discussion in English)

4-5 units, Spr (Barhoum)

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**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 an other 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 1993-94 and are organized to accommodate all entering freshmen and transfer students. Every effort is made to assign students to the specific courses that they elect, but it is not possible to place all students in the courses they list as first choice.

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**TRACTS 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 in this bulletin.

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**“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.” 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)
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 heavily 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 other cultures. Readings come from N. America, Europe, Central and S. America, the Caribbean, and Africa. Within the U.S., the course draws on Afro-American, Asian American, Chicano, Euro-American, and Native American literature and thought. Themes emphasized include 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 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 (Salivar) lecture TTh 10

5. 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, Win (Rosaldo) lecture TTh 10

6. Property and Propriety: Land, Labor, Identity — Using a matrix of terms (land, labor, and identity) traces out formations and negotiations of socioeconomic and cultural value, and ways that "land" or "space" (its possession, appropriation, and reclamation), in real and "symbolic" forms, is a site of contesting values. DR:1 (three-quarter sequence)

5 units, Spr (Palumbo-Liu) lecture TTh 10

EUROPE: FROM ANTIQUITY TO THE PRESENT

Track Chair: Carolyn Lougee (Professor of History)

(Enroll in History 1,2,3.) This 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 10 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, 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.

7A. Antiquity and the Middle Ages — From Homer and the Hebrew Bible to the dawn of the Renaissance, covering Sappho, the Greek Tragedians, Plato, Aristotle, Vergil, the New Testament, St. Augustine, the Koran, Dante, Medieval poetry and Boccaccio and Chaucer. Writing instruction concentrates on finding an appropriate thesis and on developing and organizing ideas. DR:1 (three-quarter sequence)
5-8 units, Aut (Steidle, Staff) lectures plus sections and workshops

8A,8B,8C. Renaissance and Enlightenment — Readings from the Renaissance to the Enlightenment, including works by Machiavelli, More, painters of the Italian Renaissance 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

9B,9C,9D. The Modern World — Thought and literature from the French Revolution to contemporary times, including works by the English Romantics, Goya, Dickens, the Impressionists, Marx, Douglass, Freud, Woolf, Morrison, Scandinavian drama, German Expressionism, world cinema, and American jazz. DR:1 (three-quarter sequence)
5-8 units, Spr (Marsh, 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 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 (Stephens, Staff) lecture MWF 11
Win (Brooks, Staff) lecture MWF 11
Spr (Lindenberger, 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 German Studies 7A,8A,9A.) This 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 four key myths: the golden age, erotic transgression, the court, and salvation. DR:1 (three-quarter sequence)
5 units, Aut (Andersson) lec T 11

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. DR:1 (three-quarter sequence)
5 units, Win (Berman) lec T 11 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. 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. It explores 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 explana-
tions 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 and the development and role of literacy in political and cultural systems. 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 (Crees) 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)

3-5 units, Spr (Yanagisako)

PHILOSOPHY AND HUMAN EXISTENCE

Track Chair: John Perry (Professor of Philosophy)

(Enroll in Philosophy 5A,B,C.) This sequence, developed by the Department of Philosophy and the School of Education, examines 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. Some themes explored 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, MW10 plus sections
DRAMA

Emeriti: (Professors) Wendell Cole, Martin Esslin; (Associate Professors) Helen W. Schrader, H. Donald Winbigler; (Adjunct Professor) Evelyn M. Draper
Chair: Michael F. Ramsaur
Professors: Jean-Marie Apostolides (French and Italian, Drama), Charles R. Lyons (Drama and Comparative Literature), Carl Weber
Associate Professors: William S. Eddelman, Harry J. Elam, Jr., Alice Rayner, Anna Deavere Smith
Assistant Professor: Rush Rehm
Associate Professor (Teaching): Michael F. Ramsaur
Senior Lecturers: Patricia Ryan, Alexander Stewart
Lecturer: Connie Strayer
Visiting Professor: Matthias Kralj (Winter, Spring)

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:

2. Literature and Criticism: 50, Introduction to Drama; 150, 151, 152, Major Dramatic Texts.
3. Theater History: 160 or 161, History of the Theater.
5. 170, Introduction to Directing, or 134, Stage Management.
6. Dance: 27 or equivalent.
7. 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.
8. Electives: a program of 15 units of elective courses to be worked out in consultation with the major adviser.
9. Senior Project: every Drama major must complete an approved Senior Project.

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 one of Drama's normal area courses (e.g., 135) and/or 200, Senior Project Essay.

Students pursuing Senior Projects should consult with both the Department of Drama undergraduate adviser and a faculty adviser in the specialty area of the project. 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 they have taken and grades received in the area requirements, and 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 to be part of the project. In order 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 departmental 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 departmental 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. In order 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 mounting of 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: 30, 31, 32, and a 130-level course in the specific area of the project.
   b) The student must have completed at least 4 units of 39A, 39B, or 39C and participated in some technical or design aspect of at least two departmental productions.
   c) Approved Senior Projects in Design or Technical Production: upon recommendation of the production committee, the student is assigned design or production responsibility (lighting design, scenery design, costume design, or stage manager) 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 50, Introduction to Drama.
   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

DRAMA

For a limited number of students, the department confers the degree of Bachelor of Arts with departmental honors in Drama. To be considered for departmental honors, students must meet the following requirements:

1. The student must have fulfilled the requirements for the Drama major.
2. The student must be a Drama major in good standing with 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.

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 in this bulletin for a description of the honors program. Students who enroll in it may offer Humanities 90 and two seminars from 190-198 in fulfillment of the departmental elective requirement.

GRADUATE PROGRAMS

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 in this bulletin.

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 in order 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 literary 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.
Applicants for the Ph.D. program should write directly to the Department of Drama for information and applications. 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 strongly recommended. Interviews are best scheduled between October 1 and January 31. 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.

University regulations regarding this degree are discussed in the “Degrees” section in this bulletin. The following departmental requirements are in addition to the University’s basic requirements for the doctorate:

**UNITS AND COURSE REQUIREMENTS**

1. A minimum of 72 units of graduate courses and seminars in support of the degree in addition to the doctoral dissertation.
2. The sequence in Dramatic Criticism and Critical Theory (300, 301).
3. A minimum of five graduate seminars in dramatic literature, theater history, directing, or aesthetic theory. One of them must be in theater history, and one in directing.

**LANGUAGE REQUIREMENTS**

The candidate must demonstrate reading knowledge of one foreign language in which there is a major body of dramatic literature. The language requirement may be fulfilled in any of the following ways:

1. Achievement of a sufficiently high score (70th percentile) on the foreign language examination prepared by the Educational Testing Service (ETS). (Latin and Greek are not tested by ETS.)
2. A reading examination given each quarter by the various language departments, except for Latin and Greek.
3. Passage with a letter grade indicator (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 advancement 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 two courses during the second year and three courses during the third.

**COMPREHENSIVE EXAMINATIONS**

Candidates must complete three examinations by the end of the third year. Each student is to submit a critical bibliography to his or her adviser for approval the quarter prior to the quarter in which the examination is taken.

Students are urged to take examinations as early as possible. The first examination must be taken by the end of the first year of residence. Examinations play an important role in the annual review of a student’s progress toward the degree. At least two examinations must be completed by the end of the second year of residence.

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, and the directing workshop (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.

**UNIVERSITY ORAL EXAMINATION**

A University oral examination is to be taken during Autumn Quarter of the fourth year. The prospectus must be approved by the candidate’s adviser and by the departmental Graduate Studies Committee by the end of Spring Quarter of the third year.

**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 re-instate candidacy by re-passing the written examinations on dramatic literature.

FELLOWSHIPS
The Department of Drama awards a number of fellowships to students in the Ph.D. program. Procedures for applying are included in the admission packet. The appropriate financial aid application must be filed by January 1, 1994.

COURSES
A special brochure is available providing full details of courses given in the Summer Quarter.

INTRODUCTORY


   4 units (Elam) alternate years, given 1994-95

20. Beginning Acting — Preference given to freshmen, with guaranteed placement for those admitted by audition. Introduction to acting and the department. Basic skills of concentration, imagination, pantomime, voice, movement, and learning a monologue.

   2 units, Aut (Staff) TTh 1:15-3:05

27. Musical Theater Workshop — (Same as Dance 65.)

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

28. Make-up for the Stage — The basic techniques of make-up application; aging, prosthetics, stylization, characterization, animals, and fantasy make-up.

   2 units, Aut (Strayer) W 2:15-4:05

29. Theater Performance: Acting — Students cast in departmental 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: No more than 10 units may be counted toward graduation requirements of 180 units. Prerequisite: consent of instructor.

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

30. Introduction to Scenic Design — Lecture/lab introducing basic skills of visual communication used in producing stage scenery. Covers design and construction methods.

   4 units, Aut (Stewart) MWF 11

31. Introduction to Stage Lighting — Lecture/lab introducing the basic theories of stage lighting.

   Material is approached from technical and aesthetic viewpoints.

   4 units, Spr (Ramsaur) TTh 10-11:50

32. Introduction to Costume Design — Principles of design and basic construction of stage costume.

   4 units, Win (Eddelman, Strayer) TTh 10-11:50

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

37. Costume Construction — Focuses on the technical and practical construction techniques of theatrical costumes and accessories from pattern drafting to fabric embellishment. Prerequisite: 32 or consent of instructor.

   2 units, Spr (Strayer) W 2:15-4:05

38. Fabric Techniques for Costume Use — Study in surface design techniques and fabric modification for theatrical use. Overview of textiles as a basis for understanding fabric and its manipulation for theatrical costume. Prerequisite: 32 or consent of instructor.

   2 units, Aut (Strayer) by arrangement

39A,B,C. Theater Performance: Crew — Participation in the design and technical areas of departmental productions. Students commit to a specific show, and credit is for preparation and construction as a member of “running crew” in a specific area. Normally 2 units; show with a three-week running crew commitment requires 10 hours of construction; show with two-week commitment requires 25 hours of construction. The Master Electrician is usually awarded one extra unit for the added time commitment. Majors must take 2 units to fulfill the requirement 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 140.) Current strategies for analyzing drama/performance. Readings and discussions of plays and contemporary theories. DR:7(2)

   5 units, Win (Bartholomew) MTWTh 10 plus lab W 7-10 p.m.

   Spr (Rayner) TTh 1:15-3:05

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, Win (Lyons) MW 1:15-3:05
65. American Musical Theater—Survey of the development of the American musical theater as a unique and indigenous art form and as an expression of cultural changes in American society. Slides, recordings, and films.

4 units, Win (Eddelman) MWF 11

INTERMEDIATE

Primarily for the major but open to all undergraduates who have the necessary prerequisites.

101. Introduction to Acting—For students interested in a basic approach to acting. One-quarter.

Scene work is included.

2 units, Aut, Win, Spr (Staff) MW 10-11:50 or TTh 1:15-3:05

103. Improvisation—For students wishing to study acting as improvisation only. Explores and develops the imagination; teaches games and exercises that foster spontaneity and cooperation. Students wishing to enroll must sign a class list in the Department of Drama in the term preceding.

3 units, Aut, Win (Ryan) MWF 1:15-3:05

105A.B. Group Communication—Focuses on inter-personal processes of communication as they relate to inter-group experience.

4 units, Win, Spr (Schrad) TTh 2:15-4:05

120A.B. Fundamentals of Acting—Two quarters, designed to provide fundamental training of the actor. Exercises and improvisation in basic activity, motivation, concentration, and imagination. Actors work intensively on text during Winter Quarter. Additional work in voice and movement. Prerequisite: sophomore standing or consent of instructor.

120A. 3 units, Aut (Ryan) MW 10-12

120B. Prerequisite: 120A or consent of instructor.

3 units, Win (Ryan) MW 10-12

121. Scene Study—A project class for actors who wish to continue their training with scene work with graduate directors.

1 unit, any quarter (Staff)

125. Advanced Voice Workshop—Exercises in vocal characterization, advanced work in breathing, relaxation, and diction

3 units, Spr (Ryan) MW 10-11:50

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:7(2)

3-4 units, Win (Ross) TTh 1:15-3:05

127B. Dance and Live Art in the 20th Century—(Same as Dance 160B.) Critical history and analysis of the development of live art in post-modern dance and performance art of the 20th century. Topics: the body as an art medium, performance art, experimental dance, and re-definitions of gender in live art. DR:7(2)

3-4 units, Spr (Ross) TTh 1:15-3:05

129B. The Actor and Director—Approaches to issues surrounding the actor/director relationship.

4 units, Win (Staff) MW 4:15-6:05

129D. Shakespeare Through Performance—(Same as English 183A.)

5 units, Spr (Friedlander) Th 3:15-6:05

130. Scenery Design—Creations of increasing complexity involving text analysis, historical and artistic style, visual research, spatial organization, drafting, sketching, model building, and director-designer collaboration. Prerequisite: 30, or consent of instructor.

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

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: 31.

5 units, Aut (Ramsaur) TTh 10-12

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.

5 units, Spr (Staff) W 2:15-4:05

133. Technical Production—Lecture/lab in basic production practices. The theory and use of standard tools and materials used in stage scenery construction. Prerequisite: 30.

4 units, Spr (Stewart) MW 10-12

four-hour lab by arrangement

134. Stage Management Project—For students stage managing a Department of Drama production.

1-5 units, any quarter (Staff)

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—(Same as English 93.)

5 units (Smith) alternate years, given 1994-95

141. Screenwriting—(Same as English 93A.) Practical and theoretical approach to writing for the screen, including writing exercises in story development/plot structure, character building and dialogue, with guest lecturers by professional screenwriters. Analysis of a variety of Hollywood, international, and independent films, conventional and
alternative, e.g., Citizen Kane, Vertigo, Last Year at Marienbad, Taxi Driver, and Until the End of the World. Emphasis is on the functions of the screenplay. Goal: complete the first act of an original screenplay. Selected student work (with department actors and directors) videotaped and edited.

3-4 units, Aut (Causey) MW 1:15-3:05

150. Major Dramatic Texts I: Classical Period—Contemporary ideas of tragedy, comedy, and community in selected texts from Aeschylus, Aristophanes, Euripides, Plautus, Seneca, Sophocles, Terence.

4 units, Aut (Rehm) TTh 10-11:50

151. Major Dramatic Texts II: Renaissance to Romantic—Selected texts from Buechner, Congreve, Corneille, Goldsmith, Kleist, Racine, Schiller, Shakespeare, Sheridan.

4 units, Spr (Rayner) TTh 10-11:50


4 units, Win (Apostolidès) TTh 10-11:50

153. Greek Tragedy: Aeschylus, Sophocles, Euripides—(Same as Classics 12.) DR:7(2)

3-5 units, Win (McCall)

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 (Eddelman) MWF 11

155. American Drama, 1960 to the Present—Contemporary American drama from a multicultural perspective: plays by Asian American, Latino American, and African American men and women in the context of social, economic, and political developments that helped shape them. Theories of dramatic practice including feminist criticism and African American aesthetics illuminate the complex dimensions of recent American drama. DR:3 or 9(5)

4 units (Elam) alternate years, given 1994-95

157. Contemporary Black Playwrights—The dramaticurgy, 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 1994-95

158K. The Arts and Theater in 20th-Century Austria—(Same as German Studies 175A.) The role of culture in the creation of national identity.

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

158S. The Plays of Samuel Beckett—The major dramatic writings examined in a variety of critical contexts.

4 units, Aut (Lyons) MW 10-11:50

159A, B, C. Shakespeare—(Same as English 173A, B, C.) DR:7(2)

159A. 5 units, Aut (Rebholz) MTWTh 11

159B. 5 units, Win (Friedlander) MW 11-12:30

159C. 5 units, Spr (Parker) TTh 1:15-3:05

160. Theaters and Staging: Ancient to 18th Century—The stylistic evolution of theater architecture and staging. Focus is primarily European; parts deal with Africa and Asia. Emphasis on the ways in which theaters and staging reflect their own cultural and spatial environments.

4 units (Eddelman) alternate years, given 1994-95

161. Theaters and Staging: 18th Century to the Present—The development of theaters and staging as they stylistically evolved during the 19th and 20th centuries. Emphasis on the ways in which theaters and staging reflect their own cultural and spatial environments.

4 units (Eddelman) alternate years, given 1994-95

170. Introduction to Directing—Prerequisite: consent of instructor.

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

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—The ways performance has been created by, and responded to, societal development throughout history Prerequisite: one course on history or the arts; enrollment limited to sophomores

3-4 units, Win (Weber) T 3:15-6:05

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

200. Senior Project Essay—See "Undergraduate Programs" for description.

1-5 units, any quarter (Staff)
ADVANCED COURSES

Courses numbered 200 through 299 are designed for advanced undergraduates and graduates.

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, Spr (Ryan) MWF 3:15-5:05

213. Advanced Improvisation Group — For members of the improv troupe only. Special project work.
1-2 units, any quarter (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 in Spring Quarter for autumn class and consent of instructor.
220A. 5 units (Smith) alternate years, given 1994-95
220B. 5 units (Ryan) alternate years, given 1994-95

221. Crossing the Gender Boundaries — A performance course. The use of play and media scripts in performance to investigate issues of gender. Non-actors involved in the study of gender and actors at all levels of experience are encouraged to participate. Slide lectures explain how dress creates gender, gender boundaries, and the shifting changes among those boundaries.
5 units (Eddelman, Smith) alternate years, given 1994-95

224. Audition Techniques — For the advanced actor. Preparation of monologues, cold readings, singing auditions, and preparation of resumes. Prerequisite: 120A,B or equivalent.
3 units, Aut (Ryan) M 3:15-6:05

225. One Person Shows — For actors. Creation and performance of a one person show. Prerequisite: submit writing samples to Drama by November 1.
3 units, Win (Smith) MW 1:15-3:05

229. Advanced Scene Study — Project class for actors. Continued training through ensemble work. Prerequisites: 120A,B, or 220A,B.
3 units, Spr (Ryan) by arrangement

1-5 units, any quarter (Staff) by arrangement

231. Advanced Stage Lighting Design — Projects in lighting mechanics and lighting design are resolved through experimentation, class discussions, and written report. Design projects include dorm shows and other community productions. Assignment of lighting designers for major departmental productions. Prerequisite: 131.
1-5 units, any quarter (Ramsaur) by arrangement

1-5 units, any quarter (Staff) by arrangement

235. Project in Theatrical Production — See 135.
1-5 units, any quarter (Staff)

250. Major Dramatic Texts I: Classical Period — See 150.
4 units, Aut (Rehm) TTh 10-11:50

251. Major Dramatic Texts II: Renaissance to Romantic — See 151.
4 units, Spr (Rayner) TTh 10-11:50

4 units, Win (Apostolidès) TTh 10-11:50

254. 20th-Century American Theater — See 154.
4 units, Spr (Eddelman) MWF 11

270. Independent Project in Directing — Prerequisite: 170.
2-5 units, any quarter (Staff) by arrangement

290. Special Research — Individual project in 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.

300. Selected Texts in Dramatic Criticism — Topics: representation and reality, the rejection of representation, the dramatic text and anthropology, the dramatic text as consciousness, the dramatic text and formalism, and the dramatic text and history.
3-5 units, Aut (Lyons) MW 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 (Rayner) 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 — (Same as Humanities 311.)
3-4 units, Aut (Rehm) TTh 4:15-6:05
354M. Seminar: Modern Mass Intermedia Studies—(Same as English 360.)
4-5 units, Spr (Marsh)

357. Seminar: The Past as Present Contemporary African-American Drama—The themes of the past as they echo in contemporary African-American drama by August Wilson, George C. Wolfe, and others.
3-5 units, Spr (Elam) TTh 1:15-3:05

359C. Seminar: Shakespeare—(Same as English 373C.)
4-5 units, Win (Parker) Th 3:15-6:05

360. Seminar: Topics in Theater History—Classical Greece to the Mid-19th Century—The stylistic evolution of theaters and staging from the classical period up to the development of Naturalism. Emphasis on the ways theaters and staging reflect their own cultural and spatial environments.
3-5 units, Aut (Eddelman) MW 10-11:50

361. Seminar: Topics in Theater History—1890 to the 1930s—Emphasis on innovation and experimentation as it developed in European and American theater. Focuses on the aesthetic theories that lie behind selected topics: Naturalism, Appia, Craig, the "isms," and scenography created by artists.
3-5 units (Eddelman) alternate years, given 1994-95

370-374. Graduate Directing Workshop—The core curriculum for graduate students in directing. Prerequisite: consent of instructor.

370. Concepts of Directing—The basic directorial definitions of time, space, movement, and the performer/spectator relationship. Experimentation with texts chosen from literary and other sources, including works from the realistic tradition in drama, using a multi-form performance space.
5 units, Aut (Weber) W 3:15-6:05

371. Design for Directors—Introduction to the concepts of stage, costume, and light design. Creative procedures are explored, including designing of groundplans and elevations, the building of a model, sketching and swatching of costumes, and practical work in the lighting-lab.
3 units, Win (Kralj Ramsaur) TTh 2:15-4:05

5 units, Spr (Weber) T 3:15-6:05

373. Directing the Actor—Directorial collaboration with, and guidance of, the actor in rehearsal and presentation of scenes from the canon and contemporary drama.
3 units, Win (Staff) MW 4:15-6:05

374. Graduate Directors Performance Project—Production of a full-length play to be 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.
5 units, any quarter (Weber) by arrangement

375. Seminar: Directing and Dramaturgy—Discussion/application of dramaturgic and directorial methods in working on plays from the Elizabethan tradition to Post-Modernist texts. The director's concept is tested in the staging of scenes.
5 units, Aut (Weber) T 3:15-6:05

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 play bill. 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
1-4 units, any quarter (Staff) by arrangement

399. Dissertation Research
1-9 units, any quarter (Staff) by arrangement

OVERSEAS STUDIES

101A. German Theater—(Same as German Studies 195.) Berlin. DR:7(2)
4-5 units, Aut, Spr (Kramer)

158C. An Introduction to Modern German Cinema—Berlin.
4-5 units, Win (Rehm)

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, Ho-mou Wu (Visiting)
Education: Thomas Rohlen
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: Nina Halpern, 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 Fu-mei (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 which 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 which 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

The undergraduate major in East Asian Studies enables students who are 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 guide the student in a course of study that provides 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) 5-10 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 which 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 which 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 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
Sources, 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 on 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 the Graduate Admissions Section of the Registrar’s Office, 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 completion of 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 in this bulletin. Work completed in one of these programs may be counted toward completion of 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 prior to 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. Completion of this combined course of study requires approximately four academic years, depending upon 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. Completion of 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. Completion of 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 who complete 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 policy makers. Students concluding the first year of graduate study at Stanford are eligible to apply for the degree, which is granted by the Department of Health Research and Policy in the School of Medicine. The degree may be pursued concurrently with the second and subsequent years of graduate study and is awarded upon 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 which 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 departmental listings in this bulletin.

ANTHROPOLOGY

14. Cultures in Crisis
   5 units (Befu) not given 1993-94
114. Introduction to Chinese Society
   5 units, Aut (Wolf)
117. Society in Traditional China
   5 units (Gates) not given 1993-94
121. Japanese Society and Culture
   5 units (Befu) not given 1993-94
123. Japanese Economic Organization
   5 units (Befu) not given 1993-94
125. Japanese Women through Novels
   5 units (Befu) not given 1993-94
258. Ideology and Cultural Nationalism
   5 units (Befu) not given 1993-94
267. Spatial Systems and Social Processes
   3, 5, or 8 units, Spr (Hochberg)

ART

2. Ideas and Forms in Asian Art
   5 units (Takeuchi) not given 1993-94
126A/226A. Introduction to Chinese Painting
   4 units (Vinograd) not given 1993-94
126B/226B. Early Chinese Pictorial Art
   4 units (Vinograd) not given 1993-94
126C/226C. Artists and Systems in Later Chinese Painting
   4 units (Vinograd) not given 1993-94
126E/226E. Across Cultures: Encounters of Eastern and Western Art
   4 units (Vinograd) not given 1993-94
129/229. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868
4 units (Takeuchi) not given 1993-94

129A/229A. Painting in Late Medieval and Early Modern Japan, 1500-1868
4 units, Win (Takeuchi)

226F. Colloquium: Psychological and Psychoanalytic Approaches to the Visual Arts
4 units (Vinograd) not given 1993-94

227/227A. Seminar: Painting and Theory in the Sung Dynasty
4 units (Vinograd) not given 1993-94

227B. Seminar: Studies on 18th- and 19th-Century Chinese Painting
4 units (Vinograd) not given 1993-94

229D. Seminar: Problems in Japanese Painting
4 units (Takeuchi) not given 1993-94

229E. Colloquium: Japanese Woodblock Prints
4 units, Aut (Takeuchi)

229G. Colloquium: Women and Gender in Japanese Art
4 units (Takeuchi) not given 1993-94

ASIAN LANGUAGES

46. Introduction to Chinese Thought — (Same as Philosophy 46, Religious Studies 55.)
4 units, (Ivanhoe) not given 1993-94

51. Introduction to Modern Japan
3 units, Sum (Dasher)

91. Traditional East Asian Civilization: China
5 units, Aut (Miller) MWF 11

92. Traditional East Asian Civilization: Japan
5 units, Win (Storey) MWF 2:15-3:30

113. Zhuang Zi — (Same as Philosophy 113/213, Religious Studies 113.)
5 units, Spr (Ivanhoe)

114. Early Taoism: A Doctrine Without Words
4 units, Spr (Csikszentmihalyi)

115. Images of the Warrior in Japanese Literature
4 units, Win (Staff)

131. Chinese Poetry in Translation
4 units, Aut (Miller) TTh 1:15-2:30

132. Chinese Fiction and Drama in Translation
4 units, Win (Kelley) MWF 11

133. Modern Chinese Literature in Translation
4 units, Spr (Lyell)

134. Contemporary Chinese Fiction
4 units (Lyell) given 1994-95

135. Japanese Drama in Translation
4 units (Hare) not given 1993-94

136. Japanese Poetry in Translation
4 units, Win (Storey) TTh 11-12:15

137. Japanese Fiction in Translation
4 units (Matisoff) not given 1993-94

138. Modern Japanese Literature in Translation
4 units, Spr (Maekawa) MWF 1:15

142. Constructing the Subject
4 units (Hare) not given 1993-94

156. China from Earliest Times to the Mongols — (Same as History 192A.)
5 units Aut (Neskar) MTWThF 11

181. Japanese Women Writers
4 units (Staff) not given 1993-94

195. Modern Intellectuals in Japanese Literature
3 units (Ueda) not given 1993-94

265. Comparative Poetics: Theories and Practices of Literary Theory — (Same as Comparative Literature 265.)
5 units, Spr (Miner)

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 (Show)
MTWThF 10, 11, or 1:15

1B,2B,3B. First-Year Modern Chinese for Bilingual Students
3 units, AUT, WIN, SPR (Rozelle)
MTWThF 10, 1:15, or 2:15

5. Intensive First-Year Modern Chinese
12 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)
MTWThF 12 or 2:15

25. Intensive Second-Year Modern Chinese
12 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

ADVANCED

101,102,103. Third-Year Chinese (Modern)
101. 5 units, AUT (Chuang) MTWThF 11
102. 5 units, Win (Lyell) MTWThF 11
103. 5 units, Spr (Chuang) MTWThF 11

105. Intensive Modern Chinese
12 units, Sum (Staff) MTWThF 9-12

111, 112, 113. Third-Year Chinese (Classical)
111. 5 units, Aut (Sun) TTh 2:15-4:05
112. 5 units, Win (Sun) TTh 2:15-4:05
113. 5 units, Spr (Staff) TTh 2:15-4:05

121, 122, 123. Advanced Conversation
2 units, Aut, Win, Spr (Chuang) W 2:15-4:05

131, 132, 133. Business Chinese
3 units, Aut, Win, Spr (Staff) by arrangement

GRADUATE

200. Directed Reading in Chinese
units by arrangement, Aut, Win, Spr (Staff)

201. Proseminar
5 units, Aut (Lin) W 2:15-4:05

211, 212, 213. Advanced Modern Chinese
5 units, Aut, Win, Spr (Chuang)
M 1, F 2:15-4:15

221, 222, 223. Advanced Classical Chinese
221. Philosophical Texts
5 units, Aut (Ivanhoe) MWF 1:15
222. Historical Narration
5 units, Win (J. Wang) MWF 1:15
223. Literary Essays
5 units, Spr (Miller) MWF 1:15

230. Interpreting Confucian Texts
5 units (Ivanhoe) not given 1993-94

231. Neo-Confucianism – (Same as Religious Studies 119A.)
4 units, Win (Ivanhoe)

232. Philosophical Texts of the Ming Dynasty –
(Same as Philosophy 211, Religious Studies 211.)
5 units (Ivanhoe) not given 1993-94

241, 242, 243. Modern Chinese Literature
241. The Short Story
5 units, Aut (Lyell)
242. Essay
5 units, Win (Chuang) MWF 11
243. The Novel
5 units (Lyell) not given 1993-94

261. Shih-ching and Ch'u-tz'u
4 units, not given 1993-94

263. Lyric (shih) I
4 units, Win (Miller)
264. Lyric (shih) II
4 units, not given 1993-94

271/272. Traditional Chinese Fiction
4 units (J. Wang) not given 1993-94

273. Chinese Drama
4 units, Spr (J. Wang) TTh 11-12:15

291. The Structure of Modern Chinese — (Same as Linguistics 291.)
4 units (Sun) not given 1993-94

292. The History of Chinese — (Same as Linguistics 292.)
4 units (Sun) not given 1993-94

334. Seminar in Modern Chinese Literature
5 units, Spr (Lyell) MW 2:15-3:30

361. Seminar on Tz'u Poetry of the T'ang and Sung
5 units, not given 1993-94

371. Seminar in Chinese Literary Criticism
5 units, Spr (J. Wang) TTh 2:15-4:05

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, 10, or 11

10/110. Intensive First-Year Japanese for Professionals
7 units, Sum (Staff) MWF 4-7

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

30. Reading Technical Japanese
1-3 units, Sum (Dashar) MW 4-6

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 12:45-2:05
114. Japanese for Business  
3 units, Sum (Staff) TTh 4-6

121,122,123. Advanced Japanese Conversation  
2 units, Aut, Win, Spr (Arao) TTh 1:15

GRADUATE

200. Directed Reading in Japanese  
units by arrangement, Aut, Win, Spr (Staff) by arrangement

201. Proseminar  
5 units, Aut (Matisoff) T 2:15-4:05

208. Teaching Asian Languages — (Same as Linguistics 188.)  
2 units, Win (Matsumoto)

211,212,213. Advanced Modern Japanese  
5 units, Aut (Dasher)  
Win, Spr (Kubo)

246. Introduction to Classical Japanese  
5 units, Aut (Staff) by arrangement

247,248. Readings in Classical Japanese  
247. 5 units, Spr (Matisoff) TTh 2:15-3:30  
248. 5 units (Hare) not given 1993-94

250. Introduction to Kambun  
4 units (Ueda) not given 1993-94

251. Graduate Seminar: Japanese Historical Texts — (Same as History 498.)  
5 units, Win (Mass) by arrangement

256. Readings in Japanese Culture  
4 units (Staff) not given 1993-94

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 1993-94

277. Structure of Japanese — (Same as Linguistics 277.)  
4 units, Spr (Matsumoto)

310. Medieval Japanese Narrative and Dramatic Literature  
4 units (Matisoff) not given 1993-94

311. Japanese Pragmatics  
4 units (Matsumoto) not given 1993-94

314. Major Haiku Poets  
4 units, Win (Ueda) TTh 2:15-3:30

396. Seminar in Modern Japanese Literature  
5 units (Ueda) not given 1993-94

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

EAST ASIAN STUDIES

14. Introduction to Chinese Society — (Same as Anthropology 114.)  
5 units, Aut (Wolf) MWF 3:15

290. Core Seminar: Issues and Approaches in East Asian Studies  
1 unit, Aut (Staff) M 3:15

ECONOMICS

121. The Economies of Greater China and the World — (Same as Food Research 148/248.)  
5 units, Spr (Rozelle) TTh 1:15-3:05

124. The Japanese Economy  
5 units, Spr (Aoki)

126. Comparative Economic Systems: The Economics of Transition  
5 units, Win (Qian)

131. The Development of the Korean Economy  
5 units, Spr (Staff)

134. Development of the Newly Industrialized Economies  
5 units, not given 1993-94

220. Marxist Economic Theory  
5 units, not given 1993-94

293. Reform and Transition in Socialist Economies  
5 units, Spr (Qian)

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, Win (Rohlen) TTh 9-10:50

306C. Cultural Approaches to Education and Development—(Same as Anthropology 239.)
   3-5 units, Win (McDermott) MW 9-10:50

FOOD RESEARCH INSTITUTE
148/248. The Economies of Greater China and the World—(Same as Economics 121.)
   5 units, Spr (Rozelle) TTh 1:15-3:05

HISTORY
159. Introduction to Asian American History
   4-5 units (Chang) not given 1993-94

192A. China from Earliest Times to the Mongols—(Same as Asian Languages 156.)
   5 units, Aut (Neskar) MTWThF 11

192B. Chinese History from the Ming to the Great Modern Revolutions, 14th-19th Century
   5 units, Win (Kahn) MTWThF 11

192C. Modern China, 19th and 20th Century
   5 units, Spr (Van Slyke) MTWThF 11

194A. Early and Medieval Japan to 1500
   5 units, Aut (Mass) MTWTh 9

194B. Late Medieval and Early Modern Japan 1500-1840
   5 units, Win (Ketelaar) MTWThF 10

194C. The Rise of Modern Japan
   5 units, Spr (Duus) MTWTh 1:15

265S. Senior Research Seminar: Asian-American History
   5 units (Chang) not given 1993-94

290. Undergraduate Colloquium: United States and Japan
   5 units (Duus) not given 1993-94

292. Undergraduate Colloquium: Postwar Japan
   5 units (Duus) not given 1993-94

   5 units (Ketelaar) not given 1993-94

295A. Undergraduate Colloquium: The Korean War—Watershed in Asia
   5 units, Aut (Van Slyke) T 1:15-3:05

296. Undergraduate Colloquium: Ordinary Lives—The Social History of Early Modern China
   5 units, Win (Kahn) W 1:15-3:05

299. Undergraduate Colloquium: The Institutions of Medieval Japan
   5 units (Mass) not given 1993-94

390. Graduate Colloquium: United States and Japan
   4-5 units (Duus) not given 1993-94

390A. Graduate Colloquium: Topics in Late Traditional Chinese History
   4-5 units, Aut (Kahn) T 1:15-3:05

390B. Graduate Colloquium: Topics in Late Traditional and Modern Chinese History
   4-5 units, Win (Van Slyke) T 2:15-4:05

390C. Graduate Colloquium: Topics in Late Traditional and Modern Chinese History
   4-5 units, Spr (Van Slyke) Th 2:15-4:05

392. Graduate Colloquium: Postwar Japan
   4-5 units (Duus) not given 1993-94

395A. Graduate Colloquium: Early and Medieval Japan
   4-5 units, Aut (Mass) W 2:15-4:05

395B. Graduate Colloquium: Late Medieval and Early Modern Japan
   4-5 units, Win (Ketelaar) Th 1:15-4:05

395C. Graduate Colloquium: Modern Japan
   4-5 units, Spr (Duus) Th 2:15-4:05

399. Graduate Colloquium: The Institutions of Medieval Japan
   4-5 units, Win (Mass) W 2:15-4:05

490A. Graduate Seminar: Modern China
   4-5 units (Van Slyke) not given 1993-94

490B. Graduate Seminar: Research in Modern and Contemporary China
   4-5 units (Van Slyke) not given 1993-94

493A,B. Graduate Seminar: Late Traditional Chinese History
   4-5 units (Kahn) not given 1993-94

498. Graduate Seminar: Japanese Historical Texts—(Same as Asian Languages 251.)
   4-5 units, Win (Mass) by arrangement

498A. Graduate Seminar: Japanese Historical Sources
   4-5 units, Spr (Mass) by arrangement

LAW
515. Law and Society in Asia
   2 units, Aut (Li)

LINGUISTICS
177. Structure of Japanese
   4 units, Spr (Matsumoto)

271. The Structure of Korean—(Same as Asian Languages/Korean 271.)
   4 units, Win (Cho)

281. Japanese Pragmatics
   4 units, not given 1993-94
292. The History of Chinese — (Same as Asian Languages/Chinese 292.)
4 units, not given 1993-94

PHILOSOPHY

46. Introduction to Chinese Thought — (Same as Asian Languages 46, Religious Studies 55.)
4 units (Ivanhoe) not given 1993-94

113/213. Zhuang Zi — (Same as Asian Languages 113, Religious Studies 113.)
4 units, Spr (Ivanhoe) MWF 10

114/214. Neo-Confucianism
4 units, Win (Ivanhoe) MWF 10

211. Philosophical Texts of the Ming Dynasty — (Same as Asian Languages 232, Religious Studies 211.)
4 units (Ivanhoe) not given 1993-94

212. Interpreting Confucian Texts — (Same as Asian Languages 230, Religious Studies 212.)
4 units (Ivanhoe) not given 1993-94

POLITICAL SCIENCE

20. Introduction to Comparative Politics
5 units, Spr (Halpern)

114. Japanese Politics
5 units (Okimoto) given 1994-95

115. Politics in the People's Republic of China
5 units, Win (Halpern)

125. Seminar: Rise of Industrial Asia — (Same as Economics 130; Science, Technology, and Society 152.)
5 units, Aut (Lau, Okimoto, Raphael, Rohlen)

138B. Seminar: Security and Diplomacy
5 units, Aut (Lewis)

19A. Japanese Foreign Policy
5 units, Aut (Okimoto)

213. Seminar: Issues in Chinese Politics
5 units, Win (Halpern)

5 units (Okimoto) given 1994-95

223. Seminar: Japanese Politics
5 units (Okimoto) given 1994-95

RELIGIOUS STUDIES

14. Introduction to Buddhism
4 units (Faure) not given 1993-94

18. Zen Buddhism
4 units, Spr (Bielefeldt)

20. Chinese Religious Thought and Practice
4 units, Win (Faure)

55. Introduction to Chinese Thought — (Same as Philosophy 46, Asian Languages 46.)
4 units (Ivanhoe) not given 1993-94

113. Zhuang Zi — (Same as Asian Languages 113, Philosophy 113/213.)
5 units, Spr (Ivanhoe)

116. Japanese Buddhism
5 units, not given 1993-94

117. Syncretism and Sectarianism in Chinese Buddhism
5 units (Faure) not given 1993-94

118. Ritual in East Asian Buddhism
4 units (Faure) not given 1993-94

119A. Neo-Confucianism — (Same as Asian Languages 231, Philosophy 114.)
4 units, Win (Ivanhoe)

124. Religion in Japan
5 units (Bielefeldt) not given 1993-94

136. Buddhist Yoga
4 units (Bielefeldt) not given 1993-94

150. Systems of Buddhist Thought
5 units, Win (Bielefeldt)

210. Speech and Writing in the Buddhist Tradition
4 units (Faure) not given 1993-94

211. Philosophical Texts of the Ming Dynasty — (Same as Asian Languages 232, Philosophy 211.)
5 units (Ivanhoe) not given 1993-94

212. Interpreting Confucian Texts — (Same as Asian Languages 230, Philosophy 212.)
5 units (Ivanhoe) not given 1993-94

221. Ch'an/Zen and Local Religion
5 units (Faure) not given 1993-94

230A. Zen Buddhism Seminar
5 units (Bielefeldt) not given 1993-94

258. Japanese Buddhist Texts — (Same as Asian Languages 258.)
5 units (Bielefeldt) not given 1993-94

311. Buddhist Studies Seminar
5 units (Faure) not given 1993-94

315. Ch'an Studies: Methodological Issues
4 units (Faure) not given 1993-94

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, Robert W. Staiger, Frank A. Wolak

Assistant Professors: Orazio Attanasio, Avner Greif, Charles I. Jones, Anjini Kohar, John M. Litwack, Yingyi Qian, Anne B. Royalty, Julie A. Schaffner

Courtesy Professors: W. Brian Arthur (Food Research), David Baron (Business), John Ferejohn (Political Science), Ken-ichi Imai (Institute for International Studies), David Kreps, (Business), A. Mitchell Polinsky (Law), John Roberts (Business), Thomas Sargent (Hoover Institution), Barry Weingast (Hoover Institution), Robert Wilson (Business), Mark Wolfson (Business)

Courtesy Associate Professor: Alan Garber (Medical School)

Visiting Professors: Graciela Chichilnisky, Paul Krugman, Constantine Meghir

Visiting Assistants: Sueng-Hee Choi, John Earle, Peter Huang, W. Edward Steinmueller

Affiliated Professors: Carl H. Gotsch (Food Research), Timothy E. Josling (Food Research), Henry Levin (Education), Scott R. Pearson (Food Research), Anne E. Peck (Food Research), Clark W. Reynolds (Food Research), Myra H. Strober (Education), James L. Sweeney (Engineering-Economic Systems), Pan A. Yotopoulos (Food Research)

Affiliated Associate Professor: Jeffrey Williams (Food Research)

Visiting Lecturers: Marc Flandreau, Daniel Haak, Timothy Taylor

Acting Instructors: Kwang Soo Cheong, Allen Prohofsky, Joanne Spetz, John Williams

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 work 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 as practitioners of economics. The curriculum includes a comprehensive treatment of modern theory and empirical techniques. Currently, 20 to 25 students are admitted each year.

The faculty represents a wide spectrum of interests and conducts 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 departmental Information Book for Economics Majors, available in 119 Encina Commons. For transition arrangements for continuing majors during 1993-94, 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 51Q and 52 (10 units). Requirement '2' must be completed before taking 51Q.
5. Two courses must be chosen from among Economics 111, 118, 140, 141, 145, 149, 150, 155, 156, 157, 162, 165, and 185, and must be taken at Stanford in California (10 units).
6. Economics 101 is required and must be taken at Stanford in California (5 units). This course may be taken only after completing requirement '5'.
7. Twenty additional units from economics courses numbered between 100 and 198, excluding 190 and 191. At least 10 units must be chosen from courses with a prerequisite of 51Q, 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 completion of 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 departmental Information Book for Economics Majors, available in 119 Encina Commons. 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. Completion of 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. Achievement of an LGI in economics courses of at least 3.5. See details in the Information Book for Economics Majors.
3. Submission of 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 departmental 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 prior to graduation (typically the Autumn Quarter of the senior year). Also required, later in the same quarter, is submission of a three-page thesis prospectus which 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, a course in linear algebra, and a rigorous course in probability and statistics.
MASTER OF ARTS

The department does not admit students who plan to terminate their graduate study with the A.M. degree. Students may (but need not) elect this degree in preparation for the Ph.D. degree. A master's option is also available to Ph.D. candidates from other departments.

Admission — Prospective students must have completed the Stanford requirements for an A.B. in Economics or approximately equivalent training. Since students are required to take some of the same courses as Ph.D. candidates, similar preparation in mathematics and statistics generally is expected. Prospective applicants should submit their credentials together with a plan of study to the Director of Graduate Studies for approval.

Requirements — A master's program must satisfy the following criteria:

1. Completion at Stanford of 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. Demonstration of competence in empirical methodology at the level of Economics 170. Normally, this is done by including that course in the program of study.

3. Submission of 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.

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. Completion of 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, economics 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 some fields may be advised to add a third course which can then be counted toward the distribution requirement discussed later. All courses (comprehensive exams, when offered) must be passed with an LGI of 'B' or better.

3. Completion of 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 prior to 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 departmental comprehensive written examinations that are 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; e.g., the Ph.D. in Economics combined with one or two years of study in the Law School, leading either to the non-professional Master of Legal Studies (M.L.S.) degree or the non-professional 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 departmental admissions committee.

COURSES

Note — Consult the quarterly Time Schedule for the exact times courses are given.


51Q. Economic Analysis I — (Graduate students register for 151Q.) The nature of economic systems. Methods of allocating economic resources. Theo-
eries of production and consumer choice. The role of markets and prices in a decentralized system. Principles of efficient and equitable allocation. Methods of calculus are used to develop theoretical structures most appropriate for doing modern applied economic analysis. Prerequisites: 1 and 180 (or Math. 43 or equivalent).

5 units, Aut, Spr (Milgrom)
Win (Topper)

52. 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 or 51Q.

5 units, Aut (Choi)
Win (Hickman)
Spr (Hall, Williams)

80. Introduction to Statistical Methods 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 (Martin)
Win (Staff)

90. Introduction to Accounting — (Graduate students register for 190.) Introduction to the principles and concepts underlying financial reports: the income statement, statement of financial position, 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, Win (Huddart)
Spr (Canellos)

91. Introduction to Cost Accounting — (Graduate students register for 191.) The use of internal financial data for managerial decision making. Students who have had or are now taking a college-level accounting course may not enroll. Prerequisite: 90 or Industrial Engineering 133.

5 units, Spr (Huddart)

99. State, Market, and Development — 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)

100. 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 1993-94

100C. Limits of Economic Rationality II: Individualism and Social Justice — (Same as French and Italian 296E.) Examination of several attempts to conceive of the “good society” in terms akin to economic rationality. Contemporary Anglo-American theories (David Gauthier, Friedrich Hayek, Robert Nozick, John Rawls), in light of the French liberal tradition (Constant, Montesquieu, Tocqueville). (In English)

3-4 units, Spr (Dupuy)

101. Economic Policy Analysis — Policy issues Papers and cases required. Limited enrollment. Topics vary with instructor. Writing Focus course. Prerequisites: 51 or 51Q, and 52.

5 units, Aut (Pagiola)
Win (Santos, Reynolds)
Spr (Albers, Carnoy)


5 units, Aut (Kochar)
Win (Meghir)
Spr (Lau)

103. Applied Macroeconomic Analysis — Construction and use of econometric models for analyzing macroeconomic phenomena. Students complete individual projects and core material. Topics vary with the instructor. Limited enrollment. Prerequisites: 52 and 102.

5 units, Aut, Win, (Jones)
Spr (Haak)

104. Applied Microeconomic Analysis — Develops skills in the empirical analysis of microeconomic theory, models, and data. Topics vary with instructor. Students complete individual projects and core material. Limited enrollment. Prerequisite: 51Q.

5 units, Aut, Win (Royalty)
Spr (Schaffner)
106. 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.

4 units, Win (Falcon, Naylor) TTh 1:15-3:05

107. 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, given 1994-95


5 units, Aut, Win (Haak) Spr (Wu)


4 units, Win (Weyant) 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)

4-5 units, Spr (Rosenberg) optional section for extra unit

115. European Economic History — Economic changes and growth in Western Europe from the Medieval period to WWI. 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 (Flandreau)

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 (Wright)

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, Spr (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) MW 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 (Earle)

121. The Economies of Greater China and the World — (Same as Food Research 148/248; graduate students register for Food Research 248.) Structure and development of the economy of the People's Republic of China, Taiwan, and Hong Kong. Topics: interregional and international trade, foreign
investment, the role of economy during transition, rural reform policy and development institutions, including markets; local governments and private economic entities; urban and industrial reforms; rural industrialization; progress (or stagnation) in China's poverty belts; population control; and comparisons with other countries in Asia, the socialistic bloc, and the rest of the world. Prerequisite: 1.

5 units, Spr (Rozelle) 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(5)

5 units, Spr (Harris)

123. Economic Development in Latin America — (Same 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, the Andean countries, the 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, Spr (Aoki)

125. Economic Development in Africa — (Same as Food Research 149/249; graduate students register for Food Research 249.) Economic development issues in Africa, emphasizing the sub-Saharan region. Topics: economic history, development strategies, institutional change, agricultural policies and technology, environmental degradation, informal sector industrialization, external debt, and structural adjustment.

5 units, Aut (Fafchamps) TTh 1:15-3:05

126. Comparative Economic Institutions: The Economies 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, Win (Qian)

127. 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 (Gotsch) MW 9-10:50

130. The Rise of Industrial Asia — (Same as Political Science 125; Science, Technology, and Society 152.) The political, economic, security, social, and cultural aspects of industrial development and change in Asia as a region. Consent of instructors required. 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, Spr (Staff)


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

134. Development of the Newly Industrialized Economies — The development experience of new...
industrialized economies including Hong Kong, Singapore, S. Korea, and Taiwan. Identifies the reasons for their successful development, compares and contrasts them with one another and with other developing countries.

5 units, not given 1993-94

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: capital budgeting techniques, organization of various primary and secondary markets, properties of various financial instruments, including financial futures, mutual funds, and the Capital Asset Pricing Model. Models for pricing options and other contingent claims. Prerequisites: 51, at least one course in calculus and at least one course in regression analysis.

5 units, Win (Williams)

141. Public Finance and Fiscal Policy — Effects of government expenditure, borrowing, and taxation upon resource allocation, national income and employment, prices, and income distribution. Prerequisites: 51, 52.

5 units, Spr (Cheong)


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. Alternatives to human capital theory. Prerequisite: 51.

5 units, Spr (Royalty)

148. Urban Economics — (Same as Urban Studies 120.) The economy of cities. Why cities form, the types of agglomeration, how cities grow. Location and land use, urban transportation, housing, and local taxation of provision of public services. Mix of theory and policy with some focus on poverty and discrimination, and environmental and developmental issues. Prerequisite: 51.

5 units, Spr (Bostic, Gans)


5 units, not given 1993-94

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)

151Q. Economic Analysis I — (See 51Q.)

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, 52.

3 units (Weingast) not given 1993-94

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, not given 1993-94

155. Environmental and Natural Resource Economics — (Same as Earth Systems 112.) Analysis of economic sources of environmental problems in a market economy and evaluation of alternative policies (regulation, taxation, marketable permits) for
dealing with these problems. 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 or 51Q.

5 units, Win (Huang)

156. Economics of Health and Medical Care — (Same as Health Research and Policy 256, Medical Information Sciences 256; graduate students register for 256.) Open to graduate students and undergraduates (juniors, seniors) 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: 51 or consent of instructor.

5 units, Aut (Spetz)

157. Imperfect Competition — Extends and develops the basic tools of price theory in the context of U.S. industrial market structure. Emphasizes the application of theoretical models and concepts to the behavior of firms and markets when the conditions of perfect competition are not satisfied. Topics: monopoly, oligopoly, monopolistic competition, concentration measures, international competition, advertising, innovation, externalities, economies of scale, and the role of information in markets. Prerequisite: 51.

5 units, Aut (Trajtenberg)

158. Antitrust and Regulation — The history, economics, and legal background of the institutions under which U.S. industry is subject to government control. Topics: antitrust law and economics; the economics and practice of public utility regulation in the communications, transportation, and energy sectors; and the effects of licensing. Emphasizes application of economic concepts in evaluating the performance and policies of government agencies.

5 units, Win (Steinmueller)

159. Economics of Regulation — (Stanford in Washington.) Changing policies toward microeconomic interventions by the federal government. Topics: recent efforts to reform regulatory policies and institutions and to deregulate various sectors; the legal, political, and economic theories that prevailed prior to the reform movement; and the effects of the reforms. Exploration of hypotheses regarding these issues in the context of a variety of regulatory institutions and issues.

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, Win (Goulder)

162. Introduction to Dynamic Economics — The dynamic 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: 51Q or equivalent, 180.

5 units, not given 1993-94

165. International Economics — Comparative advantage in production and trade among nations; trade policy; the international monetary mechanism; domestic monetary, fiscal, and exchange rate policies and their relationship to foreign trade. Prerequisites: 1, 51, and 52.

5 units, Aut (Sent)

Win (Krueger)

168. Cities, Regions, and Nations — (Graduate students register for 268.) Implications of geography and location theory for conventional international economics. Prerequisite: 165 or equivalent.

5 units, Spr (Krugman)

171. Intermediate Econometrics II — (Same as 271.)

5 units, Win (Kochar)

172. Intermediate Econometrics III — (Same as 272.)

5 units, Spr (MacCurdy)
180. Mathematics for Economists — Training in areas of mathematics which frequently apply 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 (Cheong)
Win (Brown)

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, Spr (Huang)

185. The Distribution of Income and Wealth — Basic facts about the distribution of income and wealth in the U.S., with comparisons to other advanced countries. Methods of measuring inequality. Statistical distributions and stochastic models. Economic theories of the distribution of income: neoclassical, Marxist, and neo-Keynesian. The relation between wealth and income distribution. Normative theories of just distribution and the limiting effects of incentives on the redistribution of income (may be taken as 285 by graduate students). Prerequisites: 51 and 180, or Math. 43 or equivalent.

5 units, not given 1993-94

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 teams 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 or 51Q, one course in calculus.

5 units, Win (Brown)

188. Senior Research Paper — Attend organizational meeting on Friday, first week of classes (see Stanford Daily for details).

3 units, Aut, Win, Spr (Prohofsky)

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 (Prohofsky)

PRIMARILY FOR GRADUATE STUDENTS

350. A.M. Thesis
by arrangement

400. Ph.D. Dissertation
by arrangement

A. CORE THEORY CURRICULUM


5 units, Aut (Lau)


5 units, Win (Milgrom)

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. Meets four hours weekly during the first five weeks, with required section on Friday.

3 units, Aut (Kurz)


5 units, Aut (Attanasio)


5 units, Win (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, Spr (J. Taylor)

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, Win (Arrow)

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 1993-94

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 1993-94, 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, Win (Schaffner)


5 units, Aut (McKinnon)

267. Special Topics in International Economies—See Section I.

5 units, Aut (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 — 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. Upper-division undergraduates may attend with consent of instructor.

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 1993-94

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, Spr (Wright)

227. European Economic History — Economic growth and development in Western Europe from the 11th to the 20th centuries, emphasizing the formative period up to the 19th century. 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, Aut (Flandreau)

228. Institutions in Economic History: Form, Function, and Evolution 5 units, not given 1993-94

325A,B,C. Workshop in Economic History 10 units (Staff) by arrangement

E. MONETARY THEORY AND ADVANCED MACROECONOMICS

Requirements for the field are successful completion of 233 and 234, and the acceptance of a research paper in the areas covered by either 233 or 234. 217 and 265 are recommended.


5 units, Win (J. Taylor)


5 units, Spr (Jones)

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 (Starrett)
242. 5 units, Spr (Gouder)

243. Economics of the Environment — Analysis of sources of environmental problems in market economies and of policy options for addressing these problems. Topics: choice of policy instruments (taxes, standards, tradable permits), environmental risk assessment, valuation of non-marketed commodities (environmental amenities, biodiversity), environmental policy making under uncertainty, optimal mix of corrective and distortionary tax instruments, and dynamics of economic growth in the presence of non-reproducible natural resources. Upper-division undergraduates may attend with consent of instructor.

5 units, Aut (Goulder)

341A,B,C. Workshop on the Economics of the Public Sector — Issues in measuring and evaluating the economic performance of government tax, expenditure, debt, and other policies; their effects on private economic activity, saving, investment, labor supply, etc.; alternative policies and methods of evaluation. Workshop format combines student research, faculty presentations, and guest speakers. Prerequisite: 241 or consent of instructor.

10 units (Staff) 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.

246. Labor Economics I — Labor demand functions, substitution among different types of labor in production, adjustment costs. Labor supply, hours

5 units, Aut (Pencavel)


5 units, Spr (MaCurdy)

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 1993-94

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, 259, or 260. Students who expect to make this field one of their primary research interests are strongly urged to take additional courses in the field.

Students expecting to make Economics of Industry their primary research field, and to write a dissertation in it, are required to take 260 and one of the workshops.

256. Economics of Health and Medical Care — (See 156.)

257, 258. The Economics of Industry, Regulation, and Firm Organizations I and II — Theoretical and empirical analyses of the determinants of market structure; firm behavior and market efficiency in oligopolies; theory and practice of pro-competitive government policies; relationship of product quality and technological innovation to market structure; internal organizations of the firm; choices between contracting and vertical integrating; government regulation of business; public utilities, regulated competition, licensing, product and worker safety, environmental protection; the political economy of business policies.

257. 5 units, Aut (Wolak)

258. 5 units, Win (Noll)

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 (Noll)


5 units, Spr (Arthur) TTh 9-10:50

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, Win (Noll)

303A,B,C. Workshop in the Economics of Science and Technology — (Same as Science, Technology, and Society 269A,B,C.) 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 under-
take 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, Win (McKinnon)


5 units, Aut (Krueger)


5 units, Spr (Krueger)

268. Cities, Regions, and Nations — (Same as 168.)

5 units, Spr (Krugman)

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 (Amemiya)


5 units, Win (Kochar)


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, Aut (Amemiya)

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, Win (Wolak)

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 1993-94

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, Aut (Chichilniski)


5 units, Win (Chichilniski)

282. Theory of Information and Organization — (Same as Operations Research 363.) Information and decision. The value and cost of information. Demand for information and its economic implica-
284. **Topics in Dynamic Economics** — Principle of optimality, discounted dynamic programming under certainty and uncertainty, and applications in economics. Optimal control theory and applications. Dynamical systems with learning.

*5 units, Aut (Kurz)*

285. **The Distribution of Income and Wealth** —  
(See 185.)

*5 units, not given 1993-94*

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, not given 1993-94*

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, Spr (Brown)*

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)*

285A, B, C. **Workshop in Mathematical Economics**

*10 units (Staff) by arrangement*

286. **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, Ayres, 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, Win (Qian)*

292. **Comparative Analysis of Organizations and Systems** — Review of recent research on organizations and firms from viewpoint of information (coordination), incentives contracts, and games. Analysis of complementarities among various institutional arrangements surrounding firms (labor markets, financial institutions, manufacturing modes, outsourcing), and of institutional complementarities including the role of government. System change and evolution. Institutional comparisons of economies: advanced market economies, developing economies, and transforming socialist economies.

*5 units, Spr (Aoki)*

293. **Reform and Transition in Socialist Economies** — Applications of organization theory to problems in reforming socialist economies. Emphasis is on understanding problems in the creation of market institutions in China, Eastern Europe, and the territory of the former U.S.S.R. Theoretical topics: coordination, incentives, commitment problems, and contract enforcement. These problems are related to issues in privatization, the building of fiscal and financial institutions, international trade, and foreign investments.

*5 units, Spr (Qian)*

294. **Institutions and Organizations in Historical Perspective** — (Same as 228.) Description and analysis of institutions and organizations in the Western historical experience, emphasizing the formative period from the 11th to the 18th centuries. 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, not given 1993-94*
391A,B,C. Seminar in Comparative Institutional Analysis  
10 units (Staff) by arrangement  

392. Comparative Institutional Approaches to Latin American Economic Development — (Same as 135.)  
3-5 units, Aut (Conklin)  

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.  
5 units, Aut (Krueger)  

5 units, Win (Fouet)  

124X. The Transformation of the Global Economy and its Implications for Latin America Growth — Santiago.  
5 units, Aut (Hachette)  

126X. From Socialism to Capitalism in East Germany: The Political Economy of “Change” — Berlin.  
5 units, Spr (Krüger)  

128X. Transition in Germany and Eastern Europe — Berlin.  
5 units, Win (Krüger)  

159X. The Political Economy of Industrial Change: Italy and Europe in a Global System — Florence.  
5 units, Win (Bianchi, Bellini)  

5 units, Aut (Crafts)  

5 units, Aut (David)  

5 units, Spr (David)  

ENGLISH  


Chair: Ronald A. Rebholtz  
Vice Chair: Albert J. Gelpi  
Director of Creative Writing Program: John L’Heureux  
Acting Director of Freshman English Program: Kenneth W. Fields  


Associate Professors: Sandra Drake, Horace A. Porter (on leave Autumn, Winter)  

Assistant Professors: Sharon Holland, Suvis Kaul, Joss Lutz Marsh, Lora Romero, William Solomon, Michael Tratner, Robert Allen Warrior  

Professor (Teaching): Larry Friedlander (on leave Autumn)  

Courtesy Professor: Charles R. Lyons (Drama)  


Visiting Professor: Leonard Nathan  
Visiting Associate Professor: Richard H. Osberg  
Visiting Assistant Professors: Regula Meyer Evitt, Jay Grossman, Ania Loomba
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.

C) Renaissance: English 113, 172, 182A, 214
D) Shakespeare: English 173A, 173B, 173C, 183A
E) Restoration and 18th Century: English 131, 142, 174
F) Romantic and Victorian: English 132G, 135, 154, 177, 185B, 254
G) American Literature before 1900: English 121, 163A, 175, 186A, 186B, 186C


Poetry and Poetics: English 92, 150, 150G, 188A

* May be counted for 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 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 13 courses offered through the Department of English. Like all English majors, they must choose one course from each of the eight areas B-H, P, listed above, one elective, 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 (Poetry 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 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, providing at least one quarter intervenes.

Students must maintain a letter grade indicator (LGI) of 'B' in all Creative Writing classes to graduate with the major in English with a Creative Writing emphasis.

**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 student's adviser.

6. In addition, students in the interdisciplinary program must write at least one interdisciplinary paper. This may be a senior honors essay (197), a senior independent essay (199), an individual research paper (194 or 198), or a paper integrating the material in two courses the student is taking in two different disciplines.

**Major in English and French Literatures** — This major provides a focus in English literature with additional work in French literature, read in the original. Candidates for the A.B. in English and French Literatures complete nine courses in English, one from each of the areas B-H, P listed under the major in English, one elective, and fulfill the seminar requirement. In addition, they must complete a coherent program of four courses in French literature, read in the original. The program of each student must be approved by the Director of Undergraduate Studies in English and by the Department of French and Italian.

**Major in English and Italian Literatures** — This is arranged as in the major in English and French Literatures, requiring the completion of nine courses in English, one from each of areas B-H, P, one elective, a Department of English seminar, and a coherent program of four courses in Italian literature, read in the original. The program of each student must be approved by the Director of Undergraduate Studies in English and by the Department of French and Italian.

**Major in English and German Literatures** — Candidates for the A.B. in this major must complete a program exactly analogous to the two preceding majors, with nine courses in English, one from each of areas B-H, P, one elective, a Department of English seminar, and a coherent program of four courses in German literature, read in the original, with approval by the departments involved as specified above.

**Major in English and Spanish or Spanish-American Literatures** — Candidates for the A.B. in this
major must complete nine courses in English, including one from each of the eight areas B-H, P, a Department of English seminar, and a coherent program of four courses in Spanish or Spanish American literature totaling at least 20 units and read in the original. The program of each student must be approved by the departments involved as specified above.

**Major in English and Classics** — Candidates for the A.B. in this major must complete nine courses in English, including one from each of the eight areas B-H, P, a Department of English seminar, and a coherent program of four courses in Classics totaling at least 20 units and read in the original. The program of each student must be approved by the departments involved as specified above.

**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 the end of Winter Quarter, or, with the agreement of the faculty adviser, no later than April 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 in 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 in 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 the Graduate Admissions Section of the 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 "Degrees" section in 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 falls short of the requirements for the A.B. degree in English at Stanford 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., the A.M. in English and American Literature, or the Master of Arts in Teaching (M.A.T.). 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. In addition to the two required graduate seminars, the master's student may schedule 5 to 10 units of directed reading and research as English 398, which would result in a substantial piece of scholarly or critical writing.

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 may write off one field on the basis of evidence of substantial work done in that field during the senior year. The program should contain 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 should register for 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 courses 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. See the description of programs under the "Degrees" section of this bulletin.

MASTER OF ARTS IN TEACHING

The A.M. in Teaching is offered jointly by this department and the School of Education. The degree is intended for candidates who have a teaching credential or relevant teaching experience and wish to further strengthen their academic preparation. The program consists of a minimum of 25 units in the teaching field and 12 units in the School of Education. Detailed requirements for the course are outlined in the "School of Education" section of this bulletin.

Candidates for the A.M. in Teaching may also qualify for the State of California Community College Instructor Credential by completing additional units of academic work at the graduate level. For further information consult the Credentials Administrator, room 110, School of Education, early in the Autumn Quarter.
DOCTOR OF PHILOSOPHY

University regulations regarding this degree are discussed in the "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. (Since departmental doctoral requirements are new in the process of minor revision, 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. Five quarters of supervised teaching are a requirement of the Ph.D. program.

Those students who began in September 1992 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 ensure 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, in English and Humanities, or in English and Linguistics.

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 are required to take a 3-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.

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 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.

5. Students are encouraged to take an advanced course in literary theory or criticism.

6. A minimum of 25 additional units of graduate courses and seminars (excluding 396, 397, 398, and 399) distributed according to the adviser's judgment and the candidate's needs. A student may receive graduate credit for three 100-level courses in the Department of English.

7. Consent of the adviser if courses taken outside the Department of English are to count toward the 97-unit requirement.

8. An oral qualifying examination based on a reading guide, to be taken at the end of the summer after the first year of graduate work. The final decision as to qualification is made by the Graduate Studies Committee in consideration of the student's course record in conjunction with performance in the examination.
A student coming to the doctoral program who has done graduate work at another university must petition in the first quarter at Stanford for transfer credit for course work completed elsewhere and for exemption from the Stanford qualifying examination. The petition should list the courses and grades and describe the nature, scope, and result of the qualifying examination taken elsewhere. The Graduate Studies Committee meets the first week of Winter Quarter to consider the petition in conjunction with the student's grades for the first quarter here. If the committee cannot make a decision at that time, it meets the first week of Spring Quarter to make a decision after two quarters of Stanford grades. If a student's petition is not granted, he or she has the option of taking the Stanford qualifying examination either in the Spring Quarter of the first Stanford year or at the regular time at the end of the Summer Quarter of the first Stanford year.

A student who has isolated a topic or area which seems promising for a doctoral thesis subject and who wants to explore it right away, and to incur additional specific course requirements insuring coverage and balance in program, may petition upon entrance to qualify upon the recommendation of a committee of advisers who would oversee and evaluate a full year's course of study. Such petitions are rigorously scrutinized by the Graduate Studies Committee and granted only in exceptional cases.

9. A University oral examination to be taken no later than the Winter Quarter of the student's third year of graduate work. This examination covers the field of concentration (as defined by the student and the student's adviser).

ENGLISH AND AMERICAN LITERATURE

Requirements are as follows:

1. A course in Old English; or a course in the history of the English language; or a course in an earlier historical form of a foreign language with a bearing on English literature and language, such as Old French or Old High German; and a course in Middle English.

2. A minimum of 35 units of graduate courses in American literature and 35 units in English. Among these, a minimum of six courses for a letter grade from the graduate colloquia and graduate seminars, of which three must be in American literature, and of which at least three must be graduate seminars. The colloquia and seminars should be in different genres and periods as approved by the adviser.

3. Students who began their Ph.D. course in September 1992 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 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 paragraph '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 paragraph '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 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.

### ENGLISH AND LINGUISTICS

Requirements are as follows:

1. A course in Old English; a course in Middle English; and English 202 (History of the English Language).

2. A minimum of three seminars in different genres and periods as approved by the adviser. The student normally takes a total of six courses from the graduate colloquia and graduate seminars.

3. Students who began their Ph.D. course in September 1992 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. Students are encouraged to take an advanced course in literary theory or criticism.

6. A minimum of 30 additional units of graduate courses and seminars (excluding 397 and 399) in English or American literature. Courses outside the department are to be taken only with consent of adviser. The student may not count more than 10 units of English 398 towards the required number for the Ph.D.

7. A minor in Linguistics (30 units, administered by the Department of Linguistics), to be worked out with the graduate adviser in Linguistics in conjunction with the graduate adviser in English.
This minor includes English 101 and Linguistics 120, 130, and 140.

9. Qualification: see paragraph '8' under requirements of the Ph.D. program in English literature.

9. A University oral examination to be taken no later than the Winter Quarter of the student’s third year of graduate work. This examination covers the field of concentration (as defined by the student and the student’s adviser). Topics for the colloquy include at least one on applications of linguistics to literary studies. Half of the question period is devoted to literature, and half to linguistics and its application to literature.

LANGUAGE REQUIREMENTS

All candidates for the Ph.D. degree (except those in English and Comparative Literature and in English Philology, 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 (i.e., 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 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.

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 will request the chair to appoint 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 application for candidacy as prescribed by the University. Ph.D. dissertations must be completed and approved within five years from the date of that application. Candidates taking more than five years are required to extend their candidacy by application to the graduate director.

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 in 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. Students interested should see the “Modern
Thought and Literature” section in this bulletin and consult the chair of the program.

CREATIVE WRITING FELLOWSHIPS

The Creative Writing Program each year offers four two-year fellowships in poetry and four 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 sake. (DR:W)

1A, 2A. Writing: Process, Structure, and Style — Focus is directly 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)

3 A. Writing: Process, Structure, and Style — Focus is directly 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, Aut, Win (Staff)

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, 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 Homer and the Hebrew Bible to the dawn of the Renaissance, covering works including the Greek tragedians, Plato, Aristotle, Vergil, the New Testament, St. Augustine, Dante, Chaucer, and medieval drama. Writing instruction concentrates on finding an appropriate thesis and on developing and organizing ideas. DR: 1 (three-quarter sequence)

5-8 units, Aut (Steidle, Staff) lectures plus sections and workshops

8A, 8B, 8C. Renaissance and Enlightenment — Readings from the Renaissance to the Enlightenment, including works by Machiavelli, More, painters of the Italian Renaissance 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

9B, 9C, 9D. The Modern World — Thought and literature from the French Revolution to contemporary times, including works by the English Romantics, Goya, Dickens, the Impressionists, Marx, Freud, Woolf, Morrison, Scandinavian drama, German Expressionism, world cinema, and American jazz. DR: 1 (three-quarter sequence)

5-8 units, Spr (Marsh, 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 (Rebolholz)

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, Aut (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, Win (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, Aut (Packer)

40. Drama — (English majors and others taking 5 units, register for 140.) Principal dramatic forms, development of dramatic art, masterpieces of the theater from various periods, countries. DR: 7(2)

3 units, Win (Bartholomew)

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, Win (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 con-
temporary American poetry that engages in dialogue with conventional notions of masculinity and femininity. DR:7(2)
3 units, Aut (Middlebrook)

60. The Bible as Literature — (English majors and others taking 5 units, register for 160.)
3 units, Win (Lifschutz)

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. Lectures by faculty from various departments. DR:7(2)
3 units, Spr (Brown, Staff)

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, Aut (Brown)

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, Win (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, MacDonald, Weinberg)

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 (Fiser)

93A. Screenwriting — (Same as Drama 141.)
3-5 units, Aut (Causey)

BASIC UNDERGRADUATE SURVEYS, SEMINARS, AND WORKSHOPS

Note — Graduate students may receive graduate credit for three 100-level courses.

101. Linguistics and Literature — (Same as Linguistics 71.) Introduction to poetics, focusing on those aspects of verbal art which are rooted in the organization of language as a representational system. Principles of metrical form. English metrics: the canonical system, its varieties and offshoots. Metrical innovation and normative prosodic discourse: the play of tradition and ideology within constraints imposed by linguistic structure. Parallelism and syntactic theory. Figurative language in light of theories of linguistic interpretation and language use.
5 units, Spr (Kiparsky)

102. History of the English Language — (Graduate students register for 202; same as Linguistics 102.) Evolution of English in Britain and the U.S.; colonial and post-colonial English; the use of English worldwide. Emphasis on issues in language contact, standardization, and the development of English as a literary medium. DR:9(4)
4-5 units, Aut (Traugott)

5 units, Spr (Rebholz)

111. Masterpieces of English Literature II: From the Enlightenment to the Modern Period — See 11.
5 units, Aut (Paulson)

5 units, Win (Solomon)

113. The Renaissance — A basic survey of English literature. (Area:C) DR:7(2)
5 units, Spr (Loomba)

121. American Literature and Culture to 1855 — (Same as American Studies 150.) (Area:G)
5 units, Aut (Fliegelman)

124C. Introduction to Chicano Life and Culture — (Same as Anthropology 110, Chicano Studies 110, Political Science 92, Spanish 281.) Interdisciplinary focus on the history and culture of Mexican Americans from the settling of the Spanish borderlands to today. Historical perspectives are balanced with anthropological and literary views of cultural diversity of Mexicans in the U.S. (Area:H)
DR:3
5 units, Aut (Fraga, Saldivar)

126. 20th-Century American Fictions — (Same as Chicano Studies 129, Comparative Literature 126.) Readings from traditional masters of modern American literature (Fitzgerald, Faulkner), and from revisionists: African American (Toomer, Hurston) and Chicano (Paredes). The post-WWII period, including African American (Toni Morrison), Asian American (Maxine Hong Kingston), Native American (Louise Erdrich), Chicana (Helena Maria Viramontes, Sandra Cisneros), and Anglo American (E. L. Doctorow, Thomas Pynchon, Don DeLillo). Aim is to see authors in their contemporary, multicultural context. (Area:H) DR:3 or 7(2)
5 units, Win (Saldívar)

130. The Novel — See 30.
5 units, Aut (Packer)
131. The 19th-Century British Novel — (Area:E) 5 units, Aut (Castle)

132G. The 19th-Century English Novel — (Area:F) DR:7f(2) 5 units, Win (Polhemus)

135. The Romantic Novel — (Area:F) 5 units, Aut (Bender)

135A. Conrad and the Impressionist Novel — Masterpieces of impressionist fiction in Conrad, Faulkner, Fitzgerald, Ford, Hawkes, James, Rhys, and Woolf read with an eye to recurrent themes, techniques, and authorial intention. (Area:H) 5 units, Spr (Moser)

137. Development of the Short Story — Required of creative writing students in fiction. Reading/discussion of American, British, and Continental short stories, emphasizing changes and developments in the form. (Area:H) DR:7(2) 5 units, Aut (L 'Heureux)

140. Drama — (See 40; same as Drama 50.) 5 units, Win (Bartholomew)

142. Issues in English Drama: Aphra Behn to Elizabeth Inchbald — Surveys plays by Behn, Dryden, Etheredge, Congreve, Susanna Centlivre, Addison, Lillo, Gay, Goldsmith, Sheridan, and Inchbald. Covers literary-historical ground, focusing on the relations between drama and cultural and socio-economic transitions. The key categories (e.g., "Restoration Drama," "heroic tragedy," "sentimental comedy") that literary critics use to describe the English drama of the later 17th and 18th centuries. (Area:E) 5 units, Spr (Kaul)

150. Poetry and Poetics — See 50. (Area:P) 5 units, Win (Lindenberger)

150G. Poetry and Poetics — (See 50G; same as Feminist Studies 164.) (Area:P) 5 units, Aut (Middlebrook)

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) 4-5 units, Spr (B. Gelpi)

155A. Modern British Poetry — Survey of several British poets from the 1890s to the present, including Thomas Hardy, G. M. Hopkins, D. H. Lawrence, Philip Larkin, Thom Gunn, and others. (Area:H) 5 units, Aut (DiPiero)

156. American Poetry since 1945: Neoromanticism and Postmodernism — Reading of representative contemporary poets whose work addresses in various ways the crisis of form and meaning in the contemporary scene. (Area:H) 5 units, Win (A. Gelpi)

160. The Bible as Literature — See 60. 5 units, Win (Lifschutz)

161A. Afro-American Writing, 1950-1970 — Identifies central literary and intellectual concerns among Afro-American writers, emphasizing the historical and social context. The emergence of the Civil Rights movement of the 1960s, the Black Power/Black Arts movement of the 1960s, and the emergence of a large number of women writers in the second part of the period. Continuities and changes in the work of individual writers over time. The relation between literary style and the artist's conception of audience and relation to community. Readings, entire and excerpted, from novels, essays, poetry. Authors: James Baldwin, Amiri Baraka, Gwendolyn Brooks, Ralph Ellison, Lorraine Hansberry, Leroi Jones, Martin Luther King, Jr., Malcolm X. (Area:H) 5 units, Aut (Drake) MTWTh

163A. Literary Foremothers: African-American Literary History, 1830 to the Present 5 units, Spr (Holland)

163C. Chicana Writers and Feminist Theory — (Same as Spanish 183.) Works by contemporary Mexican-American women writing (mostly) in English in a variety of genres (autobiography, novel, short story, poetry, and film). Discussions combine readings of primary texts with consideration of the theoretical issues raised. Secondary works that theorize race, class, gender, power, resistance, and sexuality are applied as theoretical concepts to primary texts. The applicability of Anglo-European theory to texts written by Chicanas and the status of Chicana texts in Chicano Studies and Women's Studies programs. Recommended: reading knowledge of Spanish. (Area:H) 5 units, Spr (Romero)

163D. Modern Chicano/a Fiction — (Same as Chicano Studies 198, Comparative Literature 196, Spanish 186.) Readings of novels and short fiction by novelists such as Rudolfo Anaya, Tomás Rivera, José Antonio Villareal, and texts of more recently recognized authors, i.e., Ana Castillo, Denise Chávez, Sandra Cisneros, Roberta Fernández, and Arturo Islas. Discussions on the evolution of Chicano/a literature; aspects of the Chicano/a historical and literary experience; the importance of such themes as the search for identity, problems of language use and choice, invisibility, silence, and blindness. The question of gender as it relates to issues of ethnicity and class. Students add to this list their own observations and discoveries. (Area:H) 5 units, Spr (Romero)

163H. Feminist Theory Across the Disciplines — (Same as Feminist Studies 102E.) Impact of femi-
nist theory on selected disciplines, including economics, law, literature, and political theory.

5 units, Win (Gagnier)

164A. Speaking Back to Scripture — A need to revise and still reclaim the Bible animates much modern poetry, from Dickinson and Whitman through Robert Lowell, Denise Levertov, Paul Celan, Yehuda Amichai and others. Traces the biblical presence (people, places, narratives, prophecy, textual elements) in British, American, European, and Israeli poetry; and in art and music.

5 units, Spr (Felstiner)

165A. Introduction to Medieval Culture — (Same as Medieval Studies 165.) See 65A. (Area:B) DR:7(2) or 8(3)

5 units, Spr (Brown, Staff)

165B. Arthurian Literature — See 65B. (Area:B)

5 units, Aut (Brown)

168A. 20th-Century American Indian Writing — (Area:H)

5 units, Win (Warrior)

168B. Modern Southern Writers — (Area:H)

5 units, Spr (A. Gelpi)

169B. Readings in the Asian-American Novel — (Same as Comparative Literature 169B.) (Area:H) DR:3

5 units, Aut (Palumbo-Liu)

169E. The Exotic East — (Same as Comparative Literature 169E.) Examination and critique of the construction of representations of the "Orient" that move beyond a catalogue of common figures and characterizations to an analysis of the imaginative and ideological investments and contradictions of such aestheticizations. The trope of desire is read against the "absence" or "lack" felt in the West, including critical and theoretical treatments (Saïd, Clifford, Kabbani, Lowie) and fictional and autobiographical texts (Segalen, Forster, Loti, David Henry Hwang, Chiang Yee, Wilkie Collins).

5 units, Spr (Palumbo-Liu)

171A. Chaucer's Canterbury Tales — Chaucer's poetry read in Middle English. (Area:B)

5 units, Spr (Osberg)

171B. Troilus and Criseyde and the Other Love Poems — (Area:B)

5 units, Win (Evitt)

172. Milton — (Area:C)

5 units, Win (Evans)

173A. Shakespeare — (Same as Drama 159A.) As You Like It, The Merchant of Venice, Richard II, Henry IV, Part One, Hamlet, King Lear, Antony and Cleopatra, The Winter's Tale, The Sonnets. (Area:D) DR:7(2)

5 units, Aut (Rebholz)

173B. Shakespeare — (Same as Drama 159B.) The Merchant of Venice, Henry IV, Part One, Twelfth Night, Hamlet, Othello, Measure for Measure, King Lear, Antony and Cleopatra, The Winter's Tale. (Area:D) DR:7(2)

5 units, Win (Friedlander)


5 units, Spr (Parker)

174. Swift and Johnson — (Area:E)

5 units, Win (Carnochan)

175. Henry James — (Area:G)

5 units, Spr (Dekker)

177. Austen and Dickens — (Area:F)

5 units, Spr (Polhemus)

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 literature, 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.

182A. Seminar: Christopher Marlowe — (Area:C)

5 units, Spr (Riggs)

183A. Seminar: Shakespeare through Performance — (Same as Drama 129D.) (Area:D) DR:7(2)

5 units, Spr (Friedlander)

185B. Seminar: Novels of the 1880s — (Area:F)

5 units, Aut (Marsh)

186A. Seminar: Emerson and Whitman — Writing and Reception — (Area:G)

5 units, Spr (Grossman)

186B. Seminar: American Realism and Naturalism — (Area:G)

5 units, Aut (Solomon)

186C. Seminar: Women Writers and the American Renaissance — (Area:G)

5 units, Win (Romero)

187A. Seminar: Poetry and Politics — Black Women Write — (Area:H)

5 units, Win (Holland)

187B. Seminar: William Carlos Williams — (Area:H)

5 units, Spr (Sorrentino)

187C. Seminar: Feminism, Poetics, and Women Poets — (Same as Feminist Studies 187C.) (Area:H)

5 units, Aut (Middlebrook)
187D. Seminar: Representing Sexualities — Whitman to AIDS — (Area:H)
5 units, Spr (Grossman)

187E. Seminar: Woolf and Lawrence — (Area:H)
5 units, Aut (Ruotolo)

187J. Seminar: Reading and Writing Short Fiction
5 units, Win (Drake)

188P. Seminar: Poetry and Poetics — (Area:P)
5 units, Win (Di Piero)

189A. Seminar: Representing Sappho — The Literature of Lesbianism, 1749-1936
5 units, Spr (Castle)

189B. Seminar: Satire
5 units, Aut (Carnochan)

190. Intermediate Fiction Writing — May be taken twice. For admission, manuscript must be submitted to Building 50, room 51C. Prerequisite: 90.
5 units, Aut, Win, Spr (Caldwell, LaPlante, Weinberg)

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, Spr (Fiser)

194. Individual Research — See section above on "Undergraduate Programs, Opportunities for Advanced Work, Individual Research."
5 units, any quarter, by arrangement

195. Ad Hoc Undergraduate Seminars — Undergraduates (at least three) who wish in the following quarter to study a subject or an area not covered by regular courses, may plan an informal seminar and approach a member of the department to supervise it. A syllabus should be submitted to the director of undergraduate advising at least two weeks before the end of the 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. Group seminars are not considered appropriate to 198.
any quarter, by arrangement

196A. Honors Seminar: Critical Approaches to Literature — Required of all seniors in the English honors program.
5 units, Aut, sec. 1 (B. Gelpi), sec. 2 (Junkerman)

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 (Bacon)

198M. Dickens in the Round — Multiple perspectives on the multi-faceted genius who was the "father" of the Victorian novel and one of the grandparents of modern cinema. Entry to the full range of critical perspectives on the novel. Study: Nicholas Nickleby (Dickens, London, and urban narrative; pantomime and melodrama; the graphic tradition); Dombev and Son (the imaginative transformation of new technology, i.e., the railroad; Dickens and women, feminist perspectives); Great Expectations (biographical criticism and the autobiographical matrix; psychoanalytic perspectives); Little Dorrit (materialist and economic approaches; social criticism.)
3 units, Spr (Marsh)

199. The Reciprocal Vision: Their America, Our Europe — European perceptions of the U.S. and Americans' perceptions of Europe, and their historical context. The extent to which these perceptions have been shaped by the changing political and cultural relationships between the two societies and the respective social, economic, and political conditions. Aspects of American culture that have been of most enduring interest to Europeans, and vice-versa. Readings: More, Emerson, deTocqueville, Dickens, Twain, James, Kafka, and Lewis.
4-5 units, Spr (Evans)

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)

Note — Students in other departments who wish to broaden their programs will find these courses useful.

200A. Introduction to Old Norse — (Same as German Studies 258.)
3-5 units, Win (Andersson)

202. History of the English Language — (Same as Linguistics 102.) See 102.
4-5 units, Aut (Traugott)

209. Introduction to Paleography and Codicology — (Same as Classics 177.) Introduction to late antique and medieval manuscripts in Latin, medieval Latin, and vernacular scripts, and the materials and composition of the medieval book.
4-5 units, Spr (Brown)

211. Readings in Middle English — The language and dialects of Middle English and reading in the various genres of prose and poetry. (Area:B)
4-5 units, Aut (Brown)

214. Colloquium: Renaissance Poetry — Major poetic works of Renaissance England seen in their social contexts. Authors: Donne, Jonson, Marlowe, Shakespeare, Sidney, Spenser, Webster, Wyatt. (Area:C)
4-5 units, Aut (Ross)

217. Colloquium: James Joyce and Ulysses — Joyce’s major prose before Finnegans Wake, but centers on Ulysses and its multiple implications. (Area:H)
4-5 units, Win (Polhemus)

220. Colloquium: American Indian Cultural Studies — (Area:H)
4-5 units, Win (Warrior)

229. Colloquium: American Aesthetics and Politics, 1919-41 — The relations of politics, art, and history in the fiction of Barnes, Dos Passos, West, and selected other novelists of the time. (Area:H)
4-5 units, Win (Solomon)

229A. Colloquium: Death and the Grotesque in Native and African American Literature
4-5 units, Spr (Holland)

254. Major Romantic Poets — (See 154.)
4-5 units, Spr (B. Gelpi)

260A. Narrative and Genre — (Same as Linguistics 267.) Genres of oral and written literature, especially narrative, in historical and sociocultural contexts. Emphasis on the role of certain institutions (e.g., law and education) in shaping particular genres and establishing hierarchies and preferred genres. Topics: essays and epigrams, jokes and riddles in folklore and children’s literature, stories as forms of resistance and accommodation, ideologies of genre creation and promotion. The roles of literacy, literary interpretation, and oral performance. Readings from Europe, N. America, Africa, Latin America, and the Carribean.
4-5 units, Aut (Heath)

290. Generative Devices in Imaginative Writing — Designed on the lines of the OuvLiPo (Ouvroir de Litterature 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, combinatorics, etc., and with devices of their own invention. Prerequisites: 90, 92, or any advanced writing course.
4-5 units, Aut (Sorrentino)

292. Advanced Poetry Writing — For undergraduates selected by the instructor. Promising student poets write poetry in an atmosphere of mutual aid. Manuscripts must be submitted to the Creative Writing secretary by December 1.
4-5 units, Win (Di Piero)

293. Verse Translation Workshop — The art and practice of translating poems, emphasizing theory and tradition. Students pursue and present work in progress. Consult instructor during prior quarter.
4-5 units, Spr (Felstiner)

296. Critical Theory and the Profession: An Introduction to Graduate Study for A.M. Students — Over the last two decades, English literary studies has been reconfigured by many theoretical and methodological developments. “Post-structuralism” (the often confrontational dialogues between theoretical and political positions as varied as 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 for students embarking on the professional study of literature. Key texts, statements, and debates that define these issues are studied and students work towards a broad knowledge of the complex rewriting of the project of literary studies that is in process today.
5 units, Aut (Kaul)
301. Colloquium: Literacy, Education, and the Medieval Book

4-5 units, Spr (Brown)

302. Colloquium: Gender and Identity in Renaissance England — Writings about gender and identity in 16th- and 17th-century England. Family, state, and religion were being continually redefined, often violently. The understanding of private and public identity was in flux, and gender became a central concern of cultural and intellectual life. To understand subsequent eras, feminist literary criticism and historiography is interested in the writings of this controversy, and in their cultural contexts. Did the debate on women reflect social realities, was it just an academic controversy, or did it distort the "real" issues at stake? Focuses on witchcraft, female rulers, cross-dressing, education, family politics, and state patriarchalism as represented in literary and non-literary materials, by men and women, in the plays of Shakespeare and in the writings of women. Controversies in early modern or Renaissance Europe regarding women viewed against contemporary debates about femininity, sexuality, the family, and feminist politics, helps understand the legacy of "the Renaissance" and its continuing centrality for, and the difference from, contemporary Western culture.

4-5 units, Aut (Loomba)

302A. Colloquium: Poetry, Nation, Empire — English Poetry in the Late 17th and Early 18th Centuries

4-5 units, Spr (Kaul)

302B. Colloquium: High and Low Life: Polite and Popular Forms in 18th-Century English Literature

4-5 units, Aut (Castle)

302C. Colloquium: Romanticism Psychoanalyzed — Lacan Romanticized. Parallels between Lacanian discourse on such topics as psychoanalytic technique, the split between Imaginary and Symbolic realms, and the omnipresence of guilt with salient Romantic themes and tropes.

4-5 units, Win (B. Gelpi)

302D. Chicano/a Poetry — (Same as Comparative Literature 350, Spanish 386.) Traces the trajectory of 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, and its modern evolution as an important component of the American poetic canon. Examines the work of earlier Chicano/a writers (Alurista, Rodolfo "Corky" Gonzales, Jose Montoya) and the work of newer poets (Francisco Alarcon, Alicia Gaspar de Alba, Sandra Cisneros, Benjamin Saenz). Study of the theory of poetry in general and its applications to the case of Chicano poetry.

4-5 units, Win (Espinosa)

303. Colloquium: 20th-century Primitivisms in the United States — Interdisciplinary. 20th-century representations of the primitive in the U.S. The ways in which the modern Western self has incorporated into its construction what has been designated variously as the non-Western, the primitive, the indigenous, the primal, the atavistic. Compares different texts and cultural-historic settings organized around literary naturalism (London, Hopkins, Petry); early Hollywood film and popular culture (Demille, Burroughs); anthropology (Mead, Boas); Harlem Renaissance (Hurston); contemporary chicano/a writers (Chavez, Islas, Morales, Anaya, Anzaldua); cultural theory (Levi-Strauss, Freud, Rubin Gates).

4-5 units, Win (Seidman)

306B. Writing the "Shoah": Literary Representation and Jewish Collective Memory — (Same as Comparative Literature 254.) Hebrew, Yiddish, and American Jewish fictional representations of the Holocaust. Theoretical writings on the Holocaust as a challenge to literary representation and traditional modes of Jewish commemoration. The applicability of feminist cultural study to this subject. Selections from Friedlaender, Roskies, Yerushalmi. Literary texts by Appelfeld, Celan, Glatstein, Grossman, Hareven, Klepfisz, Levi, and I. B. Singer.

4-5 units, Win (Seidman)

306C. Colloquium: Central Issues in Afro-American Literature and Intellectual History

4-5 units, Win (Drake)

306D. Chicano/a Poetry — (Same as Comparative Literature 350, Spanish 386.) Traces the trajectory of 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, and its modern evolution as an important component of the American poetic canon. Examines the work of earlier Chicano/a writers (Alurista, Rodolfo "Corky" Gonzales, Jose Montoya) and the work of newer poets (Francisco Alarcon, Alicia Gaspar de Alba, Sandra Cisneros, Benjamin Saenz). Study of the theory of poetry in general and its applications to the case of Chicano poetry.

4-5 units, Win (Espinosa)

307A. 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)

308. Colloquium: 20th-Century Primitivisms in the United States — Interdisciplinary. 20th-century representations of the primitive in the U.S. The ways in which the modern Western self has incorporated into its construction what has been designated variously as the non-Western, the primitive, the indigenous, the primal, the atavistic. Compares different texts and cultural-historic settings organized around literary naturalism (London, Hopkins, Petry); early Hollywood film and popular culture (Demille, Burroughs); anthropology (Mead, Boas); Harlem Renaissance (Hurston); contemporary chicano/a writers (Chavez, Islas, Morales, Anaya, Anzaldua); cultural theory (Levi-Strauss, Freud, Rubin Gates).

4-5 units, Spr (Romero)
309A. Colloquium: Science and Representation in the 18th-Century — (Same as Comparative Literature 309A, History and Philosophy of Science 253.) Science and its practices and resources for cultural production and, conversely, of cultural manifestations (theater, narrative, reportage, graphic projection, painting) as resources for the construction of scientific argumentation.
   4-5 units, Win (Bender, Lenoir)

   4-5 units, Win (Halliburton)

309D. Colloquium: The Poetics of Post-Modernism
   4-5 units, Spr (Perloff)

309E. Colloquium: Modern/Postmodern Race, Sexuality, Nation — The nature of subject formation in racial and sexual terms and its relation to the construction of an American national identity in the transition period prior to and following WWII. American fiction, non-fiction, drama, cultural history, and theory, and other popular forms (art, music) frame a discussion of alternative narratives of nationalism. Primary readings: Gloria Anzaldua, Ralph Ellison, Alain Locke (The New Negro), Ruben Martinez, Toni Morrison, Luis Rodriguez, Parede (poetry), Luis Valdez, Malcolm X. Also, Fregoso and Chabram, David Harvey, Jameson, Leroi Jones, Marable, and Michele Wallace.
   4-5 units, Win (Saldivar)

309F. Colloquium: Psychoanalysis and Literary Theory — (Same as Comparative Literature 309F.)
   4-5 units, Aut (Bender)

356. Seminar: Whitman and Dickinson
   4-5 units, Win (A. Gelpi)

360. Seminar: Modern Mass Intermedia Studies — (Same as Drama 354M, Modern Thought and Literature 360.) Integrates guest lectures with seminar discussions and screenings in the study of major issues in modern mass culture and 20th-century media.
   4-5 units, Spr (Marsh)

366. Seminar: American Enlightenment
   4-5 units, Aut (Fleigelman)

367. Self-Referentiality and Paradox in Post-Enlightenment Critical Thought — (Same as German Studies 297/297A.) Using the systems-theoretical perspective of Niklas Luhmann and his theory of observation, diagnoses problems of self-referen-
383. Seminar: Foucault and Contemporary Critique—(Same as Comparative Literature 383, French and Italian 280E.) The work and legacy of Michel Foucault in relation to developments in contemporary literary theory and cultural critique. 4-5 units, Spr (Parker)

385. Seminar: Henry James and the Romance Tradition—A reading of James’s novels and novellas (including Roderick Hudson, Portrait of a Lady, and The Wings of a Dove), Hawthorne, and various prefaces and critical essays. Pertinent fictional and critical works by Hawthorne, Stevens, Cather, and recent theorists. 4-5 units, Aut (Dekker)

388. Seminar: Flann O'Brien and Samuel Beckett—Readings/discussion of representative non-dramatic works by two major figures of 20th-century Irish literature. 4-5 units, Aut (Sorrentino)

389. Seminar: 20th-Century Literature and Socioeconomic Theory 4-5 units, Win (Tratner)

390. Graduate Fiction Workshop—Primarily for graduate students in the Writing program. May be repeated for credit. Prerequisite: consent of instructor. 3 units, Aut (Packer)

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)

394. Independent Study—Preparation for qualifying examination and for the Ph.D. oral examination. Sum, 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

395A. Philosophical Reading Group—(Same as Comparative Literature 395A.) Close reading of classical and contemporary texts. Autumn Quarter: Adorno’s Aesthetics. Winter Quarter: reading Marx. 2-3 units, Aut (R. Hullot-Kentor)

396. Introduction to Graduate Study for Ph.D. 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) TTh 11-12:30

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 Freshman English program. Each student is assigned as an apprentice to an experienced teacher and sits in on classes, conferences, tutorials; later, given responsibility for conducting a class, grading papers, holding conferences. Class meetings are devoted to discussing rhetoric, theories of composition, and teaching of writing. Readings are assigned 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)

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 1993-94

120. American Historical Novel
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
316E. Seminar: Historical Interpretation of Renaissance Drama — Theory and Practice
316A. Seminar: Studies in Romanticism
320. Seminar: The 1890s — American Literature and Culture
320B. Seminar: American Renaissance
330. Seminar: Theory and Narrative
357. Seminar: Recent American Poets
362. Seminar: Avant-Garde Poetics — The Intersection of Poetry and Theory
364B. Seminar: The Bloomsbury Group
365. Topics in American Literature
365C. Seminar: American Literature and Culture in Antebellum Poems
367. Seminar: Theology and the Reading of Medieval Literature
368. Seminar: Childhood and Sexuality
384. Seminar: Jane Austen
385A. Seminar: Ezra Pound and the Pound Tradition
385B. Seminar: Melville
385C. Seminar: Wallace Stevens, Poetry and Influence
386. Seminar: William Carlos Williams

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 or Professor Rachel Cohon.

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 which varies each year).

HONORS 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. It is administered by the Ethics in Society Program. 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. Su-
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 honors program as a junior, he or she takes Ethics in Society 77, given Winter Quarter. Requirement (3) is also fulfilled in Winter Quarter, and requirement (2) (the optional subject) at any time during the junior year, or possibly Autumn Quarter of the senior year. The honors thesis is 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.

20. Introduction to Moral Theory — (Enroll in Philosophy 20.) Classic questions in moral philosophy through the works of traditional and contemporary authors. Readings: Plato, Aristotle, Hume, Kant, and Mill. 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, Win (Cohon) MWF 10 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, Aut (Tomasi) MWF 11 plus section

77. The Ethics of Social Decisions — (Same as Philosophy 77.) Abortion and euthanasia, comparing new and traditional approaches to these problems pursued from American and international perspectives. Instead of questions about rights (e.g., “Does the fetus have a right to life?”), shifts the debate to questions about the intrinsic value of life. When and why is human life valuable? Can a woman sometimes best respect the value of life by choosing to have an abortion? Can an elderly person ever best respect her/his life by choosing to die? Discussion.

4 units, Win (Tomasi) MWF 11

85. Historical and Ethical Issues in Population Studies — (Same as History 104.) American society has been torn by “culture wars” over the social regulation of pregnancy, migration, health, and death. Abstract ethical considerations and moral history are combined to evaluate the probable impact of different social choices on individual rights and human welfare in real world situations where resources are limited. Readings cover moral history and applied ethics. Students meet three times in small groups to explore the possibility that controversial moral issues can be resolved through peaceful negotiation, based on mutual understanding and a commitment to non-violence.

4-5 units, Spr (Johansson) MWF 9

98. Promises and Moral Obligations — (Same as Political Science 98,) Addresses abstract issues of moral philosophy by focusing on a familiar, concrete, and accessible topic, “promising.” Intention is to make ethical and political theory exciting to sophomores by showing its connections to everyday life.

2 units, Spr (Tunick)

100. Computers, Ethics, and Social Responsibility — (Enroll in Computer Science 201; Science, Technology, and Society 215.)


140A,B,C. Ethics of Development in a Global Environment (EDGE) — (Enroll in Engineering 297A,B,C, Political Science 140A,B,C.)

150. Economics and Public Policy — (Enroll in Economics 150, Public Policy 104.)

154. Feminist Political Theory: Gender, Power, and Justice — (Enroll in Political Science 154, Philosophy 175C.) DR:8†(3)

156. Economics of Health and Medical Care — (Enroll in Economics 156, Health Research and Policy 256, Medical Information Sciences 256.)
162. Ethics, "Abominations," and "Liberations"—(Enroll in Religious Studies 162.)
   not given 1993-94

164. Introduction to Race and Ethnicity in American Experience —(Enroll in History 164, American Studies 164, Chicano Studies 164.) DR:3

170. Ethical Theories — (Enroll in Philosophy 170.)

171. Political Philosophy — (Enroll in Philosophy 171.)

177. Feminism and Philosophy — (Enroll in Philosophy 177.)
   not given 1993-94

185. The Distribution of Income and Wealth — (Enroll in Economics 185.)

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 is available to class members a week prior to the presentation. Group discussion follows.
   3 units, Win (Tomasi) T 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 Technology — (Enroll in Science, Technology, and Society 210; Urban Studies 178.)

268. Seminar: Contemporary Theories of Justice — (Enroll in Political Science 268, Philosophy 175D.)

286. Character and the Good Life — (Enroll in Religious Studies 286.)

288. Limits of Economic Rationality I: The Nature of the Social Bond
   not given 1993-94

370. Gender, Law, and Public Policy — (Enroll in Law 380.)

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FEMINIST STUDIES

Chair: Jane Collier
Program Committee:
Faculty: Alice Bach, Laura Carstensen, Paulla
Ebron, Francisco Lopez
Graduate-Taught Course Instructors: Elisabeth
Friedman, Romy Kozak
Graduate Women's Network Coordinator: Winnie
Poster
Institute Liaison: Will Roscoe
Program Coordinator: Jeanne Alcouloumre
Staff: Diana Akiyama, Fran Gibson, Kathryn Kern
Students: Leslie Garrard, Monique Reece, Carla
Winston
Women's Center Coordinator: Rebecca Bliss
Women Defending Ourselves Reps: Kelly O'Neil,
Raquel Stote

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Resource Faculty and Staff:
Anthropology: Deb Armony, Debbara Battaglia,
Jared Braiterman, Carol Delaney, Paulla Ebron,
Joan Fujimura, Akhil Gupta, Lori Hager, Purnima
Mankekar, Renato Rosaldo, Sylvia Yanagisako

Art: Lisa Bloom, Wanda Corn, Suzanne Lewis,
Melinda Takeuchi

Asian Languages: Susan Matisoff
Athletics: Tara Van-Derveer
Business: Joanne Martin
Chemistry: Carl Djerassi
Classics: Andrea Nightingale, Daniel Selden, Su-
san Stephens, Susan Treggiari
Comparative Literature: Patricia Parker
Dance: Janice Ross
Drama: William Edelman, Harry J. Elam, Ann
Deavere Smith
Education: Elizabeth Cohen, Julie Duff, Nel
Noddings, Francisco Ramirez, Myra Strober,
Joan Talbert, David Tyack

English: Terry Castle, Sandra Drake, John Felstiner,
Regenia Gagnier, Albert Gelpi, Barbara Gelpi,
David Halliburton, Shirley Heath, Sharon Hol-
lund, Suvir Kaul, Ania Loomba, Jocelyn Marsh,
Diane Middlebrook, Stephen Orgel, Robert
Polhemus, Horace Porter, Lora Romero, Luci
Rutalo, Ramon Saldívar, Leslie Townsend,
Michael Tratner

Feminist Studies: Jane Collier, Elisabeth Friedman,
Romy Kozak, Susan Krieger
French and Italian: Brigitee Caselles, Odile Hullor
Kenton, Pauline Newman-Gordon, Carol
Springer

German Studies: Russell Berman, Kathryn Stratch
History: Joel Beinin, Judith C. Brown, Stephanie
Brown, Albert Camarillo, Claybourne Carson,
Lisa Ann Cody, Estelle Freedman, Kennell Jack-
Institute for Research on Women and Gender: Iris Litt, Sherri Matteo

Law: Barbara Babcock, Sally Dickson, Mary Dunlap, Janet Halley, Morris Kaplan, Margaret Radin, Deborah Rhode, David Rosenhan, Kathleen Sullivan, Michael Wald

Library: Kathryn Kerns

Linguistics: Shirley Heath, Elizabeth Traugott

Medicine: Marita Grudzen, Charlea Massion

Music: Maria Johnson

Pediatrics: Anne Arvin

Pharmacology: Helen Blau

Philosophy: John Dupre, Debra Satz

Political Science: Elisabeth Hansot, Susan Okin

Psychiatry: Herbert Liederman

Psychology: Laura Carstensen, Eleanor Maccoby, Susan Nolen-Hoeksema, Felicia Pratto

Religious Studies: Diana Akiyama, Alice Bach, Howard Einbarg-Schwartz, Hester Gelber

Spanish and Portuguese: Wilfrido Lopes, Adrienne Martin, Mary Pratt, Sylvia Wynter

Structured Liberal Education: Mollie Rosenhan

Sociology: Joseph Berger, Susie Chow, Sanford Dornbusch, Jerald Herting, Janet Johnston, Johan Olivier, Cecilia Ridgeway, Szonja Szelenyi

Science, Technology, and Society: Renee Courney

Feminist Studies is an interdisciplinary undergraduate program that investigates 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 prizes for the best undergraduate essays on women, gender, or feminism. The prize is awarded in two divisions: thesis division for senior honors theses and masters' papers written by undergraduates in coterminous degree programs; and article division for the best short essay. Submissions are due in the Feminist Studies office April 10. 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 signed by both advisers explaining the rationale for the plan of study 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 — For approved honors projects, it is understood that the units are taken over and above the program already approved for the major, i.e., in addition to those units which comprise the body of the major.

In addition to completing all the units proposed, the student submits, in the senior year, two pre-
liminary drafts and then 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 Committee of Feminist Studies, 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 would apply for honors certification in the first quarter of the junior year but 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, who will help prepare an application outlining the student’s 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 subcommittee charged with making such decisions.

CURRICULUM

For a major in Feminist Studies, the following course of study is recommended: a minimum of 12 courses (a core of five plus seven others) for a total of at least 60 units above the 100 level. 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 12 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.


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 approved 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 a three- to five-page written statement on its nature and its relevance to the major in Feminist Studies.

**COURSES**

Courses designated "same as," and listed by another department, are central to the Feminist Studies Program. Courses designated as "enroll in" contain a significant component of attention to gender difference: the situation of women in Western or non-Western culture or the role of sex-gender systems in social organization. Some courses are planned after this bulletin is printed, but updated listings are available at the Feminist Studies office.

**CORE**

**101. Introduction to Feminist Studies: Issues and Methods** — (Same as History 173C.) How gender inequality is created and perpetuated, and when feminist theory and movements emerge to respond to gender inequality. Topics: theories of inequality; history of feminism; international and multicultural perspectives on feminism; women's work, health, and sexuality; creativity, spirituality, and movements for social change. DR:9†(5)

5 units, Win (Freedman) MWTh 11-12:15

**102A. Critical Perspectives in Feminist Theory** — (Same as Anthropology 144.) Advanced undergraduate seminar focusing 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 postmodernism. Enrollment limited to 20. Prerequisite: 101 or Anthropology 12

5 units (Yanagisako) not given 1993-94

**102C/202C. Seminar: Contemporary Issues in Feminist Thought** — Recent developments in feminist political thought. Explores understandings of the "political" and the extent to which these constructions exclude women; theories of moral choice and women's reproductive rights; and how implicit gender norms affect the structure of men's and women's careers. DR:†

5 units (Hansot) given 1994-95


5 units, Aut (Bach) MW 2:05-4:15

**102E. Feminist Theory Across the Disciplines** — (Same as Comparative Literature 163H, English 163H.) Impact of feminist theory on selected disciplines, including economics, law, literature, and political theory.

5 units, Win (Gagnier) TTh 11-12:30

**103B/203B. Feminist Methodology in the Social Sciences** — What happens to social scientific description when women's perspectives and feminist values become central? Methods course on feminist approaches to social science research. Applications to anthropology, history, psychology, and sociology. Emphasizes interactive processes and the personal involvement of an observer. Readings from feminist scholarship. Enrollment limited. Prerequisites: 101, consent of instructor.

5 units, Win (Gagnier) TTh 11-12:30

**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) TTh 1:15-3:05
GENERAL

100C. Gender Relations in Early Modern Russia — (Enroll in History 100C.) Dialogues Tutorial.
2 units, Win (Kollman) T 2:15

3 units, Aut, Win (Townsend) or Th 6:45-10 p.m.

110A. Men Understanding Issues in Self Defense for Women — Explores issues involving violence against women using the same course material as 110, without physical self-defense training. Discussions, readings, films, and speakers, taught by one male and one female instructor.
3 units, Win (Staff) W 6:45-10 p.m.

120. Women in the Contemporary Middle East — (Enroll in History 187C.) 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:2t(*) or 9t(5*)
5 units, Win (Beinin) MW 1:15-3:00, Th 7-10 p.m.

120A. Social Movements and Collective Action: The Case of South Africa — (Enroll in Sociology 113.) Analysis of the rise and fall of social movements and spontaneous collective action, including analysis of the ethnic violence in S. Africa, the women’s movement, contemporary U.S. race riots, the U.S. Civil Rights movement, student movements of the 1960s, the Greens Party in Europe, and the analysis of political social movements in S. Africa and elsewhere.
5 units, Win (Olivier) MWF 11

121A. Social Psychology and Social Structure — (Enroll in Sociology 121; graduate students register for 225.) Understanding the individual’s relationship to social groups, from intimate two-person groups to society at large. Emphasis is on socializing institutions, the family, ethnic groups in American society, gender differences, and international comparisons of social processes.
5 units, Spr (Dornbusch) MWF 11

122. Crossing the Gender Boundaries — (Enroll in Drama 221.) A performance course. The use of play and media scripts in performance to investigate issues of gender. Non-actors involved in the study of gender and actors at all levels of experience are encouraged to participate.
3 units, Spr (Smith) MW 2:15-4:05

123. Gender Stratification — (Enroll in Sociology 143.) 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; and racial and cross-national variations in gender inequality.
5 units, Spr (Szelenyi) MW 1:15-2:30

126. The Psychology of Gender — (Same as Psychology 116.) 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:9t(4)
3 units, Spr (Carstensen) MW 9:30-10:50

126A. 20th-Century American Fictions — (Enroll in English 126, Comparative Literature 126, Chicano Studies 129.) Readings from the traditional masters of modern American literature (Fitzgerald, Faulkner), and from its revisionists: African American (Toomer, Hurston) and Chicano (Paredes). The post-WWII period, including African American (Toni Morrison), Asian American (Maxine Hong Kingston), Native American (Louise Erdrich), Chicana writers (Helena Maria Viramontes, Sandra Cisneros), and Anglo American writers (E. L. Doctorow, Thomas Pynchon, Don DeLillo). Aims to see these American authors in their contemporary, multicultural context.
5 units, Win (Saldivar) TTh 11-12:30

127. Feminist Approaches to Ethics and Education — (Same as Education 276.) 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.
4 units, Aut (Duff) M 7-10 p.m.

129. The Economics of Gender — (Same as Education 131.) The determinants and effects of women's employment in the U.S. using theoretical, empirical, and policy materials emphasizing relationships between education and employment. Topics: labor force participation and attachment, earnings, discrimination, occupational segregation, housework, child care, affirmative action, comparable worth, and an introduction to feminist economics.
4 units, Win (Strober) MW 3:15-5:05

130. Gender and Education — (Same as Education 170, Sociology 132.) Gender as a critical variable in educational institutions and labor markets. Interdisciplinary approach to the distribution of power in schools, the determinants of occupational choice, the relative payoff of schooling for women and men, the causes of differential behavior and treatment
between the sexes in schools and in the work force, and the legal redress of inequalities. Primary disciplines are economics and sociology; historical, psychological, and legal materials also examined. Focus is on the U.S. with some work on other countries.

4 units (E. Cohen, Strober) not given 1993-94

133. Special Studies in Performance: Beyond Stereotypes of Race and Gender — (Enroll in Drama 122A.)
3 units, (Smith) not given 1993-94

134. Sociology of Gender — (Same as Sociology 142.) Examines 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.
3-5 units, Win (Ridgeway) TTh 9:30-10:45

134B. Africa: Gender and Representation — (Same as Anthropology 108B.) 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 1993-94

135/235. Women and Organizations — Examination of dilemmas faced by women in contemporary American organizations. Focus is on tradition and change in the definition of women's roles, and on women's styles of leadership, interaction, and communication. The importance of separate women's organizations and the potential for revising organization theory based on observations of women's behaviors. Enrollment limited. Prerequisite: consent of instructor.
5 units, Spr (Krieger) TTh 1:15-3:05

136. Utopian Political Thought — (Enroll in Political Science 153.) How utopian function as blueprints for social change or as thought experiments. Examination of classical and modern utopias (Plato, More, Bellamy, Gilman, Piercy) and anti-utopias (Orwell, Le Guin, Borges). Limited enrollment.
5 units (Hansot) given 1994-95

137. 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:8†(3)
3-5 units, Win (Cazelles)

138. Feminist Theory: Gender, Power, and Justice — (Enroll in Political Science 154.) Emphasis on recent feminist theories. How a 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)

138A. Lesbian/Gay Identities and Representations — (Enroll in Anthropology 138.) Interdisciplinary, situating lesbian and gay studies historically at its intersection with theories and politics of sex, gender, race, and class. Theories about sexuality; historical origins of lesbian and gay liberation movements in the U.S.; butch/femme and the politics of style; tensions between lesbianism and feminism; transgender and transsexual identities; the politics of liberation and assimilation; censorship and pornography; representations of lesbians and gays.
5 units, Aut (Amory, Braiterman)

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
and by arrangement

140. Gender in Cross-Cultural Perspective — (Same as Anthropology 11C.) 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. Asks 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:2†(*) or 9†(5*)
5 units, Win (Ebron)

140A. Women in Transition to Democracy in Latin America and Eastern Europe — (Same as Latin American Studies 91.) Comparison of how women have participated in, and been affected by, transitions to democratic politics in Argentina, Brazil, Hungary, Poland, former E. Germany and Yugoslavia, El Salvador, and Venezuela. Current political and feminist theory address the impact on women of changing political and economic models, family structures, religious and ethnic influences,
and feminist movements. Emphasis on the problems and possibilities of comparison.

5 units, Aut (Friedman) MW 1:15-3:05

142A. The Family — (Enroll in Sociology 150.) 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 (Herzing) given 1994-95

143. Status, Friendship, and Social Pressure: An Experiential Approach — (Enroll in Sociology 105.) 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. Enrollment limited. DR:9f(4 or 5)

5 units, Win (Berger) MWF 10 plus one two-hour section M or T 2:15-4:05

143A. Women of Color: The Intersection of Race, Ethnicity, Class, and Gender — (Enroll in Sociology 147.) 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 11-12:15

144B. Introduction to Social Stratification — (Enroll in Sociology 140.) 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:8f or DR:9f(5)

5 units, Spr (Szelenyi) MW 9-10:30

145. Seminar: Gender-Specific Perspectives of Birth Control — (Same as Human Biology 150.) Limited to 15 seniors; junior standing considered in exceptional cases. In most societies human fertility control responsibility rests predominantly with women. Is this desirable and realistic, or should changes be instituted? Students choose specific aspects of this problem and address themselves, in the form of research papers, to possible answers. Preregistration essential, using special forms available at Human Biology office. DR:

6 units (Djerassi) not given 1993-94

145A. Women'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, Matteo) T 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:9f(4)

4 units, Spr (Matteo)

147. Creation/Procreation: A Comparative Study — (Same as Anthropology 154.) 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 literature examines these relationships in several cultures, including our own. Emphasis is on the ways these beliefs are embedded in practices and structures of social life and in Western categories and meanings, and their implications for theorizing. DR:8f(3)

5 units, Aut (Delaney)

147A. Gender and Science — (Same as Anthropology 160; History and Philosophy of Science 160; Human Biology 170; Science, Technology, and Society 144.) 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 gendered science. DR:8f(3)

5 units, Spr (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 technology 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. D
cussion based on novels, reports and historical literature, commercials, and films.

5 units, Win (Courrey)

148A. Gender and Social Theory — (Same as Anthropology 248.) Seminar analyzes the ways in which gender figures in variety of "classical" and contemporary social theorists.

5 units, Delaney not given 1993-94

150. Virgin Mary and Images of Power — (Same as Religious Studies 234B.) 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 (Garber) not given 1993-94

150A. Hebrew Bible: Issues of Power — (Enroll in Religious Studies 15.) The 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. 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. DR: 7(2) or 8(3)

5 units, Win (Bach) M W 11-12:30

151. Women in Judaism — (Same as Religious Studies 128.)

5 units, Schwartz not given 1993-94

154. Undergraduate Colloquium: Topics in Comparative Women's History — (Same as History 207.) Women and religion, sexuality and reproduction, women's work, politics, colonialism, and feminism in Europe, the women's work, politics, colonialism, and feminism in Europe, the U.S., and part of Latin America and Africa. DR: 9†(5)

5 units, Spr (Brown, Magnus, Freedman) M 11-12:30

155. Sexual Politics in the Ancient World — (Enroll in Religious Studies 112.) 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: 8†(3)

5 units, Aut (Bach) MW 11-12:15

158A. Introductory Seminar: Women in the Modern African-American Freedom Struggle — (Enroll in History 58S.) Participate in the research of King's Special Project, with emphasis on the role of women.

5 units (Carson) not given 1993-94

160A. Dance History and Philosophy — (Same as 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)


3-4 units, Spr (Ross) TTh 1:15-3:05

161A. Afro-American Writing, 1950-1970 — (Enroll in English 161A.) Aims to identify central literary and intellectual concerns among Afro-American writers, emphasizing the historical and social context. The emergence of the Civil Rights movement of the 1960s; the Black Power/Black Arts movement of the 1960s and the emergence of a large number of women writers in the second part of the period. Continuities and changes in the work of individual writers over time. The relation between literary style and the artist's conception of audience and relation to community. Readings, entire and excerpted, are from novels, essays, poetry. Authors: James Baldwin, Amiri Braka, Gwendolyn Brooks, Ralph Ellison, Lorraine Hansberry, Leroi Jones, Martin Luther King Jr., Ann Petry, Richard Wright, Malcolm X.

5 units, Win (Drake)

162A. Modern Chicano/a Fiction — (Enroll in Comparative Literature 196.) Readings of novels and short fiction by such established novelists as Rudolfo Anaya, Tomas Rivera, Jose Antonio Villareal. Texts of more recently recognized authors, i.e., Ana Castillo, Denise Chavez, Sandra Cisneros, Roberta Fernandez, and Arturo Islas. The evolution of Chicano/a literature; aspects of the Chicano/a historical and literary experience; the importance of such themes as the search for identity; problems of language use and choice, invisibility, silence, and blindness. The question of gender as it relates to issues of ethnicity and class. Students add to this list their own observations and discoveries.

4-5 units, Aut (Espinosa) MW 11-12:30

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
programs. Recommended: reading knowledge of Spanish.

texts in Chicano Studies and Women's Studies. The applicability of Anglo-European theory are applied as theoretical concepts to primary theoretical issues raised. Secondary works that theorize race, class, gender, power, resistance, and sexuality; and the significance of the images of Black female identity; issues of race, gender and sexuality; and the signifigance of the images projected by African American women musicians as they reflect, challenge, and transform the racist and sexist stereotypes which are the legacy of the minstrel tradition.

166. African American Women Making Music: Voices and Images of Change — (Enroll in Music 5E.) Through a contextualized study of the musical styles African American women composers/performers (Casselberry-Dupree, Memphis Minnie, Bernice Reagon, Bessie Smith, Sister Rosetta Tharpe, and others), students become familiar with major African American musical genres (blues, jazz, gospel, spirituals, rap), and examine expressions of Black female identity; issues of race, gender and sexuality; and the significance of the images projected by African American women musicians as they reflect, challenge, and transform the racist and sexist stereotypes which are the legacy of the minstrel tradition.

167. Major Romantic Poets — (Enroll in English 154/254.) Introduction to a selection of the poems and critical statements of Blake, Byron, Coleridge, Keats, Shelley, and Wordsworth.

167C. Chicana Writers and Feminist Theory — (Enroll in English 163C.) Works by contemporary Mexican-American women writing (mostly) in English in a variety of genres (autobiography, novel, short story, poetry, and film). Discussions combine readings of primary texts with consideration of the theoretical issues raised. Secondary works that theorize race, class, gender, power, resistance, and sexuality are applied as theoretical concepts to primary texts. The applicability of Anglo-European theory texts written by Chicanas and the status of Chicana texts in Chicano Studies and Women's Studies programs. Recommended: reading knowledge of Spanish.

167D. Seminar: Women Writers and the American Renaissance — (Enroll in English 186C.)
5 units, Win (Romero)

168. Cultural and Feminist Perspectives on Theology — (Same as Anthropology 147.) 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 and community. DR:7f(2)
5 units, Aut (Middlebrook) MTWTh 10

169. Modern American Women Making Music: Rites, Images, and Identities — (Enroll in Music 163D.) Through a contextualized study of the musical styles of contemporary women composers/performers, students become familiar with major American musical genres (blues, jazz, gospel, spirituals, rap), and examine expressions of Black female identity; issues of race, gender and sexuality; and the significance of the images projected by African American women musicians as they reflect, challenge, and transform the racist and sexist stereotypes which are the legacy of the minstrel tradition.

170. The 19th-Century English Novel — (Enroll in English 132G.)
5 units, Win (Polhemus)

170A. Issues in English Drama: Aphra Behn to Elizabeth Inchbald — (Enroll in English 142.) Surveys plays by Addison, Behn, Susanna Centlivre, Congreve, Dryden, Etheredge, Gay, Goldsmith, Inchbald, Lillo, and Sheridan. Covers literary-historical ground, focusing on the relations between drama and cultural and socio-economic transition. The key categories (e.g., “Restoration Drama,” “heroic tragedy,” “sentimental comedy”) that literary critics use to describe the English drama of the late 17th and 18th centuries.
5 units, Spr (Kaul)

171A. Introductory Seminar: Women and Health in America — (Enroll in History 62S.) The major themes in the history of women’s health in the U.S. late 18th century to the present. Readings and discussions focus on themes in the history of women’s health: women’s roles as healers; sexuality and reproduction; and definitions of women’s illnesses.
5 units, Spr (Staff) T 3:15-5:05

172. TransAtlantic Feminisms: A Dialogue between ‘Center’ and ‘Periphery’ or How Tao of My French Sisters — (Same as Portuguese 295.) Interdisciplinary textual readings on French feminism(s) and theory illuminate the intersection between gender, race, and class, emphasizing postcolonial contexts, and including Luso-Brazilian and Chicana writers and filmmakers.
3-5 units, Spr (Lopes)

173. Women and Transgression in the Spanish Renaissance — (Same as Spanish 215.) Examines depiction of marginal/exceptional women in Renaissance Spanish literature, centering on those who transgress accepted gender roles, transgressive types who sabotage the division of socially-ascribed functions of the gendered self into “masculine” and “feminine,” the symbolism of the exq
174. The Body, Sex, and Gender in Ancient Judaism — (Same as Religious Studies 169.) Representations of the human body, sexuality, and gender in biblical and post-biblical Judaism. Primary and secondary sources.

5 units (Eilberg-Schwartz) not given 1993-94

175A. Women, Gender, and Jewish Modernity — (Enroll in History 184B.) Beginning with the construction of gender in traditional Jewish culture, examines how gender shaped the experience of women in modern Jewish society in Europe. Topics: women’s work and changing economic functions; traditionalism, acculturation, and assimilation; marriage and fertility patterns; adoption of bourgeois norms of family and motherhood; organized feminism; political radicalism.

5 units, Win (Magnus)

175B. Modern Jewish Identity — (Enroll in History 287A.) Why and how Jews redefined Jewish identity after the demise of the traditional Jewish community made affiliation optional and identity open to a range of interpretations. Using different sources, studies pressures to renounce Jewish identity, conscious and unconscious forces for remaining Jewish, identity, “self-hate,” religious and secular Jewishness, national consciousness. Examines the lives of some interesting individuals and studies the social formation of identity and problematics of gender in modern Jewish Identity.

5 units, Win (Magnus) W 2:15-4:05

176. American Drama, 1960 to the Present — (Enroll in Drama 155.) Contemporary American drama from multicultural perspective plays by Asian American, Latino American, and African American men and women in the context of social, economic, and political developments that helped shape them. Theories of dramatic practice including feminist criticism and African American aesthetics illuminate the complex dimensions of recent American drama. DR:3 or 9(5)

4 units (Elam) alternate years, given 1994-95

176A. 20th-Century American Theater — (Enroll in Drama 154.) American drama and theater from the beginning of the 20th century to the present, focusing on elements of theater history, design, and the plays of Albee, Miller, O’Neill, Williams, and others.

4 units, Spr (Eddelman) MWF 11

178. Undergraduate Colloquium: From Weimar to Wirtschaftswunder — German Women in the 20th Century — (Enroll in History 227.) Topics in the history of German women in this century, including politics, work, education, the family, and sexuality. Sources evaluated: histories, novels, memoirs, and films. Use and critique of different categories of historical analysis: gender, class race/ethnicity, personal experience, and public perception.

5 units, Aut (Staff) W 2:15-4:05

179. White, Male, and Middle Class: Creating and Contesting Identities and Authorities in 19th-Century Britain — (Enroll in History 143.) General, traditional outline of political and social history from the 1780s to 1880s, focusing on the construction of cultural and constitutional identities. The social lives of the traditionally marginalized in Britain (women, the Irish, the colonized, and the poor). How inclusion and exclusion came about and how categories of difference (race, gender, and class) play a central role in “traditional” politics and authority. Novels and historical documents are discussed in weekly sections.

5 units, Spr (Cod) MTWTh 10

179A. Introductory Seminar: Britain at the Turn-of-the-Century — (Enroll in History 40S.) The transformation in politics, culture, and gender roles in the late Victorian and Edwardian Britain. Issues relating to the expansion of state intervention in the economy and society.

5 units, Win (Staff) Th 2:15-4:05

179B. Senior Research Seminar: A Culture of Reason and Sensibility — Society, Sciences, and the Sexes in 18th-Century Britain — (Enroll in History 244.) Intersections of culture, knowledge, politics, and/or gender in Enlightenment Britain. Students excavate and analyze one of several preselected curiosities, causes célébres, or historical artifacts in an extensive research project. Class meetings initially on general background and theoretical reading and basic research techniques; students present work in progress in the following weeks. Possible research topics: medical quackery and fraud, mesmerism, the notorious “Cock Lane Ghost,” various “cross-dressers,” a Hogarth print, Jacobite uprisings, John Wilkes’ wild campaign for election, the British response to the French Revolution, the Gordon Riots, Lady Montague’s travels accounts, Bluestocking, and feminist writings. Students with an interest in Enlightenment and Revolutionary France can be accommodated with prior arrangement.

5 units, Win (Cod) W 2:15-4:05

183B. Women in Human Origins — (Same as Anthropology 183B.) Seminar on the role of women as agents of evolutionary change and as researchers in the field of paleoanthropology. Women in studies of early human fossils, primatology, archaeology, the interpretation of early hominid social behaviors,
and earliest evidence of sexual division of labor in humans.

5 units, Win (Hager)

184X. Victorian Women — Oxford. From the “Angel in the House” to the “New Woman,” investigates the ideology of gender, the struggle for liberation, the inflection and creation of literary forms (both ‘serious’ and ‘popular’), and what it felt like in human terms to be (and be seen as) a woman in Victorian society. Texts give male and female perspectives. In lieu of a mid-term examination: mandatory class reports, required weekly questions for class discussion.

5 units, Win (Marsh)

185A. Women and the French Revolution — (Enroll in History 32S.) Did the French Revolution take the first steps toward sexual equality? Or did it assign women to the sphere of home and family more forcefully than ever before? The relationship between gender and the French Revolution from primary sources written by women and men from all classes and political persuasions. How did revolutionaries (and counter-revolutionaries) write about gender? The ways in which the French Revolution enacted and transformed conceptions of gender, attempting to reach conclusions about the relationship (political, cultural, and social) of women and the French Revolution.

5 units, Win (S. Brown) T 1:15-3:05

185B. Seminar: Poetry and Politics — Black Women Write — (Enroll in English 187A.)

5 units, Win (Holland)

185C. Literary Foremothers: African-American Literary History, 1830 to the Present — (Enroll in English 163A.)

5 units, Spr (Holland)

186. Undergraduate Topical Seminar on the Psychology of Older Women — (Same as Psychology 198.) In-depth coverage of psychology of older women. Prerequisite: Psychology 116.

3 units, Spr (Carstensen)

187A. The Italian Renaissance and the Construction of Gender — (Enroll in History 10S.) Students examine primary sources and selected writings by Renaissance authors in the context of recent interdisciplinary studies on women’s history and the construction of gender. Focus is on Renaissance notions of “woman” and in the interdependence of “masculinity” and “femininity” as cultural contracts. The lack of studies on Renaissance “malehood” other than homosexuality and the question of women’s social status in the Renaissance is problematized. The political significance of certain images of women in a patriarchal society. The cultural importance of gender images for the appropriation of antiquity.

5 units, Aut (Sperling) M 1:15-3:05

187C. Seminar: Feminism, Poetics, and Women Poets — (Same as English 187C.) Enrollment limited.

5 units, Aut (Middlebrook) TTh 1:15-3:05

187E. Seminar: Woolf and Lawrence — (Enroll in English 187E.)

5 units, Aut (Ruotolo) TTh 11-12:30

189A. Seminar: Representing Sappho: The Literature of Lesbianism, 1749-1936 — (Enroll in English 189A.)

5 units, Spr (Castle) TTh 11-12:30

214. The Book of Genesis and Beyond — (Enroll in Religious Studies 214.) Literary-critical investigation of the patterns and topics in the book of Genesis, including creation, motherhood, covenant, brothers. Postbiblical texts (Jubilees, Genesis, Rabbah, and other expansions of Genesis narratives) are studied as examples of early reader-response criticism of the Bible. Prerequisite: Religious Studies 15 or consent of instructor.

5 units (Bach) not given 1993-94

222A. Social Processes and Pathological Outcomes — (Enroll in Sociology 222.) 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 interpersonal 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: Sociology 120/220 and 121, or consent of instructor.

5 units, Spr (Staff) T 7-10 p.m.

227. Seminar: Religion and Gender — (Same as Religious Studies 227.) Topic is “Eating Texts,” and 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, second Temple Judaism, Greece and Rome. Prerequisites: course in ancient texts, feminist theory, or literary theory, and consent of instructor.

5 units, Spr (Bach) TTh 2:15-4:05

233A. Seminar: Race and Gender Politics in Contemporary Visual Culture — (Enroll in Art 233A) Exploration of how our subjectivity and identity are formed by structures of power relations (gender, sexuality, race, class, and nationalism) within the institutions of artistic and art historical practices. Emphasis is on studying the question of sexuality and race in vision; art as a gendered raced set of practices; shifts in feminist interventions in the visual arts from the 70s to the 90s; pos...
colonial discussion of race and ethnic heritages; and ethnic and sexual difference theories.

4 units, Aut (Bloom)  
233. Colloquium: Women and Gender in Japanese Art — (Enroll in Art 229G.) 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: Art 2, 12, 129, 129A, or consent of the instructor.  
4 units, Spr (Takeuchi)  
237. Women and Health — (Enroll in Medicine 237.) Topics of interest to women as health care consumers and providers. The historical role of women in health care, how women have changed health care programs, and what changes are anticipated. Lecture series, 1 unit. Optional research project for additional unit.  
1-2 units, Aut (Grudzen, Massion) F 12-1  
seminar 1:15  
239. Power, Gender, and Families — (Enroll in Sociology 229.) 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. Prerequisites: Sociology 120, 122, or consent of instructor.  
5 units, Win (Berger) TTh 2:15-4:05  
239B. Status, Expectations, and Rewards — (Enroll in Sociology 229.) 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: Sociology 5, 120, or consent of instructor.  
5 units, Spr (Berger) W 2:15-5:05  
244A. 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. Pre-  
4 units, Spr (Springer)  
247. Fieldwork in Africa: Oral History, Life, and Family History — (Enroll in History 247S.) Oral histories in Africa and how they can be assembled in field research, with stress on women’s history.  
5 units, Win (Jackson) W 2:15-4:05  
250. Nationalism and Gender — (Enroll in Anthropology 250.) 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. Prerequisite: consent of instructor.  
5 units, Spr (Mankekar)  
253. Religion — (Enroll in Anthropology 253.) Covers theoretical and ethnographic material, attempting to sensitize 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, Aut (Delaney)  
265A/365A. Undergraduate Colloquium: Sexuality in American History — (Same as History 265.) For graduate students and senior history or feminist studies majors. Readings on the social construction of sexuality, primarily U.S., 19th and 20th centuries. Topics: histories of contraception and abortion, prostitution, homosexuality, race and sexuality, social and political movements shaping sexual values and practices. Enrollment limited to 15. Consent of instructor required; apply for admission in writing by the end of Winter Quarter.  
5 units (Freedman) not given 1993-94  
266E. Women’s Voices in Contemporary Italian Fiction — (Enroll in French and Italian 266E.) Introduction to women’s writing in Italy during this century, from Sibilla Aleramo’s pioneering novel A Woman to the narrative experiments of the 1980s. Readings from: Aleramo, Deledda, Duranti, Ginzburg, Manzini, Maraini, Morante, Ramondino.  
4 units, Spr (Springer)

3-5 units, Spr (Hullot-Kentor)

290. Brazilian Cinema — (Enroll in Portuguese 290.) Introduction to major issues in the study of Brazilian film culture. The relationships of film, society, class, artistic production, and social change; and the exploitation of women by male directors.

3-5 units, Aut (Lopes) Th 2-5:30

The following 300-level courses are available to undergraduates only by special arrangement with the instructor.

302A. Colloquium: Gender and Identity in Renaissance England — (Enroll in English 302.) Writings about gender and identity in 16th- and 17th-century England. Family, state, and religion were being continually redefined, often violently. The understanding of private and public identity was in flux, and gender became a central concern of cultural and intellectual life. To understand subsequent eras, feminist literary criticism and historiography is interested in the writings of this controversy, and in their cultural contexts. Did the debate on women reflect social realities, was it just an academic controversy, or did it distort the “real” issues at stake? Focuses on witchcraft, female rulers, cross-dressing, education, family politics, and state patriarchalism as represented in literary and non-literary materials, by men and women, in the plays of Shakespeare and in the writings of women. Controversies in early modern or Renaissance Europe regarding women viewed against contemporary debates about femininity, sexuality, the family and feminist politics, helps understand the legacy of “the Renaissance” and its continuing centrality for, and the difference from, contemporary Western culture.

4-5 units, Aut (Loomba)

303A. Colloquium: High and Low Life — Polite and Popular Forms in 18th-Century English Literature — (Enroll in English 303A.) The relations between mainstream or “high” Augustan culture and subculture forms, using representative works like The Beggar's Opera, Moll Flanders, and the Hogarth progressions.

4-5 units, Aut (Castle) TTh 1:15-3:05

304A. Colloquium: Romanticism Psychoanalyzed — (Enroll in English 304A.) Lacan Romanticized. Parallels between Lacanian discourse on such topics as psychoanalytic technique, the split between Imaginary and Symbolic realms, and the omnipresence of guilt with salient Romantic themes and tropes.

4-5 units, Win (B. Gelpi)

361A. The History and Politics of Sexual Orientation: An Interdisciplinary Investigation — (Enroll in Law 587.) The role of sexual orientation is individual and social life. Materials from the social sciences, history, literature, and philosophy to systematically examine the theoretical and practical issues posed by the phenomena of different sexualities across cultures and historical periods. Issues: the role of homosexuality in classical Greek culture and philosophy; the relationships between sexual orientation and gender (and between queer theory and feminism); the contemporary controversy between social constructivists and essentialists as to whether sexual orientation is a natural condition or a complex social artifact; the place of sexual orientation in defining individual identity and social roles; the legal, political, and ethical foundations of claims to lesbian and gay male experience and theory.

4-5 units, Win (Kaplan) T 4:15-6:45

RESEARCH AND PROJECTS

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 laboratory experience. Law offices, medical research labs and clinics, social service agencies, legislative and other public offices, and local and national women's organizations are typical placements. The faculty sponsor is chosen from Feminist Studies resource faculty. Per University guidelines, every unit for which credit is given represents approximately three hours of work per week of the quarter. Upon completion, the student must submit a written three- to five-page statement on the nature of the internship and its relevance to the major in Feminist Studies. Must be arranged in advance through the Feminist Studies Program office. Prerequisites: at least one course in Feminist Studies and written consent of faculty sponsor.

1-6 units, any quarter, by arrangement

195. Directed Reading

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.) 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. 5 units (Gibbs) not given 1993-94

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 to American popular culture, including the filmic media. Traces changes in African-Americans' self-conceptions and their status and power in American society. DR: 3-5 units, Win (Gibbs)

COMMUNICATION

The following courses are open to all students:

101/201. 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, Spr (Breitrose)

122. Documentary Film — (Graduate students register for 222.) Analysis of the techniques and strategies of films designed to effect attitudinal and behavioral change. Prerequisite: consent of instructor. 4 units, Aut (Breitrose)

141/241. History of Film — (Graduate students register for 241.) The development of the motion picture as an art form and a means of communication. Lab. Screenings of films announced in class. 4 units, Win (Breitrose)

243. Seminar in Communication Institutions: The Hollywood Studio System 1929-1949 — The relationship between economic, cultural, and social forces and the communication industries. Prerequisite: consent of instructor. 4 units (Breitrose) not given 1993-94

The following course is primarily for Communication undergraduates. Non-majors are admitted only if space is available.

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 (Staff)

The following workshops are available as part of the Summer Mass Media Institute: Film Production, Professional Journalism, Television Production, Screenwriting.

SPANISH AND PORTUGUESE

279. Garcia Marquez in International Cinema — Can Magical Realism be expressed in literature as well as in film? Does the transposition from one medium to another detract from or add to the issues presented by the author? What challenges are overcome in the transition from novel to script? The original works and screenplays by the Columbian writer are compared to the Latin-American and European films based on them. 3-5 units, Spr (Ruffinelli)

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; and the exploitation of women by male directors. 3-5 units, Aut (Lopes)

293. Spanish Cinema: From Surrealism to the Postmodern — Spanish cinema beginning with the Franco dictatorship, through the transition to contemporary democratic Spain. Viewing and analysis of the works of internationally-known directors including Gutierrez Aragon, Bardem, Bunuel, Saura, and the daring generation of Almodovar and the basque, catalan, and gallego filmmakers. The relationship of film to literature and sociopolitical realities of Spain. 3-5 units, Win (Haro)

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

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 undertake supervision of 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 University requirements for advanced degrees, as set forth under the “Degrees” section in 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 prior to the end of their 11th 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., except 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 examinations 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 Agricultural 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 completed 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.

4 units, Win (Falcon, Naylor) TTh 1:15-3:05

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 1994-95

121. Development and Population Interactions in the Third World — (Same as Economics 119/219.) 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 (Yotopoulos) MW 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 (Gotsch) MW 9-10:50


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

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 planned completion of the internal market in 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, Aut (Staff) MW 1:15-3:05

148. The Economies of Greater China and the World — (Graduate students register for 248; same as Economics 121.) Structure and development of the economy of the People's Republic of China, Taiwan, and Hong Kong. Topics: interregional and international trade; foreign investment; the role of economy during transition; rural reform policy and development institutions, including markets; local governments and private economic entities; the urban and industrial reforms; rural industrialization; progress (or stagnation) in China's poverty belts; population control; and comparisons with other countries in Asia, the socialistic bloc, and the rest of the world. Prerequisite: Economics 1.

5 units, Spr (Rozelle) TTh 1:15-3:05

149. Economic Development in Africa — (Graduate students register for 249; same as Economics 125.) Economic development issues in Africa, emphasizing the sub-Saharan region. Topics: economic history, development strategies, institutional change, agricultural policies and technology, environmental degradation, informal sector, industrialization, external debt, and structural adjustment.

5 units, Aut (Gotsch) TTh 1:15-3:05

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, including spreadsheets, word processors, drawing and graphics programs, database management systems, statistics and optimization packages, and communications and networking software. Enrollment limited to 15.

5 units, Aut (Gotsch) TTh 11-12:50

211. Theory and Analysis of Development Policy — Elements of policy analysis, emphasizing developing countries. Topics: the ldc environment (economy, policy, and institutions); theory and policy analysis (neo-classical, structuralist, and "new" development economics); analytical techniques for policy analysis (policy analysis matrix, market level, optimization, macro, and CGE modeling). Enrollment limited to 15.

5 units, Aut (Gotsch, Pearson, Yotopoulos) TTh 3:15-5:05
212. Applied Development Policy Analysis I—
Topics in developmental policy analysis including macro policies, exchange rates, structural adjustment, commodity price determination, and food security. Students apply methods surveyed in 211. Each module consists of a theory and analytical review, implementation of a policy approach using computers, and written and oral presentation of results. Enrollment limited to 15. Prerequisites: 210 (or demonstrated computer proficiency); 211.

5 units, Win (Gotsch, Pearson) TTh 11-12:50

213. Applied Development Policy Analysis II—
Topics: analysis of international commodity markets, multilateral and regional trade negotiations, natural resource management and environmental policy. Modules consist of theory and analytical review, implementation of techniques, and written and oral presentation of results. Final three weeks devoted to supervised research paper. Enrollment limited to 15. Prerequisite: 212.

5 units, Spr (Albers, Gotsch, Josling, Pearson) TTh 9-10:50

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 based export economics to newly industrializing countries. The recent experience of macroeconomic stabilization, transformation of traditional agriculture, industrial restructuring, labor market adjustment, savings and investment. The interdependence between economies at different levels of development (Mexico and the U.S., Central America and the Caribbean, the Andean countries, the Southern Cone countries).

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

229. Planning and Analysis of Development Projects—See 129.
249. Economic Development in Africa—See 149.

PRIMARILY FOR Ph.D. STUDENTS

323. Economic Development Theory—Survey of various theoretical approaches to economic development. Topics: growth and structural change; developmental 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 (Fafchamps, 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) TTh 3:15-5:05

325. Modeling Economic Development—Introduction to a variety of tools and models that capture economic phenomena in developing countries. Topics: household models, computable general equilibrium models; disequilibrium, and rationing; intertemporal choice; sequential decisions and uncertainty; contracts and institutions.

5 units, Spr (Fafchamps) MW 11-12:50


5 units, Spr (Arthur) TTh 9-10:50

327. Renewable Resource Economics and Developing Countries—Topics: issues/difficulties in applying resource economics in developing countries, sustaining development, suboptimal outcome with conflicting resource uses/users, ecological and institutional constraints in economic models of resource allocation. Modification of existing theory and application to developing country resource issues including tropical soils, timber management, preservation land/extractive reserves, large- and small-scale water projects. Prerequisite: graduate microeconomics. Recommended: familiarity with development and resource issues.

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

330. Applied Static and Dynamic Programming Analysis—Application of linear, non-linear, mixed integer, and dynamic programming algorithms to 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. Extensive w
of GAMS throughout the course. Strong policy orientation.

5 units, Aut (Gotsch, 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, Peck) 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, Spr (Rozelle) MW 3:15-5:05

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 1:15-3:05

365. Principles of International Agricultural Policy Analysis — Topics: alternative frameworks for policy analysis, social and private accounting, divergence correction and optimal policies, budget-based approach to policy analysis, market-level analysis of policy effects, multi-market approaches and general equilibrium models in policy analysis, policy alternatives to counter instability of farm incomes, buffer stocks vs. buffer funds, ICAs and international market stabilization.

5 units, Aut (Josling, Williams) TTh 3:15-5:05

366. Applications of International Agricultural Policy Analysis — Topics: U.S. agricultural policy (domestic interests and the policy process, farm structures and rural policy, main commodity programs, international ramifications), European agricultural policy (the CAP and EC integration, the CAP as a support policy, international aspects of the CAP, the EC and developing countries, relations with EFTA and Eastern Europe), aspects of agricultural policy in other developed economies (Australia, Canada, Japan, New Zealand), linkages between domestic policies and international commodity markets, multilateral and regional negotiations on agricultural trade.

5 units, Win (Falcon, Josling) MW 8:30-10

367. Techniques for International Agricultural Policy Analysis — Topics: research methods for policy analysis, techniques for information-gathering in the field, professional presentation techniques, writing of professional publications and policy briefs, and communication of policy advice.

5 units, Spr (Pearson) TTh 1:15-3:05

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

Emeriti: (Professors) Robert G. Cohn, John Freccero, Raymond D. Giraud, Alphonse Juilland, Roberto B. Sangiorgi, Leo Weinstein
Chair: Ralph M. Hester
Vice Chair: Carolyn Springer
French Division
Professors: Jean-Marie Apostolidès, Marc Bertrand, Brigitte Cazelles, Jean-Pierre Dupuy (Spring), René Girard (Winter), Hans U. Gumbrecht (on leave), Ralph M. Hester, Pauline Newman-Gordon (Autumn), Michel Serres (Autumn, Spring)
Assistant Professor: Odile Hullot-Kentor
Professor (Teaching): John G. Barson
Senior Lecturer: Nelee Langmuir
Lecturer: Mary Jane Parrine (Curator, Romance Languages and Humanities)
Visiting Professor: Philip M. W. Thody
Italian Division
Professor: Patricia Parker (English, Comparative Literature, and by courtesy, Italian)
Associate Professors: Robert Harrison, Jeffrey Schnapp, Carolyn Springer
Senior Lecturers: Maria Devine, Annamaria Napolitano (Language Program Coordinator)
Visiting Professors: Michael Hanne, Karl Mauer, Stefano Velotti

FRENCH DIVISION

The French Division offers a variety of programs in French language and linguistics, literature, cultural history, and theoretical studies. Undergraduates may obtain the A.B. degree in French with emphasis on French Studies. In addition to awarding the Ph.D. degree, the French Division also offers Master of Arts and Master of Arts in Teaching programs. 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.)

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. In-house seminars discuss contemporary aspects of French civilization. Assignments to La Maison come through the regular undergraduate housing draw.

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 language, literature, and culture, 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.

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 56 units of undergraduate work above the 100 level.

Requirements for the A.B. include one advanced language course (123 or 124), the introductory series on French literature and culture (130, 131, 132), and a minimum of ten additional courses (40 units) at the 200 level. 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.

FRENCH AS 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 or 124), the introductory series on French literature and culture (130, 131, 132), and a minimum of ten additional courses (40 units). Of these courses, at least four (16 units) will be 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 departmental major with a related program of studies should see the "Humanities Special Programs" section in 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 section in 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 (LG of 'B+.' The honors program candidate must f
fill 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 undergraduates 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 the Graduate Admissions Section of the Registrar’s Office. Applicants should read carefully the general regulations governing advanced degrees in the “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, to be 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.

MASTER OF ARTS IN TEACHING

The degree of Master of Arts in Teaching (M.A.T.) is offered jointly by the French Division and the School of Education. The degree is intended for candidates who have a teaching credential or relevant teaching experience and wish further to strengthen their academic preparation. The program consists of a minimum of 25 units of graduate-level course work in French, selected in consultation with the M.A.T. departmental adviser, and 12 units in the School of Education. Detailed requirements for the program are outlined in the “School of Education” section of this bulletin.

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

Effective 1994-95, the basic program is as follows:

Methodology of Teaching (260)

One (9 units) of the three year-long seminars 310A,B,C, 330A,B,C, or 350A,B,C

Four additional courses at the 200 level (two pre-revolution and two post-revolution).

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 the graduate students of 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 11 courses (56 units) to be chosen from the 200 series. Students select these courses in consultation with the graduate adviser, on the basis of the following two criteria: exposure to all periods of French literature and culture, and in-depth work in the student’s chosen field. A maximum of 24 units outside the French Division may be accepted.

2. Students must complete one (9 units) of the three following year-long seminars:
   - Medieval seminar (French 310A,B,C)
   - From the Renaissance to the 18th-century Seminar (French 330A,B,C)
   - 19th- and 20th-century seminar (French 350A,B,C)

3. *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.

4. *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 project, 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 project, followed by a brief question period.

   2. A discussion of aspects of the dissertation project (such as subject, scope, structure, methodology, and bibliography) on the basis of written material 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 graduate school administrative details.

5. *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 in 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. Students interested in the minor 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. Its 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 in 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 Program in the Comparative Literature, Humanities, and Modern Thought and Literature are also available.

Special collections and facilities at Stanford offer the possibility for extensive research in Italian studies and related fields. These include the undergraduate and graduate libraries and the Hoover Institution for the Study of War, Revolution, and Peace. Collections in Green Research Library are especially strong in the Medieval, Renaissance, and contemporary periods; the Italian section is one of the larger constituents of the Western European collection at the Hoover Library; and the Music Library has excellent holdings in Italian opera.

STANFORD IN ITALY

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 via 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 45 units of Italian courses (selected from courses numbered in the 100s, and 200s).
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 Renaissance, (c) the 18th or 19th centuries, and (d) the 20th century. A Dante course may fulfill the Middle Ages requirement.
3. The intermediate-level survey sequence (Italian 227 and 228).
4. Of the 60 units required for the major, up to 15 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 45 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 literature.

Italian and French Literatures — In addition to the 45 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 literature.

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 Special Programs” section in this bulletin for further information.

GRADUATE PROGRAMS

Admission to the Program — Although they need not have been undergraduate Italian majors, candidates are expected to be proficient in the Italian language and to have done significant course work in Italian literature and/or Italian studies on the undergraduate level. Candidates with a broad humanistic and linguistic background are especially encouraged to apply. Contact the Graduate Admissions Section of 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 master's thesis for two literature courses is available.

Reading knowledge of a second Romance language is required. French is recommended.

Requirements for the completion of the A.M. include a comprehensive literature and language oral examination, which is given before the end of Spring Quarter or at the beginning of the following Autumn Quarter. Before taking the exam, a candidate for the degree must submit to the Italian faculty a sample graduate seminar paper representative of the quality of his or her graduate work. On the basis of this paper, the results of the comprehensive examination, and the student’s overall progress, 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.

REQUIREMENTS

Residency and Course Work—In accordance with University regulations, candidates for the Ph.D. must complete at least nine quarters (three years) of full-time work, or the equivalent, in graduate study beyond the bachelor's degree. For a graduate student entering with an A.B., the Ph.D. program should normally be completed in four years. The first year is devoted to full-time study; the second and third years to teaching and the completion of course requirements (for a total of no fewer than 72 units of graduate work), and the fourth to dissertation work. Students entering with a master's degree receive credit for previous graduate work as determined on a case-by-case basis, up to a maximum of 36 units. Fellowship funding and teaching requirements are adjusted according to University regulations.

Students should read carefully the general regulations governing advanced degrees in the "Degrees" section in this bulletin.

Teaching—In addition to training capable and creative scholars, one of the program's primary objectives is to promote the effective teaching of Italian at all levels. To this end, students teach three to five Italian language courses (normally during the second and third year). During the first term of teaching, students must enroll in Italian 301, Graduate Workshop on Pedagogy, a seminar which permits working closely with a master-teacher and involves a regular schedule of class visitations.

Language—As soon as possible, but not later than the end of the third year, the candidate must have passed reading examinations in two additional foreign languages. If the candidate's period of concentration is earlier than the Romantic period, one of these must be Latin; if Romantic or later, French. Completion of the language requirement is a prerequisite for taking the University oral examination.

Course Requirements—In the first three years of study, three courses are required: French and Italian 279E, Italian 297, The History of the Italian Language; Italian 301, Graduate Workshop on Pedagogy; and Colloquium on Research Methods in French and Italian Literature. Apart from this requirement, students are granted considerable freedom in structuring a course of study appropriate to individual needs. During the first year, most course work is usually done within the Italian Division in order to ensure an adequate preparation for the qualifying examination. In the second and third years, students' programs normally consist of a combination of course work done inside and outside the Italian Division, supplemented by tutorials and independent work pursued under supervision of the Italian faculty.
Qualifying Procedures — Students are admitted on a probationary basis. The probationary period ends once a student is officially admitted to “candidacy” for the Ph.D. as a result of successful completion of the qualifying procedure. The qualifying procedure takes place at the end of the third or during the fourth quarter of graduate study, at which time the student: (1) takes the oral qualifying exam (equivalent to the master’s exam), and (2) submits to the Italian faculty a sample graduate seminar paper which the student considers representative of the quality of his or her graduate work at Stanford. On the basis of this paper, the results of the qualifying examination, and the student’s overall progress, the 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 Italian literature. It is taken at the end of the third or during the fourth quarter of graduate study. It is composed of two sections, the first consisting of a 20-minute presentation by the candidate, the second of a 70-minute question and answer period on the candidate’s talk and on his or her reading list. The examination committee for the qualifying examination is made up of the members of the Italian faculty including the student’s faculty adviser, who chairs the examination. While the reading list for the qualifying examination must be based on the department’s standard list, it should be amplified in consultation with the student’s adviser so as to reflect each student’s particular areas of interest.

2. The University oral examination is normally taken at the end of the third year of graduate study or at the beginning of the fourth year. The reading list for the oral examination must be established in consultation with the student’s dissertation director, who chairs a committee of readers (usually three) selected jointly by the dissertation director and the student according to the list’s emphasis. The University oral examining committee is ordinarily drawn from the committee of readers for the dissertation. Reading lists for the University oral generally cover all periods of Italian literature, with the student’s area of specialization, the primary focus, covered in depth. Aside from this general guideline, students are given considerable latitude in establishing a list which reflects their individual scholarly concerns.

The examination is divided into four sections. The first, 30 minutes, consists of a formal presentation addressing one of the questions that the student receives 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 in 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.

150E. Proust—Introduction to the life and work of Marcel Proust, whose novel A la Recherche du Temps Perdu (Remembrance of Things Past) revolutionized the writing of prose fiction. Concentrates on Proust’s theories of involuntary memory and time, his analysis of homosexuality, obsession with jealousy, his depiction of the transformation of French society in the late 19th- and early 20th-century, and the concept of art.

3-5 units, Win (Thody)

157E. Camus—Camus’s life and work as representative of major moral and political crises affecting European culture in the mid 20th-century. Contrast Camus’s notion of the absurd in L’Etranger (The Stranger) with the existentialist views found in Kierkegaard and Sartre. Camus’s views on political action and his rejection of Christianity in La Peste (The Plague). An analysis of La Chute (The Fall)
links Camus’s personality and achievements with his career and self vision; comparison to D.H. Lawrence illuminates the problem of class relationships in British and European Society.

240E. Women’s Voices in Contemporary Italian Fiction—(Same as Comparative Literature 266E.) Introduction to women’s writing in Italy during this century, from Sibilla Aleramo’s pioneering novel *A Woman* to the narrative experiments of the 1980s. Readings: Aleramo, Deledda, Duranti, Ginzburg, Manzini, Maraini, Morante, Ramondino. DR:7†(2) 4 units, Spr (Springer)

270E. European Fiction—(Same as Comparative Literature 270E.) Nine masterpieces from the early Middle Ages to WWII. Discussions emphasize relationships of desire and conflict. Cervantes (*Don Quixote*), Chrétien de Troyes (Yvain), Dostoevsky (*Notes from the Underground* Flaubert (*Mme Bovary*), Franz Kafka (*The Trial*), Thomas Mann (*Mario and the Magician*), Marcel Proust (*Combray*), Voltaire (*Candide*), Virginia Woolfe (*The Waves*).

3-5 units, Aut (Girard)

272E. Italo Calvino in Translation—(Same as Comparative Literature 272E.) Calvino’s development as a writer, analyzing the increasing structure and literary language, and the enduring component of fantasy. *The Path to the Nest of Spiders;* *Marcovaldo;* *The Baron in the Trees;* *Cosmicomics; Invisible Cities;* *Mr. Palomar;* and *Six Memos for the Next Millennium.* DR:7(2) 4 units, Win (Harrison)

273E. Women and Psychoanalysis—Psychoanalytic theories of women from Freud to the present. Readings: Chassegue-Smirgel, Chodorow, Deutsch, Horney, Lacan, Mitchell, and other essays by contemporary French and American psychoanalysts. 3-5 units, Spr (Hullor-Kentor)

277E. Theory of Literature—(Same as Comparative Literature 277E.) An initiation to French philosophical thought, from Structuralism to contemporary times. The links between philosophy and literary theory. Authors: Roland Barthes, Helene Cixous, Jacques Derrida, Michel Foucault, Julia Kristeva, Jacques Lacan, Claude Levi-Strauss, Jean-François Lyotard. Close reading of *The Order of Things* (Foucault), and *Writing and Difference* (Derrida). 3-5 units, Aut (Apostolidès)

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 students’ particular fields of interest. 3 units, Aut (Parrine)

281E. Pirandello, Sartre, and Beckett: Self and World in Modern Literature—(Same as Comparative Literature 281E.) Problems of identity, self-alienation, and human relationships as portrayed in novels and plays of Luigi Pirandello, Jean-Paul Sartre, and Samuel Beckett. Comparison of styles and ideas demonstrates common vision of “abandonment” underlying their work. Readings:
296E. Limits of Economic Rationality II: Individualism and Social Justice — (Same as Economics 100C, Political Science 259B, Comparative Literature 296E.) Examination of several attempts to conceive of the “good society” in terms akin to economic rationality. Contemporary Anglo-American theories (John Rawls, Robert Nozick, Friedrich Hayek, David Gauthier) in light of the French liberal tradition (Montesquieu, Tocqueville, Constant).
3-4 units, Spr (Dupuy)

3-4 units, Spr (Dupuy)

349E. Text in Variance — Theories of Textuality and History of Text-Editing — Introductory survey of the operating concepts of textual criticism; delineation of the main stages of its historical evolution from Zenodotus to the present day. Achievements and prospects of text reconstruction and text editing, irrespective of the age and geographic origin of texts considered.
3-5 units, Spr (Maurer)

369E. Fragments of a Material History of Literature — (Same as Comparative Literature 369, English 369.) Seminar provides a selective introduction to literary studies viewed from the perspective of the material practices and constraints that have shaped Western ideas concerning “literature” and literary expression. Topics: mnemotechnics; the history of writing instruments, machines, surfaces, and supports; paleographic analysis; oral/written communications technologies; printing and textuality; modern/postmodern media permutations of “literature.” Authors: Derrida, Genette, Svembro, Zurnthor.
5 units, Aut (Harrison)

370E. The Anthropology of Speed — (Same as Comparative Literature 370, English 368, History and Philosophy of Science 270.) Envisaged as a dialogue between the history of technology and the ethos of acceleration. Possibilities of cross-fertilization between continental and analytical philosophy about the issue of self-deception. Readings: Camus, Dostoievski, Proust, Adam Smith.
5 units, Aut (Harrison)

383E. Foucault and Contemporary Critique — (Same as Comparative Literature 383, English 383.) The work and legacy of Michel Foucault in relation to developments in contemporary literary theory and cultural critique.
4-5 units, Spr (Parker)
tion for students planning travel in France. Prereq-
quisite: 2 or equivalent.

2 units, Aut, Win, Spr (Staff) MW or TTh

15. Second-Year Conversation — Intermediate
level, designed to improve communication in ev-
eyday situations. Discussion topics include travel,
food, shopping, student life, and current events
using newspapers, magazines, and videos. Prereq-
quisite: 3 or equivalent.

2 units, Aut, Win, Spr (Staff) MW or TTh

20. Conversation and Culture — France as seen
through the writings of French and foreign authors.
Oral presentations and discussions. May be re-
peated once for credit after an interval of two quar-
ters. Prerequisite: 22 or equivalent.

2 units, Aut, Win, Spr (Staff) MW or TTh

21. Second-Year French (First Quarter) — Dis-
cussions based on literary texts, study of grammar,
and composition.

4 units, Aut, Win, Spr (Staff) MTWTh

21C. Second-Year French (Communication) —
Reading and review of essential grammar; empha-
sis on communication, using class conversation and
e-mail in the design and accomplishment of student-
generated projects (e.g., writing a newspaper in
collaboration with students at another university,
acknowledging with students in France.) Computers
mediate exchanges and develop writing skills.

4 units, Aut (Barson)

22. Second-Year French (Second Quarter) —
Continuation of 21. Discussion of reading excerpts
(novels, plays, poetry) grouped by themes. Continu-
uation of grammar and composition study.

4 units, Aut, Win, Spr (Staff) MTWTh

22L. Second-Year French (Law through Litera-
ture) — Readings from French literary texts focus
on various portrayals of the legal system in non-
legal texts. Short compositions on related issues
complement a review of essential grammar.

4 units, Win (Staff)

23. Second-Year French (Third Quarter) — Read-
ings, discussions of complete works, and grammar
study. Extra unit for individual project.

4-5 units, Aut, Win, Spr (Staff) MTWTh

41A,B. Intensive French for Beginners — Accel-
erated 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.

8-12 units, Sum (Staff) MTWThF

42A,B. Intensive Intermediate French — Accel-
erated second-year French course in which either
two or three quarters of French may be covered. A
complete grammar review is offered in conjunction
with reading of selected French texts. Classroom
discussions, entirely in French, focus on the reading
material and on topics of current interest. Written
exercises and composition, oral reports, videos, and
daily work in the language lab are included. No
auditors. Prerequisite: one year of college French or
equivalent preparation.

8-12 units, Sum (Staff) MTWThF

50. Reading French — Accelerated course specifi-
cally for the acquisition of reading ability. For
graduate students or seniors seeking to meet Uni-
versity reading requirement for advanced degrees.
No auditors.

4 units, Aut (Staff) MWF 10

ADVANCED LANGUAGE

101. Language Specials — With consent of depart-
ment only. See instructor for section number.

1-5 units (Staff)

120. Conversation: France Today — Advanced
conversation and discussion centered on contempo-
rary 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 com-
munication and as literature. 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. Prerequisite: 23 or equivalent.

3 units, Aut (Hullot-Kentor)

124. Contemporary French Usage, Spoken and
Written — Grammar, syntax, and stylistics
emphasizing similarity and divergence of oral and written
French. Some knowledge of linguistics applied to
the analysis of texts and oral presentations. Prereq-
isites: 121, 123, or equivalent.

3 units, Spr (Staff)

129. Business French — For students interested in
business 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 units, Aut (Staff)
LITERATURE AND CULTURE
(UNDERGRADUATE)

130. The Middle Ages and Renaissance in France—Introduction to the literature and culture of France, 11th-16th century. Readings from the epics (The Song of Roland), medieval romances (Yvain by Chrétien de Troyes) post-Petrarchan poetry (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, Charrière, Diderot, Lafayette, Molière, Montesquieu, Rousseau, Sorel, and Voltaire. Prerequisite: 23 or equivalent. DR:7(2)
3-5 units, Win (Hulot-Kentor)

132. 19th- and 20th-Century France—Survey of complete masterpieces (except for poetry) 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)

198. Honors—Open to juniors and seniors with consent of adviser. 9-12 units total credit for completion of honors essay.
3-12 units (Staff)

199. Individual Work—Open only to majors in French with consent of department. Normally limited to 4-unit credit toward the major.
1-12 units (Staff) by arrangement

ADVANCED UNDERGRADUATE AND GRADUATE

Note—Prerequisites for the following courses taught in French are normally 130, 131, or 132, or equivalent.

202. Old French Romance—Intensive study of traditional chivalric romance emphasizing Chrétien de Troyes’s fiction. Two perspectives: the concept of authorship in the context of the manuscript tradition (what constitutes a “better” version, role of scribal “amplifications,” how to retrieve the “original” text; strategies of interpretation (how to read medieval romance, the public as a “textual community,” “New” vs. “Old” Philology). Prerequisite: reading knowledge of Old French.
3-5 units, Win (Cazelles)

3-5 units, Spr (Hester)

216. Montaigne et Pascal—Study of the principal texts from Montaigne and Pascal and examination of the similarities and differences between these two authors who play an essential part in French thought and sensibility at the start of its apogee.
3-5 units, Aut (Girard)

226. Moralists and Psychology in the 17th Century—As 17th-century modern moralism emerged, so did the problem of determining principles of human action and decision without recourse to theology. Moral concerns arose with the emergence of reflections on human psychology. Topics: the content of moralism and psychology, their necessary relation and what is specifically modern about them, the psychoanalytic conception of morality, and the relation of Moralists’ thought to the fragment and tale. Readings: La Rochefoucauld, La Bruyère, La Fontaine, extracts from Montaigne, Théophraste and Bossuet, contes populaires.
3-5 units, Aut (Hulot-Kentor)

234. 18th-Century Novel—Introduction to the novel during the French Enlightenment. Philosophical and social aspects and the literary dimension of the works. Authors: Crébillon fils, Denis Diderot, Laclos, Marivaux, Abbé Prévost, and Sade.
3-5 units, Win (Apostolidès)

3-5 units, Win, (Apostolidès)

252. Contemporary Novel from the “Nouveau Roman” to the Present—Presentation of diverse views on narrative writing after the “Nouveau Roman.” Theoretical standards and a concern for experimentation permitted an emancipation from traditional narrative forms, but also a reaction against that which was perceived to be formalism. Tendencies of assimilation and rejection. Texts highlight the diversity of today’s narrative writings.
3-5 units, Spr (Bertrand)

254. 20th-Century Novel: Dream and Reality—André Breton, Alain-Fournier, Gide, Proust, and other Surrealists.
3-5 units, Aut (Newman-Gordon)

258. Sartre—The life, ideas and influence of Jean-Paul Sartre. Examination of his work as a literary critic and theoretician of literature, notions of existentialism and existential psychoanalysis, concept of freedom, and attempt to play a part in mid-20th-century European and world politics. Readings
short stories in Le Mur, essay on Baudelaire, and plays Les Mains Sales and Les Séquestrés d'Altona)
3-5 units, Win (Thody)

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, Win (Thody)

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, Win (Hester)

272. Pronunciation and Phonetics — Theory study and corrective work: articulation, intonation, rhythm, phonetic alphabet, etc.
3-5 units, Win (Hester)

279. Society and Culture: 19th- and 20th-Century France — The links between sociopolitical events and cultural activity after Romanticism, leading up to the ideological and artistic revolutions of our time. 19th-century revolutionary movements are discussed in relation to popular and learned culture. Focuses on collective mentalities and sensibilities of the period.
3-5 units, Win (Hester)

284. Beyond Les Misérables — Victor Hugo's chronicle of the life of the underdog in 19th-century France. Who are les misérables d'aujourd'hui and what can they tell us about the Other and ourselves?
2 units, Aut (Serres)

295A. Corneille: Roman Tragedies
2 units (Serres)

295B. Corneille: Christian Tragedies
2 units, Spr (Serres)

299. Individual Work — For students engaged in special work.
1-12 units, any quarter (Staff) by arrangement

GRADUATE WORK

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 and Degrees has gone to print. Students are advised to consult the department bulletin board on a regular basis. Courses 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 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. Accelerated First-Year Italian—Covers two or three quarters of Italian. Conversational drills and daily work in the language lab. All-in-Italian method used, developing the four basic skills: listening, speaking, writing, and reading. No auditors.
8-12 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.
1-4 units Win (Staff)

INTERMEDIATE-LEVEL LITERATURE

127. Italian Literature I: The Middle Ages and the Renaissance—Reading of selected works from Boccaccio, Dante, Machiavelli, Petrarch, the Sicilian school, and Stilnovisti. DR:7(2)
4 units, Aut (Staff)

128. Italian Literature II: From Mannerism through the Modern—Reading of selected works from Ariosto, Goldoni, Leopardi, Pirandello, and Verga. DR:7(2)
4 units, Spr (Springer)

129. Introduction to Italian History—Required of all Italian majors who select the Italian studies concentration. Italy's historical and cultural background approached via study of specific events, movements, figures, and artifacts. Prerequisite 3 or equivalent.
3 units, Win (Staff)

191. Italian Cinema—Aspects of political, social, and cultural history of 20th-century Italy studied via the major monuments of the post-war cinema. Prerequisite 3 or equivalent.
3 units (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

244. Italian Romanticism—(Same as Comparative Literature 244E.) Intensive study of major works of romantic poetry and prose, focusing on Foscolo and Leopardi. Emphasis on the relationship between literature and the historical and political context of the Risorgimento. (In English; texts in Italian) DR:7(2)
4 units, Win (Springer)

253. Italian Renaissance Epic—(Same as Comparative Literature 253.) Intensive study of Ariosto's Orlando furioso and Tasso's Gerusalemme liberata, against the background of the high Renaissance and Counter-Reformation. Major topics: the representation of gender, the tension between epic and romance traditions, Renaissance epic and political legitimation. (In English; texts in Italian)
4 units, Spr (Springer)

4 units, Aut (Staff)

282. Rhetoric of the Self: Intimate and Literary Diaries by Italian Contemporary Authors—The role and structure of the "journal" genre and its relation to the 20th-century European "crisis" of the novel. The mingling of sincerity and lie, truth and fiction, parody and satire, literature and death, irony and confession, as reflected in "journals" by authors such as A. Delfini and E. Flaiano, C. E. Gadda, and T. Landolfi.
4 units, Aut (Staff)

295. New Jars for Old: A Study in Narrative Mutation—Four week colloquium. The simple plot of Pirandello's novella La giara (1907) has been reworked in several media. Pirandello himself recast it for the theater (once in Sicilian dialect, and again in Italian); three different film versions (most recently by the Traviani brothers) and a ballet by Alfredo Casella exist. Study of several versions in the light of theories on adaptation.
2 units Spr (Staff)

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, Aut, Win, Spr (Staff)
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)  

321. Giambattista Vico—Vico's New Science in its historical context, its polemic vs. the rise of Cartesian critical philosophy, the basis of Vico's original aesthetic theories, and the relationship of Vico's thought to the significant traditions it foreshadows, i.e., Hegelianism, Marxism, structuralism, hermeneutics and speech-act theory. Readings: On the Most Ancient Wisdom of the Italians, and The New Science; Descartes' Discourse on Method; Richard Rorty's Philosophy and the Mirror of Nature.  
4 units, Win (Harrison)  

364. Extending Poetical Competence: Giacomo Leopardi—Examines the impact the poet's professional interests in classical scholarship, literary criticism and (mainly) Romance linguistics had on the development of his style, lyrical themes, and his poetic theory. Readings include a series of the major poems from the Canti.  
4 units, Spr (Maurer)  

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. Boeningher, Katharina Mommsen, Gertrude L. Schuelke;  
(Adjunct Professor) Gertrude Mahrholz  
Acting Chair: Theodore M. Andersson  
Courtesy Associate Professor: Eckart Förster (Philosophy and German Studies)  
Senior Lecturers: William E. Petig, Kathryn Strachota, Brigitte Turneaure  
Lecturer: Henry Lowood  
Consulting Professor: J. Alan Pfeffer  
Mellon 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.  

The department accepts candidates 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 departmental 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. Cur-
rently, the institute is engaged in a major computer-
based research project.

**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 “Degrees” section of this bulletin.

**OVERSEAS STUDIES**

Detailed information on the center in Berlin is given in the pamphlet *Overseas Studies*, including 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 superior. 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.

The A.M. degree in 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 departmental adviser. For a statement of re-
quirements other than German see the "School of Education" section in this bulletin.

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 departmental adviser. For a statement of requirements other than German see the "School of Education" section in 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 as a qualifying paper an example of their course work. Although ordinarily not meant to represent an original contribution to scholarship, it should demonstrate the candidate's ability to grasp complex subject matter with sufficient competence, to organize materials, and to present arguments in a clear and concise manner commensurate with scholarly standards. The paper is submitted to the department chair, who passes it on for approval by the student's faculty adviser and a second reader appointed by the chair in consultation with the adviser.

Students who enter the program with a master's degree from another institution must submit, in lieu of a qualifying paper, a master's thesis or a major research paper as evidence of ability to pursue advanced scholarly work.

At the end of the sixth quarter of study (and only if the qualifying paper has been accepted), the student takes a one-hour oral qualifying exam with two examiners, the student's chosen adviser and another faculty member appointed by the chair. The purpose of this examination is to demonstrate a broad familiarity with the literature of the major periods, movements, and some major figures. 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 departmental 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 themetic 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 “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
251. Syntax of Modern German
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 High German
or 256. Old Saxon

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 in 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 who are 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 — 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 — Representations and competing versions of four key myths: the golden age, erotic transgression, the court, and salvation. Readings by authors including Virgil, Tolstoy, Rousseau, Mozart, Kierkegaard, Marlowe, and Goethe. DR:1 (three-quarter sequence)
5 units, Aut (Andersson) 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 by authors including 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 intertwined; the origins of language; rhetoric, narrative, and poetry; intercultural translation; communication and power. Readings by authors including Aristotle, Hobbes, Humboldt, Coleridge, Adorno, Foucault. DR:1 (three-quarter sequence)
5 units, Spr (Mueller-Vollmer, Robinson) T 11 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)

38A. Introduction to the Germanic Languages — (Same as 138, Linguistics 75.) Survey of the oldest attested stages of the Germanic language family, including Gothic, Old Norse, Old Saxon, Old English, Old High German, Old Dutch and Old Frisian. External history and internal relationships. DR:9(4)
3 units, Spr (Robinson)

64A. Writings of Franz Kafka — (Same as 164.) Open to non-majors. Selected readings in translation from the stories and novels (The Trial, The Castle), major themes and enigmas of Kafka's work,
his artistic legacy in the context of 20th-century literature.
3-5 units, Spr (Gillespie)

3-5 units, Win (Andersson)

126A. Old Norse Literature in Translation — The classical sagas and short stories of medieval Iceland. Lectures and readings of selected kings’ sagas and family sagas.
3-5 units, Spr (Andersson)

136A. Seminar: Monsters, Masochists, Tyrants: Embodiments of Authority in German Film — (Same as 136.) Structures of authority in German film from the Weimar Republic to the present. Readings: theoretical and historical material encompassing such diverse approaches as feminist film criticism, sociological and psychological analyses, psychoanalytic theory, Marxist and New Historian theories of film. Movies: The Cabinet of Dr. Caligari, Metropolis, Nosferatu, Blonde Venus, Der Untertan, Coup de Grace, Mephisto, The Marriage of Maria Braun, Aguirre, Madame X. Readings and discussions in English, all films either subtitled or dubbed.
4 units, Aut (Staff)

175A. The Arts and Theater in 20th-Century Austria — (Same as Drama 158K.) The role of culture in the creation of national identity.
4 units, Spr (Kralj)

277A. European Novel of Sentiment and Education — (Same as Comparative Literature 277A.) The emergence of psychological and confessional models from Mme de LaFayette to Goethe; the novel as vehicle for the concept of Bildung (formation, education) in such major authors as Fielding, attacks on 18th-century norms by radicals such as de Sade, pre-Romantic anxieties as experienced by Rousseau and others, and the revolution of fiction in Sterne.
3-5 units, Win (Gillespie)

297A. Self-Referentiality and Paradox in Post-Enlightenment Critical Thought — (Same as 297, Comparative Literature 297/297A, English 367.) Using the systems-theoretical perspective of Niklas Luhmann, and his theory of observation, diagnoses problems of self-reference and strategies of circumvention in current theoretical debates on postmodernism. Readings focus on contemporary theorists (Derrida, Foucault, Habermas, Luhmann, Lyotard, and Rorty), but include excursions into the 18th century (Herder, Kant) and late 19th/early 20th century (Nietzsche, Freud).
3-5 units, Aut (Knodt)

393A. Seminar: Text in Variance — Theories of Textuality and History of Text Editing — (Same as Comparative Literature 349, French and Italian 349E.) Achievements and prospects of text reconstruction and text editing, irrespective of age and geographic origin of texts considered. Introductory survey of the operating concepts of textual criticism; delination of the main stages of its historical evolution from Zenodotus to the present.
3-5 units, Spr (Maurer)

INTRODUCTORY

First- and second-year language courses are under the direction of Walter F. W. 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)

IX. 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, Spr (Staff)

2C. Conversational German — Enables students to understand and express themselves in simple spoken German. Focuses on life in Germany. Recommended for students going to the Stanford Center in Berlin. 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) MTWThF 8:30-10 and 10:30-12

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 inde-
pendently. 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)

20P. Kultur Mitt
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)

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 (Strachota)

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, 130, or 150 series. Prerequisite: 21.

4 units, Aut, Win, Spr (Staff)

35. Business German — (Same as 135.) Reading/discussions in German of texts dealing with the business world, i.e. economics, banking, stock market, import-export trade, Common Market. Review of basic German structures. Prerequisite: 3 or the equivalent of one year of college German.

3-4 units, Spr (Petig)

52A, B, C. 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. Reading includes 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.

52A. Readings in Economics
3-4 units, Aut (Staff)

52B. Readings in History
3-4 units, Win (Staff)

52C. Readings in Art History — (Same as Art History 190X.)
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 (Strachota)

101. Composition and Advanced Grammar — Short fictional and expository texts read and discussed. Students write short essays. Exercises cover important points of grammar, idiomatic usage, and vocabulary building.

3 units, Win (Turneaure)

102. Composition and Advanced Grammar II — Continuation of 101.

3 units, Spr (Turneaure)

110. German Newspapers — Articles of current interest in German newspapers read and discussed. May be taken twice for credit. Prerequisite: 22 or equivalent.

3 units, Aut (Turneaure)

111. Television News from Germany — Aim is listening comprehension of authentic contemporary German video material, but also serves as an introduction to current events in Germany. Students listen to several German newscasts per week, analysed and discussed in class; also, feature films two or three times during the quarter. (In German)

2 units, Win (Lohnes)

114. Germany: Past and Present—Survey of the recent history and culture of Germany with emphasis on major political, social, and artistic events. Readings, discussions, and written work in German plus videotapes and films.

4 units, Win (Petig)

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)

121. Contemporary German Drama — Study of selected plays representative of major authors and trends in German theater since 1945. Readings from Brecht, Dürenmatt, Frisch, Handke, Kroetz, Plenzdorf, and Weiss. Performances, films, tapes, and videotapes. DR:7(2)

4 units, Win (Strachota)

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)

135. Business German — See 35.

3-4 units, Spr (Petig)

136. Seminar: Monsters, Masochists, Tyrants: Embodiments of Authority in German Film — (Same as 136A.)

3-4 units, Aut (Lohnes)

138. Introduction to the Germanic Languages — (Same as 38A, Linguistics 75.)

3 units, Win (Robinson)

162. From Romanticism to Realism — Introduction to the major literary trends of the 19th century in their historical context. Romantic lyric, novella, Kunstmärchen, poetic theory, Junger Deutschland and the critique of romanticism; transition to Realism, Realist theory and prose; cultural pessimism in the later 19th century. Readings from Bismarck, Brentano, Büchner, Droste, Eichendorff, Feuerbach, Fontane, Grillparzer, Heine, Hoffmann, Hölderlin, Kleist, Marx, Meyer, Nietzsche, Novalis, Jean Paul, Schopenhauer, Schurz, Stifter, Tieck, and Wagner. (In German)

3-5 units, Win (Mommsen)

164. Writings of Franz Kafka — (Same as 64A.)

3-5 units, Spr (Gillespie)

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 and consent of instructor.

1-2 units, Aut, 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 of the same styles 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)

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.

235. Culture and Unification — (Same as 335.) Literary and political texts since 1989 on German unification, nationhood, the GDR past, and the role of intellectuals.

5 units, Aut (Berman)

237. 1800: The Invention of Aesthetic Modernism in Early German Romanticism — (Same as 337.) Its philosophy, poetics, hermeneutics and literary discourse in relation to contemporary theory. Writings by Fichte, Novalis, Schelling, A.W. and F. Schlegel, Tieck, and Wackenroder.

3-5 units, Spr (Mueller-Vollmer)

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, Marce, Marx, Nietzsche, Schiller, and Wittgenstein. (In English)

241. Deutsche Geistesgeschichte I — Language and thought from Leibniz to Humboldt.

3-5 units, Aut (Hullot-Kentor)


3-5 units, Win (Gillespie)


3-5 units, Spr (Staff)

244. German Thought from 1750 to the present and its significance for an understanding of modern culture. Authors: Adorno, Freud, Herder, Hegel, Husserl, Marce, Marx, Nietzsche, Schiller, and Wittgenstein. (In English)

244. Linguistics and the Analysis of German — (Same as Linguistics 175.) Introduction to linguistic theory and analysis, emphasizing modern German.

3-5 units, Aut (Robinson)
255A. Middle High German — Emphasis on basics of grammar and rapid reading.
3-5 units, Win (Robinson)

255B. Advanced Readings in Middle High German
3-5 units, Spr (Andersson)

257. Gothic — Introduction to grammar and texts of the Gothic language; also, grammar of Proto-Germanic.
3-5 units, Aut (Robinson)

258. Introduction to Old Norse — (Same as English 200A.) Icelandic grammar and readings from E. V. Gordon, Introduction to Old Norse. Emphasis on the acquisition of reading skills.
3-5 units, Win (Andersson)

296. Literature of Decadence — (Same as Comparative Literature 296.) Symbolist, fin de siècle, and modernist understandings of spiritual crisis, the "decline of the West," and "art for art's sake" in European poetry, drama, and fiction during the decades 1880-1930; the impact of Decadence on modern art and thought (relation to neo-Romanticism, Jugendstil, art nouveau, Futurism, Expressionism, Wagner, Nietzsche, Freud, dissociation of sensibility, etc.).
3-5 units, Spr (Gillespie)

297. Self-Referentiality and Paradox in Post-Enlightenment Critical Thought — (Same as 297A, Comparative Literature 297/297A, English 367.)
3-5 units, Aut (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)

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.
2 units, Aut (Petig)

335. Culture and Unification — (Same as 235.)
5 units, Aut (Berman)

337. 1800: The Invention of Aesthetic Modernism in Early German Romanticism — (Same as 237.)
3-5 units, Spr (Mueller-Vollmer)

ADVANCED GRADUATE

400. Dissertation Research — Exclusively for graduate students in German working on dissertations.
1-12 units, Aut, Win, Spr, Sum (Staff) by arrangement

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 (Staff)

2 units, Aut, Win, Spr (Staff)

23B. Intermediate German — Berlin.
4 units, Aut, Win, Spr (Staff)

90B. Advanced German I — Berlin.
4 units, Aut, Win, Spr (Friesel-Kopecki)

100B. Contemporary Berlin: Public Media — Berlin.
2 units, Aut, Win, Spr (Staff)

101B. Advanced German II — Berlin. Offered depending on demand.
3 units, Spr (Staff)

129E. Modernism and Metropolis: Turn-of-the-Century Culture in Berlin — Berlin. DR:7(2)
4 units, Aut (Schutte)

134B. Divided History: East and West German Literature, 1970-1989 — (Same as History 229V; also listed as International Relations Cluster 'B.') Berlin. DR:7(2)
4 units, Win (Schutte)

195. German Theater — (Same as Drama 101A.) Berlin. DR:7(2)
4-5 units, Aut, Spr (Kramer)
HISTORY


Chair: David M. Kennedy


Associate Professors: Joel Beinin (on leave Spring), Gordon H. Chang (on leave), Stephen H. Haber, Kennell A. Jackson, Jr., Nancy S. Kollmann, Richard Roberts (on leave Autumn, Winter), Aron Rodrique

Assistant Professors: Philippe Buc, Gabrielle Hecht, James E. Ketelaar, Ellen G. Neskar, Mary Louise Roberts, Karen Sawislak (on leave)

Courtes Professors: Paul David, Susan M. Treggiari, Gavin Wright

Senior Lecturer: Joseph J. Corn

Modern Europe Lecturers: Andrew Aisenberg, Matthew Levinger, Fabio López-Lazaro, Laura Smoller, John Tolan

Lecturers: Stewart Burns, S. Ryan Johansson

Acting Assistant Professors: Pier M. Larson, Shalumit S. Magnus, William Tobin

Visiting Professors: Leon Campbell, Jonathan Haslam, Colin Jones

Visiting Lecturer: Gita Dharampal-Frick

Mellon Fellow: Lisa Ann Cody

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 in History 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 History 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 quarter in which the registration takes place.

As foundation requirements, candidates must (1) complete 12 courses in History and receive a letter grade indicator (LGI) of 'C' or higher; (2) complete an introductory seminar; (3) complete at least three additional small-group courses; and (4) complete an undergraduate seminar in the field of concentration.

The capacity to write with ease and to express oneself with lucidity is an important skill and to gain that skill requires practice. Therefore, 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 faculty. 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 towards 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 (Western Hemisphere including U.S., Canada, and Latin America); 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
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, complete an essay, the work for which normally begins in Spring Quarter of the junior year and is completed 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 on 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 going overseas Spring Quarter of the junior year, but such prospective honors 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. To encourage early preparation, prospective honors students are urged, but not required, to take an undergraduate seminar sometime in the junior year. 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 the Graduate Admissions 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 "Degrees" section in this bulletin. Those interested in applying for admission to the A.M. and Ph.D. programs should contact the Graduate Admissions Section of the Registrar's office, Old Union, in order to receive an application. Applications become available in September of the year prior to intended enrollment. 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 they will be allowed to continue to work towards the Ph.D. is made in the Winter Quarter of a 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)

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
      - Russia since 1800
      - Eastern Europe to 1800
      - Eastern Europe since 1800
      - Jewish History
      - Middle East to 1800
      - Middle East since 1800
      - Africa
      - China before 1600
China since 1600  
Japan before 1600  
Japan since 1600  
Latin America to 1825  
Latin America since 1810  
The United States (including Colonial America) to 1865  
The United States since 1850  
The History of Science

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/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 departmental 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 (i.e., 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 upon 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 in this bulletin.

**RESOURCES**

The above section relates to formal requirements, but the success of a student's graduate program depends in large part upon the quality of the guidance which he or she receives from the faculty and upon 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 international conferences. The Hoover Institution also possesses some of the richest collections available anywhere on the British labor movement; Eastern Europe including the Soviet Union, East Asia (runs of important newspapers and serials and extensive documentary collections, especially for the period of 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 *Time Schedule* for changes in course offerings each quarter. The department also maintains a bulletin board with updated information.

**INTRODUCTORY**

1. **Europe: Antiquity to the Present** — This sequence fulfills the Cultures, Ideas, and Values requirement. It explores the relationship between cultural, political, social, and economic developments in Europe and America since Antiquity. Emphasis is on the growth of European and American cultures from sources and influences within and outside Europe. Topics: Judeo-Christian heritage, the emergence of classical cultures, their influence on the Middle Ages and the Renaissance, social and religious upheavals of the Reformation, consolidation of the European state system, conditions emerging with modern industrial society, and global consequences of European and American developments. Meets three hours weekly with lecturers from the regular History faculty and two hours a week for colloquia in small groups led by postdoctoral fellows. Enrollment limited: students intending to apply the sequence toward their Area 1 requirement are given priority.

2. **Europe and Beyond, 1500-1789** — Survey of the intellectual and social currents from the Reformation to the American Revolution. Reading selections from Shakespeare, Mary Wollstonecraft, Montesquieu, and the *Declaration of the Rights of Man*. DR:1 (three-quarter sequence.)

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.)

4. **American Civilization from 9th to 17th Centuries** — Interdisciplinary approach to Russian history and culture; examines literature, society, institutions. DR:2(*) or 9(5*)

5. **Russia and the West, 18th to 20th Centuries** — Interdisciplinary approach to Russian history and culture; examines literature, society, institutions.

**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 coher-
ent 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.”

8S. Introductory Seminar: The Land of Three Faiths—Medieval Spain—Medieval Spain was a patchwork of different religious, linguistic, and political allegiances. Muslim and Christian rulers made and broke alliances; Christians, Muslims, and Jews wrote polemics against each others’ religions; translators created Latin versions of Arabic texts that profoundly influenced European thought. Close reading of the poetry, religious polemic, and historical chronicles of Spanish Muslims, Jews and Christians.

5 units, Win (Tolan) Th 2:15-4:05

10S. Introductory Seminar: The Italian Renaissance and the Construction of Gender—Primary sources and selected writings by Renaissance authors in the context of recent interdisciplinary studies on women’s history and the construction of gender. Focus is on the wide range of Renaissance notions of woman and the interdependence of masculinity and femininity as cultural constructs. The lack of studies of Renaissance malehood other than homosexuality and the question of women’s social status in the Renaissance is problematized. The political significance of certain images of women in a patriarchal society. The cultural importance of gender images for the appropriation of antiquity.

5 units, Aut (Staff) M 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 so-called 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(5)

5 units, Spr (Buc) T 1:15-3:05

16S. Introductory Seminar: The Society of Renaissance Florence—Takes the beginning student into the historian’s workshop and provides firsthand 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, ranging from census records, analyzed with the help of computers, to court records, letters, and diaries. Students develop their own interpretations of what Florentines were like. Emphasis on social structure and everyday people.

5 units (Brown) not given 1993-94

19S. Introductory Seminar: The “West” in the Russian Consciousness, 1789-1855—The seminal period in Russian intellectual, cultural, and political history. In the wake of the French Revolution, Russians first confronted a still current issue. What can Russians learn from the Western experience? Should Russia repeat the Western path toward liberal democracy or can it show the world a new route to social harmony? Primary sources from revolutionary tracts to travel diaries and fiction.

5 units, Spr (Staff) W 2:15-4:05

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, Aut (Kollmann) W 1:15-3:05

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, Fouquet’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, Aut (Lounge) T 2:15-4:05


5 units, Win (Staff) T 1:15-3:05


5 units (M. L. Roberts) not given 1993-94
36S. Introductory Seminar: The Modern European State and the Jews—Examines the public debates about the Jews and their place in European society, and the policies of England, Austria, France, and Germany to the Jews in centuries when Jewish status was redefined. Why the "Jewish question" was so prominent on the agenda of modern European states and revolutionary movements; social forces which propelled the movement toward Jewish equality, antisemitism. Readings are largely primary sources.

5 units (Magnus) not given 1993-94

38S. Introductory Seminar: Spain—Government and Society, 1492-1814—Introduces important themes in Spanish social and political history through a selection of original sources and influential secondary material. Major events and trends, and how historians have analyzed them in conflicting ways. The changing relationships between social groups and the institutions of political power. Critical readings of recent interpretations.

5 units, Spr (López-Lazo) W 2:15-4:05

40S. Introductory Seminar: Britain at the Turn of the Century—The transformation in politics, culture, and gender roles which took place in late Victorian and Edwardian Britain. Issues relating to the expansion of state intervention in the economy and society.

5 units, Win (Staff) Th 2:15-4:05

44S. Introductory Seminar: Crime, Law and Society in Modern England, 1700-1900—Historical approaches to understanding how people, institutions, and governments have responded to crime and public disorder. Topics: intellectual and cultural criminology, social and Marxian histories of crime, policing the modern state, and gender in the criminal justice system.

5 units, Aut (Staff) Th 1:15-3:05

45S. Introductory Seminar: Culture and Community during the English Revolution—The cultural and social tensions which led to civil war and regicide in 17th-century England. Did deeply-held convictions about social order, religion, and liberty pit neighbor against neighbor, as well as dividing Parliament from the king? Was the crisis much more limited in scope—an aristocratic coup which left few indelible imprints on English society? Analysis of primary materials (plays, poems, memoirs, and polemical literature) allows students to reach their own conclusions about the nature of the war and its impact on the local community.

5 units, Spr (Staff) M 1:15-3:05

47S. Introductory Seminar: Ethnicity and Violence in South Africa—The Historical Background—The historical background of ethnicity and violent political conflict in contemporary S. Africa, looking at theory and the history of formation of ethnic consciousness in S. Africa, the historical approach of important black political movements to the issue of ethnicity, and the recent political violence. Focuses on Natal region and Zulu ethnic group.

5 units, Aut (Staff) T 1:15-3:05

48S. Introductory Seminar: Slavery in Precolonial Africa—The main historical and anthropological debates animating the study of slavery in Africa. Topics: the origins of indigenous African slavery, the volume of the Atlantic slave trade and its impact on African societies, and the consequences of abolition during the early colonial period. Students analyze the use and limitation of narratives, personal diaries, Parliamentary debates, etc. related to themes and issues.

5 units, Win (Staff) W 2:15-4:05

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 (Corn) not given 1993-94

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 1993-94

59S. Introductory Seminar: American Society and Culture in the 1950s—The history of domestic America during the height of the Cold War and the impact of the Cold War on U.S. society. Focus is on primary documents: literature, oral history, census data, films, and congressional hearings. Topics: the influence of the atomic bomb on American culture, McCarthyism and anti-communism, African-American protest, the Cold War economy, domesticity and the baby boom, and mass culture.

5 units, Aut (Staff) T 1:15-3:05

60S. Introductory Seminar: The Far West—Cultural Crossroads on the Pacific, 1790-1900—Before they confronted the "wild west" beyond the Mississippi, Americans reached the Far West—California, Hawaii, the Oregon country. This maritime frontier was a meeting place in which various native American, Hawaiian, European, and Asian cultures mingled, competed, and contended with each other. Focus is on the dynamics of cultural survival, competition, and interaction in the midst of dramatic social, economic, demographic, and political change. Introduces the complexity of historical interpretation through the use of a range of primary sources (letters and diaries, consular re-
ports, immigration records, and court testimony.
5 units, Win (Staff) T 2:15-4:05

61S. Introductory Seminar: Social Movements of the 1960s in California — "The Sixties" refers to a period of grassroots political activism and social turmoil stretching from the civil rights sit-ins of 1960 to the early disability rights movement of the mid-1970s. Readings are drawn from documents contemporary to the period under study. Topics: student activism at Stanford and UC-Berkeley, the Black Panther Party, and the New Right. Speeches, mainstream and underground newspapers, private and organizational papers, and other primary source materials. Explores methods of historical analysis and interpretation by studying primary sources in tandem with more recent scholarship.
5 units, Spr (Staff) Th 2:15-4:05

62S. Introductory Seminar: Women and Health in America — The major themes in the history of women's health in the U.S. from the late 18th century to the present. Readings and discussions focus on the history of women's health, women's roles as healers, sexuality and reproduction, and definitions of women's illnesses.
5 units, Spr (Staff) 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 are 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 1993-94

91S. Introductory Seminar: The Cultural Revolution — Events, Interpretations, and Memories — The Cultural Revolution was Mao Zedong's last attempt to transform Chinese society spiritually and structurally. The events of this period (1966-1976) were marked by social upheaval, violence, massive youth movements, and extreme ideological pressure. The Cultural Revolution from a variety of perspectives, focusing on the relationship between events in China from 1966-1976 and their interpretation in China and in the West during the Cultural Revolution decade and since.
5 units, Spr (Staff) T 2:15-4:05

92S. Introductory Seminar: Remembering Blood and Glory — The History of Warfare in Medieval Japan — Using chronicles, semi-fictional tales, picture scrolls, documents, and traditional histories in translation, assesses the nature of warfare in medieval Japan. The discrete events of war and its social, economic, political, and intellectual dimensions. The shifting nature of concepts of loyalty, valor, and treachery illustrate how these notions have influenced historical reconstructions of warfare.
5 units, Spr (Staff) M 1:15-3:05

93S. Introductory Seminar: What Makes Chinese Laugh — A History of Chinese Humor — Introduces humor from a historical perspective. Readings include theories about humor and some primary sources (pictures, poems, jest books, novels, political cartoons, and films) from traditional and contemporary China.
5 units, Win (Staff) T 2:15-4:05

5 units, Win (Mass) W 2:15-4:05

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. The courses below are for Department of History credit. All Dialogue Tutorials and some Peter Seminars require a brief application. Students can refer to the Time Schedule or with the Dialogues and Seminars office (123 Sweet Hall, telephone 415-723-4504) for applications and information.

100C. Dialogue Tutorial: Gender Relations in Early Modern Russia — Survey of primary sources and secondary works on gender relations on various aspects of life in 16th- and 17th-century Russia, emphasizing the world of politics and the elite and possibly related issues in law, spirituality, social values, and moral teachings. Muscovite conceptions of honor, politics at the tsar's court and in elite families. The reign of the first de facto female ruler in Muscovy, Sofiia Alekseevna, Peter the Great's elder sister. Primary sources include saint's lives, foreign travellers' accounts, law codes, and pictorial sources.
2 units, Win (Kollmann) T 1:15

100D. Peters Seminars: The Life and Thought of Martin Luther King, Jr. — The relationship of King's evolving religious and political thinking with his leadership of the black freedom movement, focusing on the last five years of his life (1963-1968). Theme: how King's spirituality shaped his moral, intellectual, and political leadership.
2 units, Win (Burns) T 3-5
THE ANCIENT WORLD

See Classics, Ancient History section, for descriptions of the following, all of which are accepted for credit toward a major in History.

101. Society and Politics in Ancient Greece: Greek History I—From Homer to the Macedonian Take-Over (8th-4th Century B.C.)—(Enroll in Classics 101.)
4-5 units, Aut (Johnstone)

102. Citizens of the Republic: Roman History I (510-44 B.C. with emphasis on 133-44)—(Enroll in Classics 102.)
4-5 units, Win (Staff)

103. Peace and a Prince: Roman History II (44 B.C.-A.D. 235 with emphasis on 27 B.C.-A.D. 180)—(Enroll in Classics 103.)
4-5 units, Spr (Bradley)

106A. Athenian Social History—(Enroll in Classics 120.) Its economy, organization of space, agriculture and food supply, society and social structure, slavery, class and culture, gender and sexuality, family, civic ideology and ritual, and religion.
4-5 units, Aut (Johnstone)

MEDIEVAL AND RENAISSANCE EUROPE

105A. Introduction to Medieval Culture—(Enroll in English 165A, Medieval Studies 165.) Introduction to the development of medieval culture through study of religious, philosophical, literary, artistic, social, and political sources, emphasizing interrelationships among them. Lectures by faculty from various departments. DR:7(2) or DR:8(3)
5 units, Spr (G. Brown, Staff) MTWTh 9

106A. Athenian Social History—(Enroll in Classics 120.) Its economy, organization of space, agriculture and food supply, society and social structure, slavery, class and culture, gender and sexuality, family, civic ideology and ritual, and religion.
4-5 units, Aut (Johnstone)

MEDIEVAL AND RENAISSANCE EUROPE

105A. Introduction to Medieval Culture—(Enroll in English 165A, Medieval Studies 165.) Introduction to the development of medieval culture through study of religious, philosophical, literary, artistic, social, and political sources, emphasizing interrelationships among them. Lectures by faculty from various departments. DR:7(2) or DR:8(3)
5 units, Spr (G. Brown, Staff) MTWTh 9

HISTORY OF TECHNOLOGY

104. Historical and Ethical Issues in Population Studies—(Same as Ethics in Society 85.) American society has been torn by “culture wars” over the social regulation of pregnancy, migration, health, and death. Abstract ethical considerations and moral history are combined to evaluate the probable impact of different social choices on individual rights and human welfare in real world situations where resources are limited. Readings cover moral history and applied ethics. Students meet three times in small groups to explore the possibility that controversial moral issues can be resolved through negotiation, based on mutual understanding and a commitment to non-violence.
4-5 units, Spr (Johnansson) MWF 9

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 Th 1:15-3:05 for 5 units

EASTERN EUROPE AND RUSSIA

119. Aristocracies and Absolutism: Early Modern Eastern Europe, 1300-1800 —Societies and culture of E. Europe (Belorussia, Boemia, 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 is contrasted to the Russian historical experience. DR:9(5)
5 units, Spr (Kollmann) MTWTh 10

120C. 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.
5 units, Win (Emmons) TTh 1:15-2:45

121. Russian Jewish History, 1772-1917 —Survey of 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 on regional differences and their impact on the character of Jewish life in the areas of Belorussia, Lithuania, Ukraine, etc.
5 units, Aut (Zipperstein) TTh 11-12:15

122B. Soviet Foreign Policy since 1917 —Foreign and domestic determinants of policy; intentions and capabilities; continuity and change since 1917; institutions and personnel; war and peace; perceptions, priorities and attitudes; alternative futures.
5 units, Aut (Haslam) MTWTh 9

123A. Soviet History and Politics 1917-1993 (“From Coup to Coup”)—(Same as Political Science 119A.) Survey of major trends and events in the Soviet Union since the Revolution. Political leadership, social change, and problems of change. Alternative approaches and interpretations. DR:9(5)
5 units, Spr (Dallin) MTWTh 11

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 10

MEDIEVAL AND RENAISSANCE EUROPE

109. The Renaissance
5 units, Win (J. Brown) 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

132B. Modern France from the Enlightenment — DR:9(5)

5 units, Spr (Jones) MTWTh 10

136. Women, Gender and Jewish Modernity — Beginning with the construction of gender in traditional Jewish culture, examines how gender shaped the experience of women in modern Jewish society in Europe. Studies women’s work and changing economic functions; traditionalism, acculturation, and assimilation; marriage and fertility patterns; adoption of bourgeois notions of family and motherhood; organized feminism; radicalism and specific fate in the Holocaust. DR:+

5 units, Win (Magnus) MW 10-12

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) given 1994-95

133B. Undergraduate Colloquium: The Sociology of Scientific Knowledge — (Same as Anthropology 158; History and Philosophy of Science 155; Science, Technology, and Society 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) given 1994-95

133D. Origins of Life — (Same as History and Philosophy of Science 156, Philosophy 150.)

4 units (Lenoir) given 1994-95

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. Explores the
relevance of these historical studies by examining industrialization in Third World nations.

5 units, Aut (Hecht) TTh 11-12:30

135A. The Nuclear Age— (Same as History and Philosophy of Science 142; Science, Technology, and Society 163.) 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, Spr (Staff) MTWTh 10

135B. Revolutionary England, 1603-1689—DR:9(5)

5 units (Seaver) not given 1993-94

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 conservativism of the Elizabethan regime. DR:9(5)

5 units, Win (Seaver) MTWTh 11

142. Revolutionary England, 1603-1689—DR:9(5)

5 units (Seaver) not given 1993-94

143. White, Male, and Middle Class: Creating and Contesting Identities and Authorities in 19th-Century Britain — Provides a traditional outline of political and social history from the 1780s to 1880s, focusing on the construction of cultural and constitutional identities. The social lives of the traditionally marginalized in Britain (women, the Irish, the colonized, and the poor), how inclusion and exclusion came about, and how categories of difference (race, gender, and class) play a central role in “traditional” politics and authority. Reading includes several novels and historical documents discussed in weekly sections.

5 units, Spr (Cody) MTWTh 10

145. 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. Reference to the effect of the Empire on British society before and after decolonization. DR:9(5)

5 units, Spr (Staff) MTWTh 11

AFRICA

147C. Introduction to the Social History of South Africa — Social themes in the making of modern S. Africa, emphasizing oral history, personal testimony, and gendered experience. Khoisan and Cape society, Xhosa and European interactions in the Eastern Cape, transformations in the Zulu kongdon, the creation of an Afrikaaner identity, social and cultural life on the Rand mines, transformations in African agriculture, themes of rural and urban re-
sistance, the social and health impact of apartheid, popular culture and popular struggle since the 1960s.

5 units, Aut (Larson) MTWTh 9

148. Introduction to African History — African history from ancient Africa to the 1990s, from ancient societies, e.g., Egypt, to the democracy movement. What is history in Africa and how Africans see their past.

5 units, Win (Jackson) MTWTh 9

148C. Introduction to Modern African History — Central themes in the history of Africa, emphasizing social transformations in the 19th and 20th centuries. The slave trade and its impact on the Africans and African societies, international commodity trade and socioeconomic transformations, European imperialism, the scramble for Africa, colonial administrative and economic systems, patterns of African resistance, nationalism, and independence. DR:2(*)

5 units, Win (Larson) MTWTh 11

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 1993-94

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, Spr (Jackson) MTWTh 9

THE UNITED STATES

152. Introduction to Material Culture — (Same as American Studies 152; Science, Technology, and Society 124.) 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, Dornbusch, Drekmeier, Holloway, Moses, Noddings, Ross) MTW 1:15 and by arrangement

157. Afro-American History — DR:3

5 units (Carson) not given 1993-94

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, Aut (Tyack) TTh 11 and by arrangement

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 and by arrangement

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 (Chang) not given 1993-94

163A. The Transformation of American Thought and Culture, 1865 to the Present — (Same as American Studies 151.) DR:†

5 units (Gillam) not given 1993-94

164. Introduction to Race and Ethnicity in the American Experience — (Same as American Studies 164, Chicano Studies 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 developments during the past two centuries. DR:3

5 units, Spr (Camarillo, Fredrickson) MTWThF 11

165A,B,C. United States History from the Revolution to the Present — General sequence emphasizing political, social, and institutional history. Series gives 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 political and social history of the Revolutionary era (1993-94), or on the development of American society prior to the revolution.

5 units, Aut (Rakove) MTWThF 11

165B. 19th-Century America — DR:3

5 units, Win (Tobin) MTWTh 11

165C. 20th-Century America — DR:3

5 units, Spr (Kennedy) MTWTh 10

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 (Freedman) not given 1993-94

173C. Introduction to Feminist Studies — (Same as Feminist Studies 101.) 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, Win (Freedman) MWTh 11-12:15

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, Aut (Bowser) MTWTh 10

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 1993-94

180. 20th-Century Brazil — 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 (Beinin) not given 1993-94


5 units, Win (Mancall) MTWTh 9

187B. Middle East in the 20th-Century — Survey of 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 (Beinin) not given 1993-94

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 9(5∗)

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

Th 7-10 p.m.

188A, B, C. Jewish History from the Biblical Period to the Present — Designed as a sequence, but may be taken independently. (188A is in departmental fields I and IV, 188B in III and IV, 188C in III.)

188A. Jewish History from the Biblical Period to the Arab Conquest — Social, political, institutional, economic, and cultural history of the Jews from earliest times to the Arab conquest of Palestine in the middle of the 7th cen-
tury: the construction of a history of origins, the conquest and settlement of Canaan, the period of the Judges, the First and Second Common-wealths, the Jews in the Hellenistic and Roman periods, the Babylonian Exile, and Jewish society in Palestine in the first half-millennium after the destruction of Second Temple.

5 units (Mancall) given 1994-95

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.

5 units (Magnus) given 1994-95

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.

5 units (Rodrigue) given 1994-95

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 units, Aut (Mancall) MTWTh 9

EAST ASIA

192A. Chinese History from the Earliest Times to the Mongols — (Same as Asian Languages 156.) DR:2(*)

5 units, Aut (Neskar) MTWTh 11

192B. Chinese History from the Ming to the Great Modern Rebellions: 14th-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 units, Win (Kahn) MTWThF 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 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 units, Spr (Van Slyke) MTWThF 11

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 units, Aut (Mass) MTWTh 9

194B. Late Medieval and Early Modern Japan 1500-1840 — 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 units, Win (Ketelaar) MTWThF 10

194C. 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 units, Spr (Duus) MTWTh 1:15

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 — (Same as 202/302A.)
3 units, Spr (Emmons) W 2:15-4:05

200W. Undergraduate Directed Reading
units by arrangement (Staff)

200X. Undergraduate Directed Research
units by arrangement (Staff)
Directed Research: Martin Luther King, Jr. Papers Project — (Register under 200X-65.)
T 4-5

202. Undergraduate Colloquium: Introduction to Problems of Historical Interpretation and Explanation — (Same as 200H/302A.)
5 units, Spr (Emmons) W 2:15-4:05

205A. Undergraduate Colloquium: Private Lives: Public Stories — Autobiographies and othersources. The changing contexts of women's lives and the way women's actions have shaped and responded to those contexts. DR:9t(5)
5 units, Spr (Lougee, Johansson) T 2:15-4:05

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, Spr (Buc) T 2:15-4:05

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:9t(5)
5 units, Spr (J. Brown, Magnus, Freedman) MW 2:15-3:30

208. Undergraduate Colloquium: Disease and Society from the Black Death to AIDS
5 units, Win (Jones) W 2:15-4:05

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, Win (Buc) T 2:15-4:05

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 precesses related with one another and with social changes? Aims at analytically straddling the realm between bodification of spiritual powers and control (or manipulation) of the body in society, from the cult of relics to asceticism.
5 units, Win (Buc) not given 1993-94

219. Undergraduate Colloquium: Major Problems in Soviet History and Politics — (Same as Political Science 226C.) Critical reading of diverse interpretations of the October Revolution of 1917, Stalinism, and the Gorbachev reforms, and concepts such as political culture and civil society applied to the Soviet Union. Prerequisite: prior course on the Soviet Union.
5 units, Win (Dallin) M 2:15-4:05

221S. Senior 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, Win (Naimark) W 2:15-4:05

223. Undergraduate Colloquium: Comparative Early Modern Nobilities: Russia, Poland, 19th and 20th Century — (Same as 323.)
5 units (Kollmann) not given 1993-94

224. 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, Spr (Naimark) T 2:15-4:05

225S. Senior Research Seminar: Law and Society in Early Modern Russia
5 units, Win (Kollmann) T 1:15-3:05

227. Undergraduate Colloquium: From Weimar to Wirtschaftswunder — German Women in the 20th-Century — Topics in the history of German women in this century, including politics, work, education, the family, and sexuality. Sources evaluated: histories, novels, memoirs, and films. Use and critique different categories of historical analysis.
233A. Undergraduate Colloquium: Modern German Jewry — The rise of this community from poverty to middle class respectability, its efforts to win civic equality and social acceptance, its intellectual and religious creativity from the mid-17th century through the Weimar Republic. Topics: court Jews, the Reform movement, neo-orthodoxy, "salon Jewesses" and the more typical German Jewish bourgeoisie, attitudes to East European Jews, responses to antisemitism. DR:9(5)

5 units, Spr (Magnus) W 10-11:50

243A. Undergraduate Colloquium: Modern Britain — The Politics and Culture of Growth — Sources for England from 16th-century Protestant Reformation to the civil wars and revolution in the mid-17th century are unusually rich. Introduces types of records, from private diaries and letters to the official proclamations and state papers; defines question that shapes the investigation, and critiques a draft of the research paper.

5 units (Seaver) not given 1993-94

243B. Undergraduate Colloquium: East Africa in Transition - 1880s-1920s

243B. Undergraduate Colloquium: Mau-Mau Uprising - Kenya in 1950s

5 units, Aut (Jackson) T 2:15-4:05

243S. Senior 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. Introduces types of records, from private diaries and letters to the official proclamations and state papers; defines question that shapes the investigation, and critiques a draft of the research paper.

5 units (Seaver) not given 1993-94

243S. Senior Research Seminar: 20th-Century Britain — Students write a paper on an aspect of modern Britain on the basis of original material from the Hoover Institution. Introduces the student to the joys and tribulations of original research.

5 units (Stansky) not given 1993-94

244. Senior Research Seminar: A Culture of Reason and Sensibility — Society, Sciences, and the Sexes in 18th-Century Britain — The intersections of culture, knowledge, politics, and/or gender in Enlightenment Britain. Students excavate and analyze one of several preselected curiosities, causes celebres, or historical artifacts in an extensive research project. Class meetings center on general background and theoretical reading and basic research techniques; students present their work in progress. Possible research topics: medical quackery and fraud, mesmerism, the notorious "Cock Lane Ghost," various "cross-dressers," a Hogarth print, Jacobite uprisings, John Wilkes' campaign for election, the British response to the French Revolution, the Gordon Riots, Lady Montague's travel accounts, Bluestocking, and feminist writings. (Students with an interest in Enlightenment and Revolutionary France can be accommodated with prior arrangement.)

5 units, Win (Cody) W 2:15-4:05

244A. Undergraduate Colloquium: African History and African Novel

5 units (Jackson) not given 1993-94


3-5 units (R. Roberts) not given 1993-94

245A. 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 1993-94

246B. Undergraduate Colloquium: Mau-Mau Uprising — Kenya in 1950s

5 units, Aut (Jackson) T 2:15-4:05

246S. Senior Research Seminar: East Africa in Transition - 1880s-1920s

5 units (Jackson) not given 1993-94

247A. Undergraduate Colloquium: 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 (Seaver) not given 1993-94
247S. Senior Research Seminar: Fieldwork in Africa—Oral History, Life, and Family History—(Same as 447A.) Oral histories in Africa and how they can be assembled in field research, with emphasis on women's history.
5 units, Win (Jackson) W 2:15-4:05

248A. Undergraduate Colloquium: Slavery in Comparative World Perspective—(Same as 348A.) Explorations in slavery worldwide, the problem of defining slavery, the characteristics of slave societies, the variety of slave settings, slavery in ancient societies, debates on slavery and capitalism, varieties of master-slave relationships, women and slavery in diverse societies, variations in the development of slave subcultures, varieties of resistance and revolt, the several paths in the transformation from slave to free labor. Emphasis on Africa and the Americas.
5 units, Spr (Larson) T 2:15-4:05

249C. Undergraduate Colloquium: Ethnicity in African History—Theories of ethnicity, their use and abuse by Africanist scholars, studies of ethnicity and pre-colonial economic transformations, early state building, slavery and the slave trade, literacy, education and missions, the controversy over the “creation” of tribalism, anthropology and African ethnicity, ethnicity and political mythologies, ethnicity and gender. The elaboration, transformation, and “death” of ethnic identities as an ongoing process influenced by local and international historical forces which vary geographically and temporally.
5 units, Win (Larson) T 2:15-4:05

250A. Undergraduate Colloquium: The Constitution in American Politics—Topics in the constitutional history of the U.S., emphasizing the relation between political controversies and the development and articulation of constitutional norms.
5 units, (Rakove) not given 1993-94

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/classroom discussions. Must interview with the professor before enrolling.
5 units, Win (Camarillo) TTh 2:15-4:05

252S. Senior 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, Aut (J. Corn) W 1:15-3:05
field trip Th 1-5:30

253S. Senior Research Seminar: Museum Practicum—Supervised curatorial work on exhibition at local museum. Prerequisites: 252S or equivalent, and consent of instructor.
1-3 units, Win (J. Corn) by arrangement

258. Undergraduate Colloquium: Modern America in Historical Perspective—The historical background, present character, and public implications 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 1993-94

260A. Undergraduate Colloquium: The American Character—(Same as American Studies 200.) DR:3
5 units, Aut (J. Corn) T 3:15-5:30
Spr (Gillam)

261. Undergraduate Colloquium: Nuclear History and Theory—(Same as Political Science 246.) Case studies involving nuclear weapons and related international relations theory.
5 units, Spr (Bernstein, Holloway) Th 2:15-5

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 1993-94

265S. Senior Research Seminar: Asian-American History—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 1993-94

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 (Sawislak) not given 1993-94
267S. Senior 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 1993-94

268S. Senior 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, Spr (Rakove) T 2:15-4:05

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 2:15-4:05

267S. Senior Research Seminar: NAFTA and Beyond — (Stanford in Washington)
5 units, Aut (Wirth)

277A. Undergraduate Colloquium: Ethnicity, Class, Identity in Latin America
5 units (Bowser) given 1994-95

277S. Senior Research Seminar: Ethnicity, Class, Identity in Latin America
5 units (Bowser) given 1994-95

277B. Undergraduate Colloquium: The Western Spanish Borderlands — Texas, New Mexico, Arizona, and California owe much of their present character to their Spanish past. Spain’s presence until Mexican independence in 1821 continues to have enormous influence. Focus is on the social environment of the western Spanish frontier and the cultures of the invaders and the invaded. As native peoples and Spaniards competed for access to power and resources, both cultures were transformed. This transformation provides a key to understanding the contemporary region.
5 units, Spr (Campbell) W 2:15-4:05

278. Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America — The methods and approaches of economic history. Emphasis is on the critical analysis of scholarly studies of issues in Latin American economic growth that have been 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, Spr (Haber) Th 3:15-5:05

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 (Haber) not given 1993-94

284A. Undergraduate Colloquium: European Encounters with India in the Early Modern Period — India’s exotic otherness has fascinated the West since Antiquity, and direct contact from 1500 stimulated this interest. Concentrates on influential early modern European reports (1500-1750) so as to comprehend an intercultural constellation in its historical context and cognitive implications, providing a paradigm for the study of the Western encounter with the non-European world.
5 units, Spr (DHarampul-Frick) Th 2:15-4:05

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 (Beinin) not given 1993-94

287A. Undergraduate Colloquium: Modern Jewish Identity — Why and how modern Jews redefined Jewish identity after the demise of the traditional Jewish community that made affiliation optional and identity open to a range of interpretations. Pressures to renounce Jewish identity; conscious and unconscious forces for remaining Jewish; ambivalence; “self-hate;” religious and secular Jewishness; national consciousness. The lives of some individuals; the social formation of identity and problematic of gender in modern Jewish identity. DR:9f(5)
5 units, Win (Magnus) W 2:15-4:05

287S. Senior 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, Aut (Beinin) T 2:15-4:05

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 2:15-4:05

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 governance and the economy of the Ottoman Levant. Onset of weakness and decline after the 17th century. European imperialism in the Middle East. Ottoman westernizing reforms in the 19th century. Rise of nationalism. The Balkan Wars, WWI, and the collapse of the Ottoman Empire.
5 units (Rodrigue) not given 1993-94

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 1993-94

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 1993-94

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, Aut (Duus) T 1:15-3:05

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 1993-94

5 units, Win (Duus) T 2:15-4:05

292S. Senior Research Seminar: China in the Western Imagination, 16-20th 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 research project which explores subject (the viewer) and object (the viewed) in the early modern history of China.
5 units, Aut (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 1993-94

295A. Undergraduate Colloquium: The Korean War—Watershed in Asia
5 units, Aut (Van Slyke) T 1:15-3:05

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, Win (Kahn) W 1:15-3:05

297. Undergraduate Colloquium: History of the Chinese Family
5 units, Win (Neskar) T 2:15-4:05

299. Undergraduate Colloquium: The Institutions of Medieval Japan
5 units (Mass) not given 1993-94

GRADUATE

300W. Graduate Directed Reading
units by arrangement (Staff)
302A. Graduate Colloquium: Introduction to Problems of Historical Interpretation and Explanation  
4-5 units, Spr (Emmons) W 2:15-4:05

303C. 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, Aut (Haber) Th 3:15-5:05

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 3:15-5:05

305. Graduate Colloquium: Graduate Workshop in Teaching — Introduction to teaching, lecturing, and curriculum development.  
1-2 units (R. Roberts) not given 1993-94

307. Graduate Core Colloquium in Medieval History  
4-5 units, Aut (Buc) F 1:15-3:05

309. Graduate Colloquium: The Renaissance  
4-5 units, Win (J. Brown) Th 2:15-4:05

310A. Graduate Colloquium: The Language of Politics in the Middle Ages  
4-5 units, Win (Buc) T 2:15-3:05

311. Graduate Colloquium: Body, Gender, and Society in the Middle Ages  
4-5 units (Buc) not given 1993-94

319A. Graduate Colloquium: Major Problems in Soviet History and Politics  
4-5 units, Win (Dallin) M 2:15-4:05

320A. Graduate Colloquium: Topics in Early Modern Russian History  
4-5 units, Aut (Kollmann) M 1:15-3:05

324. Graduate Colloquium: Stalinism in Eastern Europe  
4-5 units, Spr (Naimark) T 2:15-4:05

331B. Graduate Core Colloquium: Europe in the 17th and 18th Century  
4-5 units, Spr (Lougee) W 2:15-4:05

331C. Graduate Core Colloquium on Modern Europe  
4-5 units, Aut (Robinson) W 2:15-4:05

331D. Graduate Core Colloquium on Modern Europe  
4-5 units (Sheehan) not given 1993-94

331E. Graduate Core Colloquium on Modern Europe  
4-5 units (Sheehan) not given 1993-94

331F. Graduate Core Colloquium on Modern Europe  
4-5 units, Win (M. L. Roberts) W 2:15-4:05

334. Graduate Colloquium: 18th-Century European History  
5 units, Aut (Jones) T 1:15-3:05

336A. Graduate Colloquium: Technology, Work, Culture, since the Industrial Revolution — (Same as History and Philosophy of Science 243.) 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, Win (Hecht) W 2:15-4:05

341A. Graduate Colloquium: Topics in the History of Early Modern England  
4-5 units (Seaver) not given 1993-94

342. Graduate Colloquium: Topics in the Social and Cultural History of Early and Modern England  
4-5 units, Spr (Seaver) T 2:15-4:05

344A. Graduate Colloquium: Problems in Modern British Society  
4-5 units, Aut (Stansky) T 2:15-4:05

346A. Graduate Colloquium: African History and African Novel  
4-5 units (Jackson) not given 1993-94

347B. Graduate Core Colloquium in African History — The Colonial Period  
4-5 units, Spr (R. Roberts) Th 2:15-4:05

348A. Graduate Colloquium: Comparative Slavery and America  
4-5 units, Spr (Larson) Th 2:15-4:05

349. Graduate Core Colloquium: Precolonial Africa  
4-5 units (R. Roberts) not given 1993-94

349B. Graduate Colloquium: African Social History Workshop  
1 unit (R. Roberts) not given 1993-94

349C. Graduate Colloquium: Ethnicity in African History  
4-5 units, Win (Larson) T 2:15-4:05
351A, B, C, D, E, F. Graduate Core Colloquium in American History  
30 units

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<td>Graduate Core Colloquium in American History — Part VI</td>
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352. Graduate Colloquium: Decision-Making in International Crisis  
4-5 units, Win (Bernstein) T 2:30-5

361. Graduate Colloquium: Nuclear History and Theory — (Same as 261.)  
4-5 units, Spr (Bernstein, Holloway) Th 2:15-5

376. Graduate Colloquium: The Creation of North America  
4-5 units, Spr (Wirth) T 2:15-4:05

377. Core Colloquium: Regionalism in America  
4-5 units, Win (Wirth) T 3:15-5:05

384. Graduate Core Colloquium in Jewish History  
4-5 units, Aut (Rodrigue, Zipperstein) W 1:15-3:05

386. Graduate Colloquium: Economic and Social History of the Modern Middle East  
4-5 units (Beinin) not given 1993-94

388. Graduate Colloquium: Palestine and the Arab-Israeli Conflict  
4-5 units, Aut (Beinin) W 2:15-4:05

390. Graduate Colloquium: United States and Japan  
4-5 units (Duus) not given 1993-94

390A. Graduate Colloquium: Topics in Late Traditional Chinese History  
4-5 units, Aut (Kahn) T 1:15-3:05

390B. Graduate Colloquium: Topics in Late Traditional and Modern Chinese History  
4-5 units, Win (Van Slyke) T 2:15-4:05

390C. Graduate Colloquium: Topics in Late Traditional and Modern Chinese History  
4-5 units, Spr (Van Slyke) Th 2:15-4:05

391A. Graduate Colloquium: Industrialization in Modern Japan  
4-5 units, Aut (Duus) T 2:15-4:05

392. Graduate Colloquium: Postwar Japan  
4-5 units (Duus) not given 1993-94

393. Graduate Colloquium: Topics in the Middle Period of Chinese History  
4-5 units, Win (Neskar) Th 3:15-5:05

395A. Graduate Colloquium: Early and Medieval Japan  
4-5 units, Aut (Mass) W 2:15-4:05

395B. 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) Th 1:15-4:05

395C. Graduate Colloquium: Modern Japan  
4-5 units, Spr (Duus) Th 2:15-4:05

399. Graduate Colloquium: The Institutions of Medieval Japan  
4-5 units, Win (Mass) W 2:15-4:05

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.

400X. Graduate Research  
units by arrangement (Staff)

402. Graduate Colloquium: Fieldwork Methods in African History  
4-5 units (Jackson) not given 1993-94

406. Graduate Seminar: Medieval History  
4-5 units, Spr (Buc) by arrangement

409. Graduate Seminar: Medieval History  
4-5 units, Spr (Buc) by arrangement

420B. Graduate Seminar: Topics in Modern Russian History  
4-5 units, Spr (Emmons) by arrangement

421A. Graduate Seminar: Topics in Russian History  
4-5 units (Emmons) not given 1993-94

430A. Graduate Seminar: French Political Culture, 1700-1850  
4-5 units (Baker) not given 1993-94

430B. Graduate Seminar: French Political Culture, 1700-1850  
4-5 units (Baker) not given 1993-94

432. Graduate Seminar: 18th-Century France and England  
8-10 units, Aut, Win (Jones) Th 1:15-3:05
433. Graduate Seminar: Modern Eastern Europe 4-5 units, Spr (Naimark) Th 2:15-4:05
433A. Graduate Seminar: European History 8-10 units, Win, Spr (Sheehan) by arrangement
435. Graduate Seminar: Research Seminar in European History 4-5 units (M. L. Roberts) not given 1993-94
437. Graduate Seminar: Modern European Cultural and Intellectual History 8-10 units, Win, Spr (Robinson) T 1:15-3:05
442. Graduate Seminar: Early Modern England 4-5 units, Win (Seaver) Th 2:15-4:05
445. Graduate Seminar: Research — Modern Britain 4-5 units, Aut (Stansky) W 2:15-4:05
447. Graduate Seminar: Modern European Cultural and Intellectual History 4-5 units, Win, Spr (Robinson) T 1:15-3:05
449. Graduate Seminar: Modern Chinese History 4-5 units (Van Slyke) not given 1993-94
451. Graduate Seminar: 20th-century America 4-5 units (Bernstein) not given 1993-94
452. Graduate Seminar: United States Social History 4-5 units (Sawislak) not given 1993-94
454. Graduate Seminar: Culture and Ideology in 19th-Century America 4-5 units, Spr (Fredrickson) Th 2:15-4:05
456A. Graduate Seminar: United States in the 20th Century 4-5 units (Kennedy) not given 1993-94
456B. Graduate Seminar: United States in the 20th Century 4-5 units (Kennedy) not given 1993-94
468. Graduate Seminar: American Politics and Political Ideas, 1760-1870 4-5 units (Rakove) not given 1993-94
472. Graduate Seminar: Women’s Family and Sexual History 4-5 units (Wirth) not given 1993-94
473. Graduate Seminar: Women’s Family and Sexual History 4-5 units (Wirth) not given 1993-94
476. Graduate Seminar on Brazil 4-5 units (Wirth) not given 1993-94
478. Graduate Seminar: Economic and Social History of Latin America — Open to non-Latin Americanists who are working on research projects that utilize quantitative data. Acquaints students with social science approaches to Latin American history. 4-5 units, Win (Haber) Th 3:15-5:05
485. Graduate Research Seminar in Modern Jewish History 8-10 units, Win, Spr (Rodrigue) W 1:15-3:05
487. Graduate Seminar: Topics in the Modern History of Egypt and Palestine 4-5 units, Aut (Beinin) T 2:15-4:05
490A. Graduate Seminar: Modern China 4-5 units (Van Slyke) not given 1993-94
490B. Graduate Seminar: Research in Modern and Contemporary China 4-5 units (Van Slyke) not given 1993-94
493A. Graduate Seminar: Late Traditional Chinese History 4-5 units (Kahn) not given 1993-94
493B. Graduate Seminar: Late Traditional Chinese History 4-5 units (Kahn) not given 1993-94
498. Graduate Seminar: Modern China 4-5 units (Van Slyke) not given 1993-94
498A. Graduate Seminar: Modern China 4-5 units (Van Slyke) not given 1993-94
226V. The City, 1150-1870: The Nucleus of Bourgeois Culture — DR:9(5) 4 units, Aut (Neckenig)
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)
The Program in History and Philosophy of Science is an interdisciplinary, non-degree program which focuses upon historical and contemporary aspects of science. At its colloquia, speakers from history of science and technology, history, philosophy, medicine, and the sciences address current problems in this 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. Alternatively, an adviser from the History of Science Committee can help students design a History of Science 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 of science with majors in history or philosophy 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(3) 5 units, Win (Godfrey-Smith) MWF 1:15

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 on technologies of production and consumption (armory practice, department stores); of temporal and spatial transformation (telegraphic time signals, railroad simulation and reproduction (photography, photograph), and communication and control (telephony, scientific management). 4-5 units, Win (J. Corn) TTh 10

122. Technology and Culture in 20th-Century America and Europe — (Same as History 234; Science, Technology, and Society 122.) Colloquia on the history of 20th-century western technological 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, Spr (Hecht) W 2:15-4:05

123. Women and Technology, Women in Technology—(Same as Feminist Studies 147B; Science, Technology, and Society 145.) Undergraduate 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.) Intermediate-level treatment of topics such as explanation, confirmation, and induction; theory change; realism; reductionism and the unity of science(s).

4 units, Win (Dupré) Th 1:15-2:30

125. Philosophy of Physics—(Enroll in Philosophy 165.) Methodological and philosophical issues in modern physics.

4 units, Spr (Guttmann) T 1:15-5:05

126/226. Topics in the Philosophy of Physics: Philosophy of Space and Time—(Same as Philosophy 166/266; graduate students register for 266.) The nature of space and time—how 17th-century disputes are altered in the context of 20th-century physics. Topics: the connection between matter and space; substantival and relational theories of space, time, and spacetime; and the “direction” of time.

3 units, Win (Nelson)

127. Philosophy of Biology—(Enroll in Philosophy 167.) Explanation and theory construction in evolutionary biology.

4 units, Aut (Godfrey-Smith) Th 11-12:15

128. Visions of Science: Competing Views of Knowledge in Early Modern Europe—“Modern Science” is the product of intense debates on the proper way to true knowledge, a crucial part of which took place during the 16th and 17th centuries. Seminar explores various competing views from mysticism to empiricism and mathematical determinism. How did the various approaches contribute to the emerging notion of science? Readings from Bacon, Bruno, Dee, Descartes, Newton, and others.

4 units, Spr (Alexander)

129. Pragmatism—(Enroll in Philosophy 129.) Peirce, James, and Dewey on truth, belief, and knowledge.

4 units, Win (Godfrey-Smith) TTh 3:15-4:30


138A. Ancient Period—DR:8(3); satisfies Area 4(6) when taken with 138B or 138C.

4 units, Aut (Knorr) MWF 2:15

138B. Science and Technology in the Scientific Revolution—DR:8(3); satisfies Area 4(6) when taken with 138A.

4 units, Win (Knorr) MWF 2:15

138C. Modern Period: Newton to Einstein—DR:8(3); satisfies Area 4(6) when taken with 138A.

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 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.) Examines the technological changes that constituted the Industrial Revolution in Europe and America within the context of social, political, economic, and cultural developments. Explores the contemporary relevance of these historical studies by examining industrialization in Third World nations.

5 units, Aut (Hecht) TTh 11-12:30

142. The Nuclear Age—(Same as History 135A; Science, Technology, and Society 163.) The historical implications of nuclear technology for post-WWII society, focusing on the relationships between nuclear technological development and political, economic, and cultural change. Topics: the 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, with some material on Asia, the Middle East, and S. America.

5 units, Spr (Hecht) TTh 11-12:30

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, Win (Nelson)

148. From Gutenberg to Volkswagen: Technology and Culture in Germany — (Same as Science, Technology, and Society 146.) Surveys the interaction of material life, technology, and culture in Germany, beginning with the emergence of print culture. Developments since 1850 emphasized. Topics: the Industrial Revolution, mechanization, urban development, new means of transportation and communication, “Americanization,” technological heroes and crazes, the symbology of progress, and anti-technological 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.) 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, semiconductors, and computers; economics of skills; university-industry relations; political dissent and the counterculture; 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 (Lecuyer, Lenoir, Lowood)

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, Aut (Lenoir) MW 11-12:15

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) given 1994-95

155/255. The Sociology of Scientific Knowledge — (Graduate students register for 255; same as Anthropology 158; History 133B; Science, Technology, and Society 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) given 1994-95

156. Origins of Life — (Same as History 133D, Philosophy 150.) 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 main 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 (Lenoir) given 1994-95

160. Gender and Science — (Same as Anthropology 160; Feminist Studies 147A; Science, Technology, and Society 144.) 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 vs. de-gendered science.

5 units, Spr (Fujimura)
161. Undergraduate Colloquium: Nuclear Weapons and International Relations — Theories and History — (Enroll in History 261/361.)
5 units, Spr (Bernstein, Halloway) Th 2-4:30

168. History of Physics — (Same as History 139A; Philosophy 168; Science, Technology, and Society 126.) 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 (Dresden) MTWTh JO

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 (Dresden) given 1994-95

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 and explores recent approaches to the social production of scientific knowledge. Developments in the sociological and cultural study of science, including considerations 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, Win (Fujimura)

238. 20th-Century United States — (Enroll in History 451.) Graduate research seminar in the institutional and political history of the U.S. in the 20th century. Topics in contemporary American science and technology.
5 units (Bernstein) not given 1993-94

243. Technology, Work, and Culture since the Industrial Revolution — (Same as History 336A; Science, Technology, and Society 243.) Graduate colloquium examines 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.
5 units, Win (Hecht) W 2:15-4:05

253. Science and Representation in the 18th Century — (Same as Comparative Literature 309A, English 309A.) Graduate colloquium on science and its practices as resources for cultural production and, conversely, of cultural manifestations (e.g., theater, narrative, reportage, graphic projection, painting) as resources for the construction of scientific argumentation.
5 units, Win (Bender, Lenoir) M 7-10 p.m.

255. The Sociology of Scientific Knowledge — (For graduate students; same as 155.)
4 units (Lenoir) given 1994-95

261. Graduate Colloquium: Nuclear Weapons and International Relations — Theories and History — (Enroll in History 361.)
5 units, Spr (Bernstein, Halloway) Th 2:45-4:30

270. The Anthropology of Speed — (Same as Comparative Literature 370, English 368, French and Italian 370E.) Envisaged as a dialogue between the history of technology and cultural history (art, music, literature, film), seminar examines the formative impact of themes of speed, acceleration, intensification, and novelty on modern/postmodern ideas of experience, rhythm, power, and production. Topics: exercise and hygiene from the fin de siecle to the present; scientific management and the world of work; bodies and machines; cognitive and perceptual ramifications of aviation, mechanized ground transportation, film, and video; mass media, mass culture, and the ethos of acceleration. Authors: Baudrillard, Debord, Marinetti, Virilio.
5 units, Spr (Schnapp)

273. Topics in Philosophy of Economics — (Enroll in Philosophy 273.)
4 units (Dupré) not given 1993-94

299. Graduate Individual Work
1-5 units (Staff)

PROGRAM IN HUMAN BIOLOGY

Emeriti: (Professor) Albert H. Hastorf (Psychology)
Chair: William H. Durham
Professors: Brian Arthur (Food Research Institute), J. Myron Atkin (Education), Clifford Barnett (Anthropology), Roland Ciapponi (Psychiatry/Behavioral Science), William Dement (Psychiatry/Behavioral Science), Carl Djerassi (Chemistry), Sanford Dornbusch (Sociology),
William H. Durham (Anthropology), Russell Fernald (Psychology), H. Craig Heller (Biological Sciences), Herant Katchadourian (Psychiatry/Behavioral Sciences), Donald Kennedy (Biological Sciences), Richard Klein (Anthropology and Human Biology), Timothy Lenoir (History), Seymour Levine (Psychiatry), Michael Marmor (Ophthalmology), Frank Stockdale (Medicine/Oncology), Arthur B. Wolf (Anthropology)

Associate Professors: Christos Constantinou (Urology), Stephen P. Fortmann (Medicine and Stanford Center for Research in Disease Prevention), James Fox (Anthropology), Joan Fujimura (Anthropology), Iris Litt (Pediatrics), 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 (Consulting Assistant Professor, Human Biology), Gail Butterfield (Acting Assistant Professor, Human Biology), Susan Charnley (Teaching Fellow, Anthropology), Malcolm Cohen, Ruth Cronkite (Senior Lecturer, Sociology), Ben Crow (Acting Associate Professor, Human Biology), Anne Ehrlich (Center for Conservation Biology), S. Shirley Feldman (Director of Center for the Study of Family, Children and Youth), Dolores Gallagher-Thompson (Acting Associate Professor, Human Biology), Lori D. Hager (Acting Assistant Professor, Anthropology), William B. Hurlbut (Lecturer), Dominique Irvine (Acting Assistant Professor, Anthropology), Alan Launer (Research Associate, Conservation Biology), Sherri Matteo (Associate Director, Institute for Research on Women and Gender), Joseph Miller (Acting Assistant Professor, Human Biology), Ellen Porzig (Acting Associate Professor, Biological Sciences), Mark Rosekind (Acting Assistant Professor), Merritt Ruhlen, Robert Scott (Associate Director, Center for Advanced Study in the Behavioral Sciences), Marjorie Shuer (Acting Assistant Professor, Human Biology), Robert Siegel (Lecturer), Eduardo Viola (Visiting Professor, Latin American Studies), Gwendolynne Yeo

Student Advisers: Carol Cho, Melissa Freeberg, Heidi Hamann, Risa Hoffman, Tayler Long, Heather Marks, Kyle Shepperson

The Program in Human Biology is an interschool, 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 requires a minimum of 83 units in the major divided between four levels of courses:

1. Fundamental Program: at least 35 units, to include:
   - Human Biology Core 24
   - Statistics 3-5
   - Policy Course 3-5
   - Internship (197) 4

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.

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. All but one course in the concentration must be listed by, or cross-listed with, other University departments. Each

   a. Statistics may be selected from: Statistics 60, Psychology 60, or Biological Sciences 141.

   b. Courses which satisfy the policy requirement may be obtained from the program offices.

   c. The core, a policy course, and a statistics course must be taken at a grade by majors.

   d. 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.

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. All but one course in the concentration must be listed by, or cross-listed with, other University departments. Each
course must be taken for a minimum of 3 units. Final approval of the concentration rests with the student's faculty adviser. All area of concentration courses must be taken for a grade.

**Upper-Division Courses:** students must take three Human Biology upper-division courses. Students are expected to enroll in courses not directly related to the area of concentration. One upper-division course may be taken Satisfactory/No Credit. Each course must be taken for a minimum of 3 units. An upper-division course used to fulfill the program's policy course requirement may not be used in the student's foundation or area of concentration or as one of the three required upper-division courses.

A prospective major should consult with the 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 do 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 Mendelian genetics, evolutionary theory, and population biology. Topics: population 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, and contemporary diversity, emphasizing the concept of culture and its influence on human differences.

**2A. Genetics, Evolution, and Ecology — DR: 5(7)**

5 units, Aut (Boggs, Durham)

**2B. Culture, Evolution, and Society — DR: 9(4 or 5)**

5 units, Aut (Klein, Rick)

**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)**

**3A,B. Cell Biology and Developmental Biology:**

**The Human Life Cycle —**

3A: basic principles of biology of cells — biochemistry of energetics and metabolism, nature of membranes and organelles, hormone action, plant biochemistry and development, and immunology. Principles of human developmental biology. 3B: social and cognitive development focusing on adaptation and maladaptation during infancy, childhood, and adolescence. Career and marital choice in young adulthood, midlife, and aging.

**3A. Cell Biology and Developmental Biology — DR: 5(7)**

5 units, Win (Stockdale, Staff)

**3B. The Human Life Cycle — DR: 9(4 or 5)**

5 units, Win (Feldman, Katchadourian)

**3S. 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, Win (Hurlbut)**

**3X. Practicum in Young Child and Family Development — Practicum experience at Children's Health Council for 3.5 hours/week. Must be taken concurrently or subsequent to 3B. Enrollment limited to 35.**

1 unit, Win, Spr (Feldman, Rothenberg) by arrangement

**3Y. Practicum in Daycare and the Young Child — Practicum experience at Stanford Daycare Centers for 3.5 hours/week. Must be taken concurrently or subsequent to 3B. Enrollment limited to 35.**

1 unit, Win (Feldman, Sullivan)

**4A,B. The Human Organism: The Human Predicament —**

4A: organ system physiology, beginning with coverage of basic principles of neurobiology and endocrinology, and the functions of body
organs. The mechanisms of control, regulation, and integration of organ systems function. 4B: the relation of the biological sciences to public policy in: resource management and conservation practices, the regulation of environmental and health risks, agricultural production, the delivery of health services, the protection of biodiversity, and global climate change. Assigned policy challenges in lectures and section meetings. Reading on actual cases.

4A. The Human Organism — DR:5(7)
5 units, Spr (R. Fernand, Heller)

4B. The Human Predicament — DR:9(4 or 5)
5 units, Spr (Kennedy) MWF 10

4S. 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, Spr (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 NREM 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 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 or/behavioral aspects affecting the health of women.
1 unit, Aut, Win, Spr (Litt) T 4:15

60. Colloquium on Population Studies — (Same as Biology 183.) 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

PETERS SEMINARS
FOR SOPHOMORES

Enrollment limited. Applications required and available at 123 Sweet Hall.

96B. Contemporary Issues in Human Experimentation — Practical 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. Specific ethical/legal issues involving human subjects in terms of confidentiality, recruitment, and conflict of interest. Legislation addressing the issue of inadequate numbers of women and minorities in research projects. Emphasis 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, Aut (Constantinou)

96C. Adolescent Sexuality — The emergence of sexuality in the context of developmental tasks of adolescence and the changing social conditions. Topics: theoretical perspectives; methodological approaches and limitations to the study of sexuality; adolescent’s sexual behavior and beliefs; biological aspects and the role of hormones at puberty; social influences, particularly the influence of parents and peers; social (or gendered) constructions of sexuality and their relationship to sex-roles during adolescence; gay and lesbian adolescence; AIDS and sexually transmissible diseases; and teenage pregnancy and abortion.
3 units, Spr (Feldman)

96D. Through the Eyes of Scientists — Insight into the nature and practice of science by reading personal reflections of the scientific discovery process. The sociology and history of science, focusing on molecular biology. Texts by Nobel laureates Francis Crick, Arthur Kornberg, Maclyn McCarty, James Watson, and others. Discussion. Students interview one scientist of their choosing.
2 units, Spr (Siegel)

ADVANCED

Open to non-majors with the proper prerequisites. Human Biology majors have preference when enrollment is restricted.

102. Evolutionary Ecology — (Same as Biology 115.)
Basic concepts of evolutionary ecology, including population growth, foraging, reproductive
and life history strategies, predator/prey, and competitive and mutualistic interactions among species. Discussion sections apply concepts to contemporary environmental and agricultural problems. Enrollment limited to 75. Prerequisites: Human Biology core, Biology core, or equivalent; calculus through Math. 20 or 41, or equivalent; or consent of the instructor.

4 units (Boggs) not given 1993-94

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

4 units (Gallagher-Thompson) not given 1993-94

105. Ethnogerontology—(Same as Education 108X.) 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. Enrollment limited to junior and above. Prerequisites: Human Biology core or consent of instructor.

4 units, Spr (Gallagher-Thompson, Yeo)

106. 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 (Cohen, Staff)

107. 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 are available.

4 units, Spr (Cronkite) TTh 10:30-12

109. Human Behavioral Biology—(Same as Biology 163/263.) 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, Spr (Sapolsky)

110. Vertebrate Biology Lab and Lab—(Same as Biology 110.) The evolution, form, function, and behavior of the vertebrates, from primitive fishes to birds and mammals, including humans.

5 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, Win (Heller, Staff)

112. Biology and Evolution of Language—(Same as Anthropology 5, Linguistics 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 1993-94

113. 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, Aut (Durham)
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, AIDS, herpes viruses, cancer 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, Aut (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 three to five oral presentations based on their reading. Discussion on student questions and critique. Prerequisite: 115A or equivalent.

4 units, Win (Siegel)

116. Eye and Implications of Vision — The basic physiology of how we see, and how visual capabilities influence human endeavors. Comparisons to the specialized eyes of animals. Illusions, visual physiology of art, the eye in history and literature, and vision in sports. Initially didactic, the remainder is a seminar 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 retaining qualified teachers, goals of science teaching for different populations). The substance and style of formulating policy for science education in the U.S., now and in 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 1993-94

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 180.) 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 (Boggs, Launer) not given 1993-94

120. Human Nutrition — Introduction to human nutrition including the function, digestion, absorption, and metabolism of nutrients; dietary recommendations and standards; and an overview of national nutrition problems. Prerequisite: Human Biology core or consent of instructor.

4 units, Aut (Butterfield)

124. Neural Basis of Sleep and Circadian Rhythms — (Same as Biology 149.) Underlying neurophysiology, neurochemistry, and behavioral biology of sleep/wake and circadian processes. Prerequisite: 4A or Biology 32, or consent of instructor.

3 units (Heller, Miller) not given 1993-94

127. Latin America in the Global Environmental Politics — (Same as Anthropology 163, Latin American Studies 185, Political Science 113E.) From the international system to the global system; the nexus environment-development and the politics of sustainability; the main issues on global environmental politics (global warming, depletion of the ozone layer, loss of biodiversity and transboundary air and water pollution); the nexus domestic-international in environmental politics; case studies (Brazil, Chile, Colombia, Costa Rica, Mexico, Venezuela); Latin America and the incipient agenda of global governance.

5 units, Win (Viola)

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 e-
hance 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. 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, evolution and adaptation, and population dynamics. Current directions within indigenous systems of resource management, and problems of conservation and development. DR: 2(*) or DR: 9(5*)
3-5 units, Win (Charnley)

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

139. Indigenous People and Forest Conservation — (Same as Anthropology 161A.) Upper-division/graduate seminar focuses on the merging role of indigenous people in forest conservation. Indigenous people offer distinct and diverse approaches to conservation building on traditional management systems to develop new models for forest use. Case studies explore a range of indigenous approaches to conservation, the impact of Western conservation on indigenous people, and the role of different tenure regimes in the conservation of indigenous forest resources (including state forests, parks and protected areas, indigenous territories, and private property systems).
4 units (Durham, Irvine) not given 1993-94

142. The Impact of AIDS — Non-science majors welcome. 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 the AIDS virus, emphasizing education. Cultural aspects of AIDS, 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, Win (Siegel)

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 (Levine) given 1994-95

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, Win (Raffin, Thaler, Franzblau)

145. Third World Development — Interdisciplinary introduction to the issues of Third World development, differences in approach, and contributions of different academic disciplines. Explores 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.
4 units, Win (Crow)

147. The Politics of Environmental Degradation in Latin America — (Same as Anthropology 166, Latin American Studies 136, Political Science 113V.) A typology of environmental problems in Latin America (urban, rural, and natural ecosystems); the main players in environmental politics in Latin America (the environmental movement, the state environment-natural-resources agencies, the sector of the social movements and the sector of the entrepreneur oriented toward sustainability); the politics of urban-industrial pollution (Brazil, Chile, Mexico, Venezuela); the politics of topsoil depletion and rural pollution (Argentina, Brazil, Mexico); the politics of biodiversity (Brazil, Colombia, Costa Rica, Mexico); the participation of some Latin American countries in the UNCED process (Brazil, Colombia, Mexico, Venezuela).
5 units, Spr (Viola)

148. Environmental Policy — Enrollment limited to 15 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, decisionmaking 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 1993-94

149. Indigenous Peoples and Environmental Problems — (Same as Anthropology 169.) The human consequences of contemporary environmental problems. The impact of market economies, "development" efforts, and conservation programs on indigenous peoples with reference to the Amazon, E. Africa, Alaska, and Central America. The role of indigenous grassroots organizations in combating environmental destruction and degradation of homeland areas. DR: *

3-5 units (Charnley, Durham)
not given 1993-94

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. Pre-registration essential; forms available from Human Biology or Feminist Studies office. DR: *

6 units (Djerassi) not given 1993-94

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 1993-94

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 his 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:9(4)

4 units, Aut (Lenoir) MW 11-12:15

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 (Giacca)

156. Human Development — Biological, medical, and social aspects of normal and abnormal human development. Topics: in vitro fertilization and embryo transfer; gene and cell therapy; gametogenesis 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. Lectures plus required discussion section. 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 adaptations in animal systems.

3 units (R. Fernald)
alternate years, given 1994-95


5 units, Spr (Durham)

162. Ode to the Code — Introduction to 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. The 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 many 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, recombinant technology, the human genome project, and gene therapy. Scientific background is a springboard to discussion of the broad ethical challenges posed by this new technology: challenges to the individual, medicine, business and industry, and society as a whole.

4 units, Win (Siegel)

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. 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 biochemical 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, Spr (Wong)

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, Aut (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:9†(4)

4 units, Spr (Matteo)

170. Gender and Science — (Same as Anthropology 160; Feminist Studies 147A; History and Philosophy of Science 160; Science, Technology and Society 144.) 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 vs. degendered science. DR:9†(5)

5 units, Spr (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 a statistics course.

4-5 units, Win (Feldman)

173. Medical Ethics — (Same as Philosophy 78.) Philosophical analysis of moral dilemmas in health care from perspectives of health care professionals and concerned laymen (patients, family members,
or observers.) Traditional insights about rights, compassion, respect for persons, and other moral matters illuminate such issues as euthanasia, informing vs. lying to seriously ill patients, treatment of deformed newborns, and the just allocation of scarce lifesaving therapies.

4 units, Win (Wilburn)

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, Win (Hastorf, Scott)

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? Questions are addressed through 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 (Barnett) not given 1993-94

181. Women in Human Origins — (Same as Anthropology 183B, Feminist Studies 183B.) Seminar on the role of women as agents of evolutionary change and as researchers in the field of paleoanthropology. Women in studies of early human fossils, behaviors, and the earliest evidence of sexual division of labor in humans.

5 units, Win (Hager)

182. Peasant Society: Economy and Change — (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-proletarian populations in rural Asia, Latin America, and Africa number some two billion people. Core seminars are on peasant society and the aspects of agrarian economic and social change. Students complete a research project on a specific question, relating to a social and geographic context in: food, forests, technology, or water. Prerequisite: previous course on developing world.

4 units, Aut (Crow)

183. Hunter-Gatherers in Archaeological Perspective — (Same as Anthropology 187.) 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 such data reconstructs the cultural systems of extinct hunter-gatherers. DR:9(5*) 5 units (Rick) not given 1993-94

189. Behavioral Endocrinology — (Same as Psychology 189.) Behavioral and environmental influences on endocrine regulation, particularly those hormones related to responses to stress. The basic endocrinology and neuroendocrine regulation of stress-related hormones. Emphasis: interaction of psychological variables and activity of the pituitary-adrenal system; also, a detailed examination of concepts of stress, and coping from a theoretical perspective. Prerequisites: Human Biology core, or consent of the instructor.

3 units, Win (Levine) TTh 4:15-5:30

193. The Origins of Modern Humans — (Same as Anthropology 194.) 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, Spr (Klein)

196. Molecular Neurobiology Seminar — (Same as Psychology 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 (Wong) not given 1993-94

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 fol-
lowed by a brief question and answer session. Mini-
mum 1 unit per quarter, 10-15 total.
1-15 units (Porzig)

199. Directed Reading/Special Projects — Inde-
pendent study. Students must consult with program's
course coordinator for requirements.
(Staff) by arrangement

200. Teaching of Human Biology — For upper-
division undergraduate and graduate students. Prac-
tical experience in teaching human biology or serv-
ing as an assistant in a lecture course.
7-5 units, Aut, Win, Spr (Staff) by arrangement

HUMANITIES SPECIAL
PROGRAMS

Emeriti: (Professors) Paul H. Kocher, Lawrence
V. Ryan
Chair: Paul Robinson
Professor: Kurt Mueller-Vollmer (German Stud-
ies and Humanities)
Teaching and Program Coordinator; Lecturer:
Helen Brooks

Honors Program Committee in Charge: Paul
Robinson (Chair); Helen Brooks, Gregory
Freidin, Robert Harrison, Andrea Nightingale,
David Palumbo-Liu, Alice Rayner
Graduate Program Committee in Charge: Paul
Robinson (Chair); Martin Bloomer, Helen
Brooks, Eckart Förster, Hester Gelber, Suzanne
Lewis, Kurt Mueller-Vollmer, Rush Rehm

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 in this bulletin.)
4. Medieval Studies. (See the “Medieval Studies”
   section in 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, aes-
thetic, literary, historical, social, and ethical.

ADMISSION

Interested freshmen and sophomores may ob-
tain information from the program office. Appli-
cations should be submitted at the earliest oppor-
tunity, preferably Spring Quarter of the freshman
year, and in every case before the junior year. Stu-
dents must meet the following entrance require-
ments 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 per-
formance courses); all courses in the Depart-
ments of Asian Languages, Classics, English,
French and Italian, German Studies, Slavic Lan-
guages and Literatures, and Spanish and Portu-
guese (except first-year language courses); all
courses in the Departments of Comparative Lit-
erature, History, Philosophy, and Religious Stud-
ies; 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 concen-
   trating in Comparative Literature and submit a
   study plan approved by one of the designated
   Comparative Literature undergraduate advisers
   (see the “Comparative Literature” section in this
   bulletin).
2. Choose a major in Humanities honors concen-
   trating in Modern Thought and Literature and
   submit a study plan approved by one of the des-
   ignated Modern Thought and Literature under-
   graduate advisers (see the “Modern Thought and
   Literature” section in this bulletin).
3. Propose and receive approval of a 40-unit con-
   ception of interdepartmental course work
   constituting a unified program of study that is
   not encompassed by any other undergraduate
   major at Stanford.

Students who wish to major in Humanities hon-
ors 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 appropri-
ate course work or equivalent.

REQUIREMENTS

1. Humanities 160: 5 units, sophomore year. Pre-
   requisite: 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 (formerly 90). Both seminars must be completed by the end of the 10th 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 (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 Section of the 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. Qualified undergraduates at Stanford may petition to complete the A.M. program coterminal with their bachelors degrees. The deadline for 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 (e.g., art history, classics, philosophy, etc.) from which the graduate-level courses are drawn. The candidate must also note his or her qualifications for undertaking graduate study in that discipline. Once admitted, the student submits a proposed program of study to the chair, specifying the particular courses to be taken. The proposed program is approved on its own merits to ensure that the chosen graduate courses are suited to the A.M. in Humanities.

4. Satisfactory completion of 298, the Spring Quarter Graduate Program in Humanities Symposium.

The minimum number of units for the A.M. degree is 36. Additional elective units may be taken at the option of the student.

Undergraduates wishing to pursue the A.M. as part of a coterminal program should speak with the department administrator about the application procedures for coterminal students.

**JOINT Ph.D.**

The 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, etc.

Because the GPH supplements, and does not substitute for, departmental 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 departmental 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 (Stephens, Staff)

62. The Middle Ages and the Renaissance — DR: 1 (three-quarter sequence)

5 units, Win (Brooks, Staff)

63. The Enlightenment to the Present — DR: 1 (three-quarter sequence)

5 units, Spr (Lindenberger, Staff)

110B,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 61, 62, 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, Win, Spr (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 (Eisen)

Spr (Brooks)

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. Interdepartmental Seminars on the Nature of the Humanities — Students in the Humanities honors program must complete two different seminars; other students may enroll only by consent of the director. Prerequisite: 160 (formerly 90).

191. History and the Humanities

5 units, Win (Ketelaar)

192. The Arts and the Humanities

5 units, Aut (Rayner)

193. Philosophy and the Humanities

5 units, Spr (Guttmann)

194. Literature and the Humanities — Critical study of major texts; theory and practice of criticism.

5 units, Win (Nightingale)

197. Modernism and the Humanities

5 units, Aut (Freidin) (same as Slavic Languages and Literature 190)

Spr (Perloff)

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.

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.

5 units (Staff) by arrangement

GRADUATE

275. Directed Reading

2-5 units (Staff) by arrangement

298. GPH Symposium

1-3 units (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 — (Same as Drama 311.)
3-4 units, Aut (Rehm) TTh 4:15-6:05

312. Medieval Seminar
3-4 units, Win (Gelber) TTh 4:15-6:05

313. Early Modern Seminar
3-4 units, Aut (Rozemond) 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 — (Same as History 315.)
3-4 units, Spr (Harrison) TTh 4:15-6:05

INTERNATIONAL POLICY STUDIES (IPS)

Co-Chairs: Barton J. Bernstein (History), Timothy E. Josling (Food Research)

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 government. It requires that the student complete an unusual number of prescribed courses during his or her undergraduate career.

The program provides: an understanding of the historical development of the modern world; training in economics and politics, with emphasis on the study of international relations; and work in greater depth on either a major region such as East Asia or Latin America, or a major issue such as economic development. 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 coterminal 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 10 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 Coterminal 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 15th 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 10 pages and three recommendations, by the preceding January 1.

DEGREE REQUIREMENTS

The A.M. degree in International Policy Studies is awarded to students who fulfill the following requirements:

1. Meet satisfactorily all departmental, 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 pre-
scribed 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 aforemen-
tioned statement on International Policy Stud-
ies, and set forth in "Degree Requirements: Fields
and Courses." The requirements involve speci-
fied courses and seminars normally to be com-
pleted in the space of five years (four undergradu-
ate 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 un-
dergraduate 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 coterminous student's
fourth or fifth year. Students entering the pro-
gram at the graduate level, however, can receive
dergee 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 require-
ments. Coterminous students must be sure to list
45 unduplicated units, i.e., 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 coterminous 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-' 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, Timothy E. Josling
(Food Research Institute)
Committee in Charge: Barton J. Bernstein (His-
tory), Peter Duus (History), Judith L. Goldstein,
Terry Karl (Political Science), Stephen Krasner
(Political Science), Scott Pearson (Food Research
Institute), Jeffrey Williams (Food Research In-
stitute)
Affiliated Faculty: David Abernethy (Political
Science), Masahiko Aoki (Economics), W. Brian
Arthur (Food Research Institute), Joel Beinin
(History), Barton J. Bernstein (History), Byron
Bland (Institute for International Studies),
Frederick Bowser (History), Alexander Dallin
(History and Political Science), Sanford
Dornbusch (Sociology), Charles Drekmeier
(Political Science), Peter Duus (History), Marcel
Fafchamps (Food Research Institute), Walter
Falcon (Food Research Institute), Kurt T. Guba-
batz (Political Science), James Gibbs (Anthropology),
Judith Goldstein (Political Science), Stephen Haber
(History), Nina Halpern (Political Science),
Robert Hamerton-Kelly (International Strategic
Institute), Donald Harris (Economics), David
Holloway (Political Science), Kennell Jackson,
John (History), Timothy Josling (Food Research
Institute), Harold Kahn (History), Terry Karl
(Political Science), Anjini Kochar (Economics),
Nancy Kollmann (History), Stephen D. Krasner
(Political Science), Lawerence Lau (Econom-
ics), John Lewis (Political Science), Mark
Mancall (History), Robert McGinn (Science, Technology, and Society), Ronald I. McKinnon
(Economics), Norman Naimark (History),
Rosamond Naylor (Institute for International
Studies), Nel Noddings (Education), Daniel
Okimoto (Political Science), Robert Packenham
(Political Science), Scott Pearson (Food Research
Institute), Bill Perry (Engineering-Economic Systems), Clark Reynolds (Food Research In-
stitute), Richard Roberts (History), Paul Robinson
(History), Aron Rodrigue (History), Scott Sagan
(Political Science), Julie A. Schaffner (Econom-
ics), Philippe Schmitter (Political Science), James
Sheehan (History), Clint Smith (Latin Ameri-
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 to think about world affairs, and capable of doing creative work in the international arena.

The program seeks to enrich undergraduate course offerings in international relations for non-majors as well as for majors. All students considering either a major or extensive work in international relations are strongly encouraged to first take Political Science 35, International Politics. Following that, prospective majors develop their own programs, in conjunction with advisers, as outlined below.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

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, and one designated course in American foreign policy; 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. It is strongly recommended that at least one course on security issues be taken in Cluster A. 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 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 will 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 expected 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 invites its undergraduate students, particularly juniors, to apply for funds to finance research or intensive study on forces that transcend national borders. These grants are intended primarily for use during the summer between the junior and senior year by students writing senior honors theses in international relations. Application forms are available in the Winter Quarter in the International Relations office.

The grants may be used to finance travel to places where field work or library research is to be conducted or may be used to support intensive work during the summer at Stanford. The creativity and intellectual promise of the project and the preparation of the student are major considerations in awarding these funds.

GRADUATE PROGRAMS
MASTER OF ARTS

It is possible for students majoring in International Relations to work simultaneously for a coterminal master’s degree in a number of related fields. Coterminal students should consult advisors 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.

Political Science 35, International Politics, (Cluster A) is required for all majors.

CLUSTER A: POLITICAL-HISTORICAL EMPHASIS

20. Introduction to Comparative Politics — (Enroll in Political Science 20.)
5 units, Spr (Halpern)

24B. Russian Civilization II: 18th to 20th Centuries — (Enroll in History 24B.) Interdisciplinary approach to Russian history and culture; examines literature, society, institutions.
5 units (Emmons) not given 1993-94

DR:2(*) or 9(5*)
5 units, Win (Abernethy)

35. International Politics — (Enroll in Political Science 35.) 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)
5 units, Aut (Krasner)

36S. Introductory Seminar: The Modern European State and the Jews — (Enroll in History 36S.) Examines the public debates about the Jews and their place in European society, and the policies of England, Austria, France, and Germany to the Jews in centuries when Jewish status was redefined. Why the “Jewish question” was so prominent on the agenda of modern European states and revolutionary movements; social forces which propelled the movement toward Jewish equality, antisemitism. Readings are largely primary sources.
5 units (Magnus) not given 1993-94

38. The Transformation of International Security in a Changing World — (Enroll in Political Science 38.) 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, Lewis, Holloway, Rice)

85S. Introductory Seminar: Jews and Moslems — (Enroll in History 85S.)
5 units (Rodrigue) not given 1993-94
112D. Readings in Political Science and International Relations in German — (Enroll in Political Science 112D.) Open to undergraduate and graduate students. For students with a knowledge of German (one year or equivalent) who want to acquire reading proficiency in various disciplines. Reading materials include excerpts from scholarly works and professional journals. Students may introduce material they need to read for their course work or research.

5 units, Aut (Staff) not given 1993-94

113V. The Politics of Environmental Degradation in Latin America — (Enroll in Political Science 113V.) A typology of environmental problems in Latin America (urban, rural, and natural ecosystems); the main players in environmental politics in Latin America (the environmental movement, the state environment and natural resource agencies, popular organizations, private entrepreneurial groups); the politics of urban-industrial pollution; the politics of topsoil depletions and rural pollution; the politics of biodiversity; the participation of Latin American countries in the UNCED process.

5 units, Spr (Viola)

115. European History — (Enroll in Economics 115.) Economic changes and growth in Western Europe from the Medieval period to WWI. Transformation of Europe from an economically and culturally backward part of the world to the center of the word 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 (Flandreau)

116. Politics in the People's Republic of China — (Enroll in Political Science 116.) DR:2(*) or 9(5*)

5 units, Win (Halpern)

116B. European Politics and Society — The Integration of Europe — (Enroll in Political Science 116B.) Europe is characterized by a mixture of unity and diversity; common beliefs, practices, and institutions ("European civilization") vs. a history of political division ("the European state system") and armed conflict ("European civil wars," ending in 1945). Whether this historical diversity has diminished in recent decades and, if so, whether this convergence can be attributed to the process of regional integration.

5 units, Aut (Schmitter)

117R. The Role of the Military in Politics — (Enroll in Political Science 117R.) The interaction between military and political leaders in western-industrial, communist, and developing states. Questions of military professionalism, the role of the military in political processes, and problems of the allocation of resources to defense. Diverse cases including the U.S., the U.S.S.R., and countries of the developing world. DR:9(5)

5 units, Aut (Schmitter) given 1994-95

118A. Political Change in Tropical Africa — (Enroll in Political Science 118A.) The colonial situation, the growth of nationalism, the achievement of political independence, ethnic patterns in new states, civilian and military leadership, the role of party and bureaucracy. DR:2(*)

5 units, Spr (Abernethy)

118B. The Politics of Race and Class in Southern Africa — (Enroll in Political Science 118B.) 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 movement, corporations, and international organizations based outside the region. DR:2(*) or 9(5*)

5 units, Win (Abernethy) given 1994-95

118D. South Africa in Comparative Perspective — (Enroll in Political Science 118D.) Seminar discussions identify distinctive features of South African politics, economy, and differences with the situation in other countries; e.g., policies regarding race relation movements in India and Algeria, federalism in Nigeria and Canada. Oral report on a major research paper required.

5 units, Win (Abernethy)

119. Aristocracy and Absolutism: Early Modern Eastern Europe — (Enroll in History 119.) Societies and cultures of E. Europe (Poland, Ukraine, Belarus, Bohemia, Hungary) in the late medieval and early modern periods. The conflict of aristocratic parliamentary governments with absolutist empires (Russia, Prussia, Austria-Hungary). DR:9(5)

5 units, Spr (Kollmann)

122B. Soviet Foreign Policy — (Enroll in History 122B.)

5 units, Aut (Haslam)

122G. The Political Economy of Contemporary Europe — (Enroll in Political Science 122G.) Analysis of two fundamental issues in contemporary European politics: the balance of political and economic power between the left and right within individual countries, and the emerging EC polity. The decline of social democracy and the rise of market-liberalism in the 1970s and 1980s. The reinvigoration of the EC since the mid-1980s: "1992" and the creation of the internal market; economic and monetary union; and, the enlargement of the EC. (Cluster A or C.) DR:9(5)

5 units, Spr (Dorfman)

124. Seminar: Latin American Dependency — (Enroll in Political Science 124.) Basic concepts and theoretical frameworks, single-country case studies, and research and political strategies regard-
125. 20th-Century Eastern Europe — (Enroll in History 125.) 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)

125O. Seminar: The Rise of Industrial Asia — (Enroll in Political Science 125.) Interdisciplinary. The political, economic, security, social, and cultural aspects of industrial development and change in Asia as a region. Prerequisite: consent of instructor. (Cluster A or C.)
5 units, Aut (Okimoto)

127D. 20th-Century Germany — (Enroll in History 127D.) DR:9(5)
5 units, Win (Sheehan)

132B. Modern France From the Enlightenment — (Enroll in History 132B.) DR:9(5)
5 units, Spr (Collins)

133. Peace Studies — (Enroll in Political Science 133.) Interdisciplinary, dealing with the challenges of pursuing peace in a world where the sources of conflict are many and regional, ethnic, and religious antagonisms are rising. The art of creating and maintaining peace is analyzed from historical, social, psychological, and moral perspectives. Goal: 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 consequences; peace and you.
5 units, Spr (Bernstein, Bland, Dornbusch, Drekmeier, Holloway, Noddings, Ross)
TTh 2:15-4:05 and by arrangement

134B. America and the World Economy — (Enroll in Political Science 134B.) (Fulfills 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.
5 units, Win (Goldstein)

134P. The Role of Technology in National Security — (Enroll in Political Science 134P.) Examines critical decisions made by the U.S., including development of the A-bomb and H-bomb, the crash ICBM program after Sputnik, and the military space program. Current issues, e.g., demilitarization and defense conversion in the post-cold war era, proliferation of weapons of mass destruction, and ballistic missile defense against potential threats from regional powers. Case studies illustrate the fundamentals of the process by which technical issues are synthesized and explained to policymakers with no background in technology; in particular, the way in which technical organizations in government, government committees, and science advisory boards interact to bring a broad spectrum of informed advice to senior policymakers. For certain technologies, the U.S. government decision process is compared with other countries. (Cluster A or C.)
3 units, Aut (May)

138B. Seminar: Security and Diplomacy — (Enroll in Political Science 138B.)
5 units, Spr (Lewis)

139. Seminar: Chinese Foreign Policy — (Enroll in Political Science 139.) Chinese foreign policy and its sources: historical, ideological, strategic, political, economic, and the decision making process. Relations with two superpowers and the Third World. Prerequisite: 115 or equivalent, or consent of instructor.
5 units, Spr (Halpern)

139A. Japanese Foreign Policy — (Enroll in Political Science 139A.) Analysis of origins of WWII in the Pacific; Japan’s role in international security and U.S.-Japan trade conflict.
5 units, Aut (Okimoto)

142. Evolution of Sovereignty — (Enroll in Political Science 142.)
5 units, Win (Krasner)

143K. Seminar: Democratic States and International Relations
5 units, Aut (Gaubatz)

143L. Seminar: War, Peace, and Organization Theory — (Enroll in Political Science 143L.) Draws on organization theory to build an 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 mostly on recent organizational approaches (e.g., new institutionalism,
cultural approaches) and recently published or forthcoming works on security issues.

5 units, Spr (Eden)


5 units, Aut (Goldstein)

145. 20th-Century Britain—(Enroll in History 145.) 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. Reference to the effect of the Empire on British society before and after decolonization. DR:9(5)

5 units, Spr (Staff)

148. Introduction to African History—(Enroll in History 148.) African history from ancient Africa to the 1990s, ancient Egypt to the democracy movements. What is history in Africa and how Africans see their past.

5 units, Win (Jackson)

165C. 20th-Century America—(Enroll in History 165C.) (Fulfills the American Foreign Policy Requirement.)

5 units, Spr (Kennedy)

172A. America since 1945—(Enroll in History 172A.) (Fulfills the American Foreign Policy Requirement.) Analyzes foreign policy and politics, and deals with the intellectual history and social themes. DR:9(5)

4-5 units (Bernstein) not given 1993-94

176. Spain in America, 1492-1825—(Enroll in History 176.) 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 into the modern world on achievement of political independence. DR:9(5)

5 units, Au (Bowser)

179. History of Mexico—(Enroll in History 179.) 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 1993-94

180. 20th-Century Brazil—(Enroll in History 180.) 5 units (Wirth) not given 1993-94


5 units, Au (Smith)

194C. The Rise of Modern Japan—(Enroll in History 194C.) DR:2(*)

5 units, Spr (Duus)

212P. The Politics of International Cooperation and Regional Integration—(Enroll in Political Science 212P.) Open to advanced undergraduates (by consent of instructor) and to 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 supra-national institutions. Emphasizes the European Community, the N. American Free Trade Area, and various experiences in Latin America.

5 units, Win (Schmitter)

213. Seminar: Issues in Chinese Politics—(Enroll in Political Science 213.) For students with knowledge of the political history of the PRC; analyzes some of the major theoretical and empirical issues in the study of contemporary Chinese politics. Prerequisite: Political Science 115 or consent of the instructor.

5 units, Win (Halpern)

219. Undergraduate Colloquium: Major Problems in Soviet History and Politics—(Enroll in History 219.)

5 units, Win (Dallin)

221S. Senior Research Seminar: Wartime and Postwar Poland—(Enroll in History 221S.)

5 units, Win (Naimark)

223. Seminar: Japanese Politics—(Enroll in Political Science 223.) 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 (Okimoto) given 1994-95

224. Stalinism in Eastern Europe—(Enroll in History 224.)

5 units, Spr (Naimark)

224K. Contemporary Issues in Latin America—(Enroll in Political Science 224K.)

5 units, Win (Karl)

227. Seminar: Democratization—East, West, and South—(Enroll in Political Science 227P.) Open to advanced undergraduates and graduate students. Comparison of political changes possibly leading to more democratic institutions in Eastern and Southern Europe, with reference to Latin America 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, Win (Schmitter)

227A. European Economic History — (Enroll in Economics 227.) (Cluster A or C.)

5 units, Aut (Flandreau)

228S. Senior Research Seminar: War and Society in the 20th Century — (Enroll in History 228S.)

5 units, Spr (Sheehan)

240. Seminar: Security in an Insecure World — (Enroll in Political Science 240.) The revolution in international and regional security relations occasioned by the collapse of Soviet power, German unification, and the rise to globalism 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 — (Enroll in Political Science 243A.) Introduction to contemporary theories of international politics. Micro and macro approaches to the study of conflict and cooperation in world politics, including the works of Carr, Waltz, Gilpin, Keohane, and Bueno de Mesquita. Emphasizes oral and written presentation of assigned readings.

5 units, Aut (Goldstein)

243B. Research on Decision Making and Strategic Interaction in International Relations — (Enroll in Political Science 243B.) Examines theories of decision making and strategic interaction in international security affairs. Prerequisite: 243A or consent of instructor.

5 units, Win (Gaubatz)

244D. Theories of European Imperialism — (Enroll in Political Science 244D.)

5 units, Aut (Abernethy)

244H. Seminar: The Collapse of the Soviet Union: Causes and Consequences — (Enroll in Political Science 244H.) 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)

246A. Undergraduate Colloquium: African History and the African Novel — (Enroll in History 246A.)

5 units, Win (Jackson) not given 1993-94

246S. Senior Research Seminar: East Africa in Transition — (Enroll in History 246S.)

5 units (Jackson) not given 1993-94

247. Seminar: The Causes of War — (Enroll in Political Science 247.) Review of the theoretical literature on the causes of war and implications for its prevention. Case studies and consideration of different proposals for controlling war. Prerequisites: Political Science 35 and 243A, or consent of instructor.

5 units, Aut (Gaubatz)


5 units (Roberts) not given 1993-94

252. Decisionmaking in International Crises — (Enroll in History 252.)

5 units, Win (Bernstein)

261. Undergraduate Colloquium: Nuclear Weapons and International Relations — Theories and History — (Enroll in History 261.) Theories of arms races, deterrence, and nuclear diplomacy, evaluated in light of the merging field of nuclear history. Based on the experience of the main nuclear weapon states.

5 units, Spr (Holloway, Bernstein)

270. International Health — (Enroll in Health Research and Policy 270.)

2-4 units, Spr (Basch)

276. Undergraduate Colloquium: The Creation of North America — (Enroll in History 276.)

5 units, Spr (Wirth)

278. Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America — (Enroll in History 278.) Methods and approaches of economic history. Emphasis is on critical analysis of scholarly studies of issues in Latin American economic growth addressed by economic historians, including the creation of national transportation systems, the growth of industry, the economics of slavery, and the long term effects of export oriented growth. Prerequisite: consent of instructor prior quarter. (Cluster A or C.)

5 units, Spr (Haber)

284A. Undergraduate Colloquium: European Encounters with India in the Early Modern Period — (Enroll in History 284.)

5 units, Spr (Dharampal-Frick)

286. Undergraduate Colloquium: Economic and Social History of the Modern Middle East — (Enroll in History 286.) 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 expan-
sion of the international capitalist market are combined with possible case studies of Egypt, Iraq, and Palestine.

5 units (Beinin) not given 1993-94

287S. Senior Research Seminar: The Modern History of Egypt and Palestine—(Enroll in History 287S.)
5 units, Aut (Beinin)

288. Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict—(Enroll in History 288.)
5 units, Aut (Beinin)

289A. The Ottoman Empire—(Enroll in History 289A.) Rise of the Ottoman Empire from the 14th to 16th centuries. The Balkans and the Middle East under Ottoman rule. Systems of governance and the economy of the Ottoman Levant. Onset of weakness and decline after the 17th century. European imperialism in the Middle East. Ottoman westernizing reforms in the 19th century. Rise of nationalism. The Balkan Wars, WWI, and the collapse of the Ottoman Empire.
5 units, Win (Rodrigue)

292. Undergraduate Colloquium: Postwar Japan—(Enroll in History 292.)
5 units (Duus) not given 1993-94

295A. Undergraduate Colloquium: The Korean War—Watershed in Asia—(Enroll in History 295A.)
5 units, Aut (Van Slyke) T 1:15-3:05

CLUSTER B: HUMANITIES EMPHASIS

19S. Introductory Seminar: “The West” in the Russian Consciousness, 1789-1855—(Enroll in History 19S.) The seminal period in Russian intellectual, cultural, and political history as Russians in the wake of French Revolution and its aftermaths first confronted a still current issue: what can Russians learn from the Western experience? Should Russia repeat the Western path toward liberal democracy or can it show the world a new route to social harmony? Primary sources: revolutionary tracts, travel diaries, fiction.
5 units, Spr (Staff) Th 2:15-4:05

80. Culture, Society, and Politics of Latin America—(Enroll in History 80.) 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. Concentrates on the histories of Mexico, Brazil, and Argentina, and other national experiences. DR:9(5*)
5 units, Spr (Haber)

99A. Peters Seminar: The Reciprocal Vision—Their America, Our Europe—(Enroll in English 189N.)
5 units, Spr (Evans)

109. African Societies in a Changing World—(Enroll in Anthropology 109.) Lectures, discussions, 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: shifts in patterns of marriage and family life, the emergence of new classes, the impact of Islam and Christianity. DR:2(*) or 9(5*)
5 units, Aut (Gibbs)

110. Ethics in Public Policy—(Enroll in Science, Technology, and Society 110.) Philosophical and 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 (euthanasia, pre-determination of sex of offspring, and genetic testing); environmental affairs (endangered species, wilderness and landmark preservation, and high-rise proliferation); the technical professions (“whistle-blowing,” fraud, human subjects research); and international relations (warfare, technology transfer, immigration, and repatriation of artistic patrimony). For IR credit, course term paper must be on an international topic. (Cluster B or C.) DR:8(3)
5 units, Win (McGinn)

136. Women, Gender, and Jewish Modernity—(Enroll in History 136.) Beginning with study of the construction of gender in traditional Jewish culture, examines how gender shaped the experience of women in modern Jewish society in Europe. Women’s work and changing economic functions; traditionalism, acculturation, and assimilation; marriage and fertility patterns; adoption of bourgeois notions of family and motherhood; organized feminism; radicalism and specific fate in the Holocaust
5 units, Win (Magnus)

136A. European Thought in the 19th Century—(Enroll in History 136B.) DR:8(3)
5 units, Win (Robinson)

136B. European Thought in the 20th Century—(Enroll in History 136B.)
5 units (Robinson) not given 1993-94

141K. Ethics and International Relations—(Enroll in Political Science 141K.) How moral claims function in the foreign policy process and in relations between states. Arguments for and against normative approaches to making and studying policy.
Consideration of the moral dimensions of selected foreign policy issues. Prerequisite: Political Science 35 or consent of instructor.

5 units, Win (Gaubatz)

185. Introduction to Islamic Civilization — (Enroll in History 185.) 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, law, philosophy and science; relations among Islam, Christianity and Judaism; modern currents in Islam.

5 units (Beinin) not given 1993-94

187C. Women in the Contemporary Middle East — (Enroll in History 187C.) 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 9†(5*)

5 units, Win (Beinin) MW 1:15-3:05
Th 7-10 p.m.

188B. Jews in the Medieval World — (Enroll in History 188B.)

5 units (Magnus) not given 1993-94

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)

207. Undergraduate Colloquium: Topics in Comparative Women's History — (Enroll in History 207.) DR:9†(5)

5 units, Spr (Brown, Freedman, Magnus)

235A. Undergraduate Colloquium: Art and Society in 19th-Century Europe — (Enroll in History 235A.)

5 units, Aut (Sheehan)

246A. Undergraduate Colloquium: African History and African Novel — (Enroll in History 246A.)

5 units (Jackson) not given 1993-94

248. The Caribbean Americas: An Introduction to Their Literature, Thought, and Cultural Worlds — (Enroll in Spanish 248.)

3-5 units (Wynter) not given 1993-94

249C. Undergraduate Colloquium: Ethnicity in African History — (Enroll in History 249C.)

5 units, Win (Larson)

263. The Latin America Novel of the 60s: Cortazar, Vargas Llosa, Garcia Marquez — (Enroll in Spanish 263.)

3-5 units (Ruffinelli) not given 1993-94

268. A New Literary Genre: Testimony — (Enroll in Spanish 268.) Latin American literature and politics viewed in light of a new narrative genre in works of Rodolfo Walsh, Omar Cabza, Elena Poniatowska, and others.

3-5 units (Ruffinelli) not given 1993-94

288. Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict — (Enroll in History 288.)

(Counts for either Cluster A or B.)

5 units, Aut (Beinin)

291. “Race,” Discourse, and the Origin of the Americas: A New World View of 1492 — (Enroll in Spanish 291.) 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, and analyzes juridico-theological, historical, and literary texts from the perspective of the Americas; attempts to decipher the politics of representation in the orthodox interpretation of Columbus’ discovery and to deconstruct the strategies whereby a symbolic construct of “race” (in a Natural Law variant) would take primary place in the New World instead of the “gender” construct of previous human societies. (In English)

5 units (Wynter) not given 1993-94

292. Spain in America/America in Spain — (Enroll in Spanish 292.) 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, Martin) not given 1993-94

292S. Senior Research Seminar: China in the Western Imagination, 16th-20th Centuries — (Enroll in History 292S.)

5 units, Aut (Kahn)

295. Cinema, Literature, and Politics in Latin America — (Enroll in Spanish 295.)

3-5 units, Aut (Ruffinelli)

CLUSTER C: POLITICAL-ECONOMIC ISSUES AND POLICY ANALYSIS


4 units, Win (Meier)
103. The World Food Economy — (Enroll in Economics 106.) Interrelationships among food, population, 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.

4-5 units, Win (Flandreau, Naylor)

110. Ethics in Public Policy — (Enroll in Science, Technology, and Society 110.) See Cluster B for course description. (Cluster B or C.) DR:8(3)

5 units, Win (McGinn)

113. Technology and Economic Change — (Enroll in 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 "spillover" from military R&D, and coping with rapid technological change). Optional section for 5 units. DR:9(5)

4-5 units, Spr (Rosenberg)

113E. Latin America and Global Environmental Politics — (Enroll in Political Science 113E.) The relationship between development and environmental concerns; the politics of sustainable development; the main issues of global environmental politics (global warming, depletion of the ozone layer, loss of biodiversity and transboundary air and water pollution); the intersection of domestic and international environmental concerns in Latin America and the incipient agenda of global governance. Case studies from Brazil, Chile, Costa Rica, Mexico, and Venezuela.

5 units, Win (Viola)

114K. The Political Economy of Development — (Enroll in Political Science 114K.) Introduction to major theories of political development, emphasizing interplay between economic and political processes, and national and international factors from Latin America, and also Africa and Asia. Cases include Brazil, China, Cuba, El Salvador, India, Taiwan, Nigeria, and Venezuela. DR:2(*) or 9(5*)

5 units, Aut (Karl)

115. European History — (Enroll in Economics 115.) See Cluster A for course description. (Cluster A or C.)

5 units, Win (Flandreau)

118. The Economics of Development — (Enroll in Economics 118.) 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, migration, population growth, education, nutrition, rural markets, and government policies. Focuses on principles, not case studies. Prerequisite: Economics 51.

5 units, Spr (Kocher)

120. Socialist Economies in Transition — (Enroll in Economics 120.)

5 units, Spr (Earle)

121. Development and Population Interactions in the Third World — (Enroll in 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 (Yotopolous)

121A. The Economies of Greater China and the World — (Enroll in Economics 121.) Structure and development of the economy of the People's Republic of China, Taiwan, and Hong Kong. Topics: interregional and international trade; foreign investment; the role of the economy during transition. Rural reform policy and development institutions, including markets; local governments and private economic entities; the urban and industrial reforms; rural industrialization; progress (or stagnation) in China's poverty belts; population control; and comparisons with other countries in Asia, the socialist bloc, and the rest of the world. Prerequisite: Economics 1.

5 units, Spr (Rozelle)

122. The Theory of Capitalist Development — (Enroll in Economics 122.) 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)

122C. Third World Development — (Enroll in Food Research 122.) Interdisciplinary introduction to the issues of Third World development, differences in approach, and contributions of different academic
disciplines. Explores 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.

4 units, Win (Crow)

122G. The Political Economy of Contemporary Europe — (Enroll in Political Science 122G.) See Cluster A for course description. (Cluster A or C.)
5 units, Spr (Dorfman)

123. Economic Development in Latin America — (Enroll in Economics 123; open to advanced undergraduate students, with the 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. Interdependence between economies at different levels of development (Mexico and the U.S., Central America and the Caribbean, Andean countries, Southern Cone countries).
5 units, Spr (Reynolds)

124. Seminar: Latin American Dependency — (Enroll in Political Science 124.) See Cluster A for course description. (Cluster A or C.)
5 units (Packenham) given 1994-95

124A. The Japanese Economy — (Enroll in Economics 124.) 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 the financial institutions and the government. Comparison with corresponding American institutions and relevancy to developing transforming socialist economies.
5 units, Spr (Aoki)

125A. Economic Development in Africa — (Enroll in Economics 125.) Economic development issues in Africa, emphasizing the sub-Saharan region. Topics: economic history, development strategies, institutional change, agricultural policies and technology, environmental degradation, informal sector industrialization, external debt, and structural adjustment.
5 units, Aut (Fafchamps)

125O. The Rise of Industrial Asia — (Enroll in Political Science 125.) See Cluster A for course description. (Cluster A or C.)
5 units, Aut (Lau, Okimoto, Raphael, Rohlen)

127. Peasant Society: Economy and Change — (Enroll in Food Research 127.) Until WWII, peasants were a minority 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-proletarian populations in rural Asia, Latin America, and Africa number some two billion people. Core seminars are on peasant society and the aspects of agrarian economic and social change. Students complete a research project on a specific question, relating to social and geographic context in: food, forests, technology, or water.
4 units, Aut (Crow)

134. Development of Newly Industrialized Economies — (Enroll in Economics 134.) The development experience of newly industrialized economies including Hong Kong, Singapore, S. Korea, and Taiwan. Identifies their successful development, compares and contrasts them with one another, and with other developing countries.
5 units, not given 1993-94

134P. The Role of Technology in National Security — (Enroll in Political Science 134P.) See Cluster A for course description. (Counts for either Cluster A or C.)
3 units, Aut (May)

5 units, Spr (Arthur)

140A, B, C. Ethics of Development in a Global Environment (EDGE) — (Enroll in Political Science 140A, B, C.)
1-4 units, Aut, Win, Spr (Lusignan)
lecture W 7:30-9:30 p.m.
workshops by arrangement

165. International Economics — (Enroll in Economics 165.) 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, and 52.
5 units, Aut (Sent)
Win (Krueger)

5 units, Aut (Santos) MW
169. Development and Technology in the Third World — (Enroll in Science, Technology, and Society 169.) The relationship between technology and industrial development from technical, social, and economic perspectives. Technology in developing countries and in newly industrializing countries (India, Brazil, Mexico, and Korea), including transfer of technology, "appropriate" technology, factors affecting choice of technology, technological capability, and the relationship between technology and culture. Limited enrollment.

4 units, Aut (Forbes)

171. The Role of Technology in Policy Decisions — (Enroll in Science, Technology, and Society 171.) Examines critical decisions made by the U.S., including the development of the A-bomb and H-bomb, ICBM program after Sputnik, and the military space program. Current issues, e.g., demilitarization in the post-cold war era, proliferation of weapons of mass destruction, and ballistic missile defense against potential threats from regional powers. Case studies illustrate the fundamentals of the process by which technical issues are synthesized and explained to policymakers with no background in technology; in particular, the way in which technical organizations in government, government committees, and science advisory boards interact to bring a broad spectrum of informed advice to senior policymakers. For certain technologies, the process is compared with other countries.

3 units, Aut (May)

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 limited to 15. Prerequisite: consent of instructor by prior application at department office.

4 units, Win (Naylor)

215. Industrialization, Growth, and Economic Development — (Enroll in Economics 215.) 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, Win (Schaffner)

215B. Seminar: Japanese Political Economy — (Enroll in Political Science 215B.) Research seminar aimed at acquiring the skills needed to complete a term paper on a subject related to the Japanese political economy. Prerequisite: 215A, or consent of instructor.

5 units (Okimoto) given 1994-95


5 units, Aut (McKinnon)

225A. Introduction to Political Economy — (Enroll in Political Science 225A.) Basic theoretical and empirical issues in the political economy of capitalist democracy: the applicability of rational choice microeconomic perspectives (social choice, collective action, non-cooperative game theory) to the study of politics; the dynamics of democratic political competition; the operation of the capitalist economy; the politics of international economic cooperation. Prerequisite: consent of instructor.

5 units (Garrett) given 1994-95

227A. European Economic History — (Enroll in Economics 227.) (Cluster A or C.)

5 units, Aut (Flandreau)

234. American Foreign Economic Policy — (Enroll in Political Science 234.) 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 particular policy issues, e.g., protectionism, monetary coordination, financial adjustment, and NAFTA.

5 units, Win (Goldstein)

241. World Politics and the Global Economy — (Enroll in Political Science 241.) 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)

278. Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America — (Enroll in History 278.) See Cluster A for course description. (Cluster A or C.)

5 units, Spr (Haber)

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 (Kruger)

Eastern Europe in Transition: The German Case in Comparison to other East European Countries — (Enroll in Economics 128X.) Cluster C. DR:9(5)
4-5 units, Win (Kruger)

Divided History: East and West German Literature, 1970-1989 — (Enroll in History 229V.) Cluster B. DR:7(2)
4-5 units, Aut (Hornigk)

From Socialism to Capitalism in East Germany: The Political Economy of Change — (Enroll in Political Science 153X or Economics 126X.) Cluster A or C.
4-5 units, Spr (Krueger)

FLORENCE
The Political Economy of Industrial Change: Italy and Europe in a Global System — (Enroll in Economics 159X.) Cluster C.
5 units, Win (Bianchi, Bellini)

OXFORD
European Economies in a Changing World — (Enroll in Economics 167X.) Cluster C.
5 units, Aut (Crafts)

5 units, Aut (Kirk-Greene)

European Integration: Europe, the U.S.A., and the World — Cluster A.
5 units, Win (Thomas)

International Politics in the Era of Two World Wars — (Enroll in History 102V.) Cluster A.
5 units, Spr (Moshaver)

International Relations of the Middle East — (Enroll in Political Science 40X.) Cluster A.
5 units, Aut (Moshaver)

European Imperialism and the Third World, 1870-1970 — (Enroll in Political Science 141V, History 141V.) Cluster A.
5 units, Spr (Darwin)

PARIS
20th-Century French and European Economy — (Enroll in Economics 122X.) Cluster C.
5 units, Aut (Fouet)

Immigration in France: A New Reality — Cluster B.
4 units, Aut (Kastoryano)

International Relations: Europe and the United States — (Enroll in Political Science 36X.) Cluster A.
4-5 units, Win (Lacorne)

SANTIAGO
Institutional Change and Democracy in the Southern Cone of Latin America — (Enroll in Political Science 224X.) Cluster A.
5 units, Aut (Godoy)

The Transformation of the Global Economy and its Implications for Latin American Growth — (Enroll in Economics 124X.) Cluster C.
5 units, Aut (Hachette)

PROGRAM IN JEWISH STUDIES

Director: Steven Zipperstein
Faculty Advisory Committee: Alice Bach, Joel Beinin, Howard Eilberg-Schwartz, Arnold Eisen, John Felstiner, Van Harvey, Roger Kohn, Seymour Martin Lipset, Shulamit Magnus, 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 require-
ments 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.

COURSES

COMPARATIVE LITERATURE


4-5 units, Aut (Seidman) Th 4:30-7:30

254. Writing the “Shoah”: Literary Representation and Jewish Collective Memory — (Same as English 306B.) Hebrew, Yiddish, and American Jewish fictional representations of the Holocaust. Theoretical writings on the Holocaust as challenge to literary representation and traditional modes of Jewish commemoration. The applicability of feminist cultural study to this subject. Selections from Friedlander, Roskies, Yerushalmi. Literary texts by Applefeld, Celan, Glatstein, Grossman, Hareven, Klepfisz, and I.B. Singer.

4-5 units, Win (Seidman) F 10-11

ENGLISH

60. The Bible as Literature — (English majors and others taking 5 units, register for 160.)

3 units, Win (Lifschutz) TTh 11-12:30

164A. Speaking Back to Scripture — A need to revise and still reclaim the Bible animates much modern poetry, from Dickinson and Whitman through Robert Lowell, Denise Levertov, Paul Celan, Yehuda Amichai and others. Traces the biblical presence (people, places, narratives, prophecy, textual elements) in British, American, European, and Israeli poetry; and in art and music.

5 units, Spr (Felstiner) MW 11-12:30

HISTORY

121. Russian Jewish History, 1772-1917

5 units, Aut (Zipperstein) TTh 11-12:15

136. Women, Gender, and Jewish Modernity — Construction of gender in traditional Jewish culture, focusing on major themes in the history of Jewish women in modern western and eastern Europe: economic function, motherhood and family, religion and spirituality, communal alienation, radicalism, specific fate in the Holocaust. DR:

5 units, Win (Magnus) MW 10-12

137. The Holocaust — The Jews in European and German society in the 19th century. 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.

5 units, Spr (Rodrigue) MW Th 1:15

189A. Isreal: 1880 to the Present— From the beginning of the Zionist Movement to the establishment of the State of Israel. Analysis of the ideological development 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; relationship with the Palestinians and their responses to Zionism; the revolt against the British; establishment of the State of Israel.

5 units, Aut (Mancall) MWTh 1:15

233A. Undergraduate Colloquium: Modern German Jewry — The rise of this community from poverty to middle class respectability, its efforts to win civic equality and social acceptance, its intellectual and religious creativity, from the mid-17th century through the Weimar Republic. Topics: court Jews, the Reform movement, neo-orthodoxy, “Sala Jewesses” and the more typical German bourgeois, the “Science of Judaism,” attitudes to European Jews, responses to antisemitism. DR:9(5)

5 units, Spr (Magnus) W 10-11:50

287A. Undergraduate Colloquium: Modern Jewish Identity — Why and how modern Jews re-defined Jewish identity after the demise of the traditional Jewish community that made affiliation optional and identity open to a range of interpretations. Pressures to renounce Jewish identity; conscious and unconscious forces for remaining Jewish; ambivalence; “self-hate”; religious and secular Jewishness; national consciousness. The lives of some individuals; the social formation of identity
and problematics of gender in modern Jewish identity. DR:9†(5)
5 units, Win (Magnus) W 2:15-4:05

287S. Senior Research Seminar: Topics in the Modern History of Egypt and Palestine — Student-selected research topics with guided historiographical reading and discussions as an introduction.
5 units, Aut (Beinin) T 2:15-4:05

384. Graduate Core Colloquium in Modern Jewish History
4-5 units, Aut (Rodrigue, Zipperstein) W 1:15-3:05

388B. Graduate 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.
4-5 units, Aut (Beinin) W 2:15-4:05

485. Graduate Research Seminar in Modern Jewish History
8-10 units, Win, Spr (Rodrigue) W 1:15-3:05

LINGUISTICS, FOREIGN LANGUAGES

628A,B,C. Beginning Hebrew
4-5 units, Aut, Win, Spr (Ben-Meir Sikuler)

629A,B,C. Intermediate Hebrew
4 units, Aut, Win, Spr (Ben-Meir Sikuler)

630A,B,C. Advanced Hebrew
3 units, Aut, Win, Spr (Ben-Meir Sikuler)

RELIGIOUS STUDIES

15. 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. DR:7(2) or 8(3)
4 units, Aut (Bach) MW 11-12:30

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, Hesio, Euripides’ The Bacchae, Aristotle. DR:7†(2) or 8†(3)
5 units, Aut (Bach) MW 11-12:30

5 units, Spr (Eilberg-Schwartz) TTh 9-10:30

166. Myth and Ritual in Judaism — Reconsideration of major practices and beliefs of ancient Judaism from perspectives of symbolic, cultural, and structural anthropology. Dietary restrictions, circumcision, sacrifice, menstrual laws, rules of impurity. DR:8(3)
5 units, Spr (Eilberg-Schwartz) TTh 9-10:30

NOT OFFERED 1993-94
6. Jewish Intellectual History: Medieval Period
13. Literature of the Holocaust
15. Jewish Literature and Society
16. Modern Jewish Thought
18. Genesis of Anti-Semitism
22. Introduction to Jewish Law
23. Judicial Process in Jewish Law
24. Introduction to Hebrew Literature
26. Topics in Modern Hebrew Literature
32. Medieval Jewish Biblical Interpreters
33. New Testament
38. Contemporary Jewish Thinkers
39. Rabbinic Literature
40. Religions of Late Antiquity
42. Anthropology of Ancient Judaism
43. Women in Judaism
47. Religious Ritual
57. Jewish Intellectual History: Modern Period
58. Encounters Between Modern Philosophy and Judaism
164A. The Biblical Presence in Modern Poetry
213. Myth in the Ancient Near East
264. The Body, Sex, and Gender in Ancient Judaism

CENTER FOR LATIN AMERICAN STUDIES

Chair of the Committee and Director of the Center: Terry Karl
Associate Director: Kathleen B. Morrison
Affiliated Faculty:
Anthropology: Clifford Barnett, George Collier, Jane Collier, William Durham, James Fox, John W. Rick, Renato Rosaldo
Biology: Paul Ehrlich, Harold Mooney, Peter Vitousek
Dance: Susan Cashion
Economics: Donald Harris, Ronald McKinnon
Education: Martin Carnoy, Henry Levin, Amado Padilla
Food Research Institute: Tim Josling, Reynaldo Martorell, Clark Reynolds, Pan Yotopoulos
History: Frederick Bowser, Albert Camarillo, Stephen Haber, John D. Wirth
Latin American Studies: James Breedlove, Kathleen Morrison, Peter Rosset, Clint Smith
Law, School of: John Barton, Thomas Heller, Bill Hing
Linguistics: Shirley B. Heath, John Rickford
School of Medicine: Paul Basch, Yvonne Maldonado, Julie Parsonnet, Gary Schoolnik
Political Science: Terry Karl, Stephen Krasner, Robert Packenham, Philippe Schmitter
Spanish and Portuguese: Fernando Alegria, Wilfrido Corral, Juergen Hahn, Maria-Paz Haro, Francisco Lopes, Adrienne Martin, Mary Pratt, Michael Predmore, Jorge Ruffinelli, Karin Van Den Dool, Sylvia Wynter
Tinker Visiting Professor: Eduardo Viola (Winter, Spring)

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 call (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.
   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 '3,' below).
   d) Remaining courses must be at the 100-level or higher and focus directly on Latin America.
   e) First- or second-year language courses may not be counted toward the 55 units. Only 10 units of Satisfactory/No Credit work may be counted towards the major.

2. Demonstration of language competency in either Spanish or Portuguese at least equivalent to satisfactory completion of courses in grammar and composition at the third-year level of university training (e.g., Spanish 201 and 202), or any course taught in Spanish at the third-year level of university training (e.g., Spanish 131B, 160, or 161). Alternatively, certification from the Department of Spanish and Portuguese of oral language proficiency at the advanced level on the scale of the American Council for the Teaching of Foreign Languages. Portuguese 109, Portuguese for Students of Spanish, is strongly recommended for those students demonstrating competency in Spanish.

3. Field experience in Latin America (study abroad, summer research, internship, etc.).

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 se-
nior 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 no later than Autumn Quarter of the junior year to the Subcommittee on Undergraduate Programs. 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 (e.g., Spanish 201 and 202), or any course taught in Spanish at the third-year level of university training (e.g., 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, etc.).

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 requirement 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 the Graduate Admissions Section of the 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 the 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 (e.g., Spanish 201 and 202), or any course taught in Spanish at the third-year level of university training (e.g., 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 gives 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 grade assigned for the master's paper or project counts 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 research grants for graduate students to conduct individual research projects in Latin America. Separate competitions are held each Spring Quarter in the following categories: pre-dissertation 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; 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

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. Culture, Society, and Politics of Latin America—(Same as History 80.) 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
5 units, Spr (Haber) TTh 1:15-3:05

185. Latin America and Global Environmental Politics — (Same as Anthropology 163, Political Science 113E.) Examines the relationship between development and environmental concerns; the politics of sustainable development; the main issues of global environmental politics (global warming, depletion of the ozone layer, loss of biodiversity and transboundary air and water pollution); the intersection of domestic and international environmental concerns; Latin America and the incipient agenda of global governance. Case studies from Mexico, Costa Rica, Venezuela, Colombia, Brazil, and Chile.
5 units, Win (Viola)

5 units, Aut (Smith) W 7-9 p.m.

195. Perspectives on Sustainable Development in Latin America — Cross-disciplinary examination of perspectives for "sustainable development" in rural areas of Latin America. Interactions between poverty, development, environmental degradation and such approaches to growth and sustainability as agroecology, agroforestry, small farm development, and conservation biology. Limited enrollment.
5 units, Win (Rosset) Th 10-1.

198. 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

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.)
5 units, Aut (Bowser) Th 3:15-5:05
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

260. Latin American Bibliography — Introduction to research use of Stanford library collections on Latin American topics.
3 units, Aut (Breedlove) T 10:15-11:45

379. Graduate Seminar: Economic and Social History of Latin America — (Same as History 478.) Open to non-Latin Americanists working on projects with quantitative data. Research seminar on social science approaches to Latin American history. Emphasis on student research and presentation of findings.
5 units, Win (Haber) T 3:15-5:05

DEPARTMENT OFFERINGS
See respective department listings for course descriptions and Distribution Requirement (DR) information.

AFRICAN AND AFRO-AMERICAN STUDIES

251. Afro-Iberian-American Literature and Thought — (Same as Spanish 251.)
3-5 units (Wynter)

ANTHROPOLOGY

3. Human Prehistory
3-5 units (Rick)

4. Language and Culture of Urban Youth
5 units (Heath)

73A,B,C. First Year Spoken Yucatec Maya
3 units (Fox)

93. Pre-Field Research Seminar
5 units (Yanagisako)

94. Post-Field Research Seminar
5 units (Gibbs)

109. Dance and Culture of Latin America — (Same as Dance 177, Spanish 177.)
3-4 units (Cashion)

149A. Peasant Society: Economy and Change
5 units (Durham)

161A. Indigenous Peoples and Forest Conservation
5 units (Durham, Irvine) given 1994-95

164. Ecological Anthropology
3-5 units (Charnley)

167. Ethnography of Communication — (Same as Linguistics 147.)
4 units (Heath)

168. Medical Anthropology — (Same as Human Biology 168.)
5 units (Barnett)

172. Indigenous Languages of North and South America
5 units (Fox)

181. Evolutionary Anthropology
5 units (Duham)

239. Cultural Approaches to Education and Development — (Same as Education 306C.)
3-5 units (McDermott)

251. Issues in Cultural Studies
5 units (Rosaldo)

258. Ideology and Cultural Nationalism
5 units (Befu)

262. Topics in Political Economy
5 units (Moore)

273. 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 (Cashion)

177. Dances of Latin America
1 unit (Cashion)

179. Mexican Dance: Intermediate
2 units (Cashion)

185. African Caribbean Roots of American Jazz Dance
2 units (Osumare)

186. African-Caribbean Dance Technique
2 units (Osumare)

197. Argentine and Social Tango
1 unit (Powers)

268. Society, Education, and Dance — (Same as Education 218.)
3-5 units (Cashion, Ross)

ECONOMICS

106. The World Food Economy — (Same as Food Research 103.)
4 units (Falcon, Naylor)

118. The Economics of Development
5 units (Kochar)

119. Development and Population Interaction in the Third World — (Same as Food Research 121/219.)
5 units (Yotopoulos)

122. The Theory of Capitalist Development
5 units (Harris)
<table>
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<th>Course Title</th>
<th>Units</th>
<th>Instructor(s)</th>
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<td>Economic Development in Latin America — (Same as Food Research 218.)</td>
<td>5</td>
<td>Reynolds</td>
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<td>165.</td>
<td>International Economics</td>
<td>5</td>
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<td>215.</td>
<td>Industrialization, Growth, and Economic Development</td>
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<td>217.</td>
<td>Money and Finance in Economic Development</td>
<td>5</td>
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<td>266.</td>
<td>International Trade Theory</td>
<td>5</td>
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<td>267.</td>
<td>Special Topics in International Economics</td>
<td>5</td>
<td>McKinnon</td>
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<td>315A,B,C.</td>
<td>Workshop in Economic Development</td>
<td>10</td>
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<td>365A,B,C.</td>
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<td>207.</td>
<td>Seminar: The Politics of International Cooperation in Education</td>
<td>3-5</td>
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<td>First-Year Proseminar in Language, Literacy, and Culture</td>
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<td>Padilla, Sperling, Hakutu</td>
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<td>283.</td>
<td>Attitudes Towards Language and Language Study</td>
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<td>306A.</td>
<td>Education in Economic Development</td>
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<td>306B.</td>
<td>Education and Political Change</td>
<td>5</td>
<td>Staff</td>
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<td>306D.</td>
<td>Sociology of Development and Education — (Same as Sociology 332.)</td>
<td>5</td>
<td>Ramirez</td>
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<tr>
<td>387A,B,C.</td>
<td>Workshop: Comparative Systems — (Same as Sociology 311A,B,C.)</td>
<td>2-5</td>
<td>Meyer, Ramirez</td>
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<td>408.</td>
<td>Research Workshop in International Development Education</td>
<td>2-5</td>
<td>Carnoy</td>
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<tr>
<td>136/236.</td>
<td>Population, the Environment, and the Third World — (Same as Economics 133, Human Biology 136, Sociology 153.)</td>
<td>5</td>
<td>Arthur</td>
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<td>385.</td>
<td>Introductory Seminar: Spain, Government, and Society; 1492-1814</td>
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<td>Spain in America</td>
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<td>20th-Century Brazil</td>
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<td>276/376.</td>
<td>Undergraduate/Graduate Colloquium: The Creation of North America</td>
<td>5</td>
<td>Wirth</td>
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<td>276S.</td>
<td>Senior Research Seminar: NAFTA and Beyond — (Stanford-in-Washington)</td>
<td>5</td>
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<td>277B.</td>
<td>Undergraduate Colloquium: The Western Spanish Borderlands</td>
<td>5</td>
<td>Campbell</td>
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<tr>
<td>277S.</td>
<td>Senior Research Seminar: Ethnicity, Class, Identity in Latin America</td>
<td>5</td>
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<tr>
<td>303C.</td>
<td>Graduate Colloquium: Process of Industrialization: Europe, United States, and Latin America</td>
<td>4-5</td>
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<td>304A,B.</td>
<td>Graduate Colloquium: Historiography of Colonial Spanish America</td>
<td>4-5</td>
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<td>377.</td>
<td>Regionalism in the Americas</td>
<td>4-5</td>
<td>Wirth</td>
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<td>150.</td>
<td>Introduction to Sociolinguistics</td>
<td>4-6</td>
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<td>25.</td>
<td>Colonialism and Nationalism in the Third World</td>
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<td>International Politics</td>
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<td>113A.</td>
<td>Politics and Development in Latin America</td>
<td>5</td>
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<tr>
<td>114K/314K.</td>
<td>The Political Economy of Development</td>
<td>5</td>
<td>Karl</td>
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<tr>
<td>140.</td>
<td>Ethics of Development in a Global Environment</td>
<td>1-4</td>
<td>Lusignan</td>
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<tr>
<td>212P.</td>
<td>The Politics of International Cooperation and Regional Integration</td>
<td>5</td>
<td>Schmitter</td>
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</tbody>
</table>
224. Seminar: Political Economy of Latin American Development  
5 units (Packenham) given 1994-95

227P. Seminar: Democratization—East, West, and South  
5 units (Schmitter)

241. World Politics and the Global Economy  
5 units (Krasner)

243A. International Relations Theory  
5 units (Goldstein)

243C. Seminar: Theoretical Issues in International Political Economy  
5 units (Krasner)

311. Graduate Seminar: Comparative Political Analysis  
5 units (Rice)

315. Workshop on Democratic Theory  
5 units (Schmitter)

SPANISH AND PORTUGUESE

109P. Portuguese for Speakers of Spanish  
2 units (Van den Dool)

109R. Reading Portuguese for Speakers of Spanish  
3 units (Van den Dool)

121M. Spanish for Medical Personnel  
3 units (Corso)

125. Spanish for Professions  
4 units (Staff)

130. Brazilian Cultural Perspectives  
3-5 units (Van den Dool)

131B. Hispanic American Cultural Perspectives  
4 units (Sandoval)

132B. Mexican and Chicano Cultural Perspectives  
4 units (Sandoval)

140. Introduction to Literary Analysis  
3-5 units (Corral)

160,161. Latin American Literature I,II  
3-5 units (Vich, Corral)

186. Modern Chicano/a Fiction  
4-5 units (Espinosa)

190B. Cuba Now!  
3-5 units (Ruffinelli)

201. Advanced Grammar  
3 units (Sandoval)

202. Advanced Composition  
3 units (Haro)

208. Literature and Society in Latin America  
3-5 units (Ruffinelli)

251. Afro-Iberian-American Literature and Thought  
3-5 units (Wynter)

271. Postmodern Brazilian Poetry  
3-5 units (Lopes)

281. Introduction to Chicano Life and Culture  
3-5 units (Saldivar)

290. Brazilian Cinema  
3-5 units (Lopes)

295. Cinema, Literature, and Politics in Latin America  
3-5 units, Aut (Ruffinelli)

295. TransAtlantic Feminism: A Dialogue between “Center” and “Perciphery” on How Tasty Were My French Sisters  
3-5 units Spr (Lopes)

301P. Teaching Practicum  
1 unit (Haro)

307. Latin American Cultural Theory  
3-5 units (Pratt)

309. The Modern Tradition: Criticism and Colonialism  
3-5 units (Pratt)

362. Latin American Writing, 1960 to Present: Gender, Authoritarianism, Resistance  
3-5 units (Pratt)

366. City and Country in Latin American Literature: Onetti and Rulfo  
3-5 units (Ruffinelli)

379. Gabriel García Marquez in Latin American Cinema  
3-5 units (Ruffinelli)

380. Three Brazilian Writers: Machado de Assis, Gracilion Ramos, Guimaraes  
3-5 units (Lopes)

389. Border Culture, Border Writings  
3 units (Morales)

LINGUISTICS

Emeriti: (Professors) Clara N. Bush, Charles A. Ferguson, Joseph H. Greenberg, Dorothy A. Huntington  
Chair: Eve V. Clark  
Professors: Joan Bresnan, Eve V. Clark; Shirley Brice Heath, Martin Kay, Paul Kiparsky, William R. Leben, Stanley Peters, John R. Rickford, Ivan A. Sag, Elizabeth C. Traugott, Thomas A. Wasow  
Associate Professor: William J. Poser  
Assistant Professor: Peter Sells  
Courtesy Professor: John Baugh
activities of the department.

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Study of Language and Information, whose mem-

Cognitive Science Group and the Center for the

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phy of language.

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include courses in language acquisition, sociolin-

ena that directly concern other disciplines. These

the analysis of linguistic structure with phenom-

mantics), words (morphology), sentences (syntax),

components that make up language, including

sounds (phonetics and phonology), meanings (se-

of language.

Lecturer in Hebrew:

Mina Ben-Meir Sikuler

Lecturer in Swahili:

John Mugane

Senior Lecturer in Arabic:

Khalil Barhoum

Senior Lecturer in Hebrew:

Penelope Eckert

Lecturer in Swahili:

John Mugane

Lecturer in Hebrew:

Mina Ben-Meir Sikuler

Lecturer in Swahili:

John Mugane

Acting Assistant Professor: Alex Lascarides (Winter, Spring)

Consulting Professors: Per-Kristian Halvorsen, Jerry R. Hobbs, Ronald M. Kaplan, Charlotte Linde, Geoffrey Nunberg

Consulting Associate Professors: Jared Bernstein, Penelope Eckert

Consulting Assistant Professor: Mary Dalrymple

Visiting Professor: Arnold Zippy (Winter)

Visiting Associate Professor: Peter Austin (Autumn)

Affiliated Faculty: Herbert H. Clark, Kenji Hakuta, James A. Fox, Mary L. Pratt, Orrin W. Robinson, III, Richard D. Schupbach

Fellow: Lisa Green

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: Mina Ben-Meir Sikuler

Lecturer in Swahili: John Mugane

Linguistics concerns itself with the fundamen-
tal questions of what language is and how it is re-
lated 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 cog-
nitive sciences; it provides a link between the hu-

manities and the social sciences, as well as educa-
tion and hearing and speech sciences.

The department offers courses at undergradu-
ate and graduate levels in the areas central to lin-
guistic 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 (se-

mantics), words (morphology), sentences (syntax),

and the way they change. Other courses integrate
the analysis of linguistic structure with phenomen-
a that directly concern other disciplines. These
include courses in language acquisition, sociolin-
guistics, computational linguistics, and the philoso-
phy of language.

A variety of open forums provide for the dis-
cussion of linguistic issues, including colloquia and
regularly scheduled workshops in phonology, syn-
tax, sociolinguistics, child language, and histori-
cal linguistics. Faculty and visiting scholars in the
Cognitive Science Group and the Center for the
Study of Language and Information, whose mem-
bers are linguists, philosophers, psychologists, and
computer scientists, participate extensively in the
activities of the department.

UNDERGRADUATE PROGRAM

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 humani-
tics, social sciences, and physical sciences and pro-
vides a solid general education as a background
for advanced studies in such disciplines as anthro-
pology, communication, computer science, edu-
cation (language, literacy and culture), hearing and
speech sciences, languages, law, philosophy, and
psychology.

Requirements for the A.B. include at least 48
units of course work in linguistics and related fields
and 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.

1. Courses: a total of 48 units is required includ-
ing 110, 120, 130, and 150, (100-level courses are
waived if 200-level courses in the same area are
taken), and a course in historical linguistics or
history of a language. Other courses must form
a coherent program within one of the following
areas of specialization and must be approved
by an undergraduate studies adviser. Specific
requirements vary with each area. Detailed in-
formation is available from the Department of
Linguistics (Bldg. 100).

a) Linguistic Structure: this involves the inves-
tigation of the internal properties of the hu-
man linguistic system. Traditional core ar-

ares are phonology, morphology, syntax, and
semantics, in which linguists attempt to de-
velop and justify theories of organization and
content of the linguistic system. Advanced
undergraduates may take introductory gradu-
ate courses in this area, if they wish.

b) Cognitive Science: this seeks to understand

the nature of human cognitive systems, an
important one being the human linguistic
system. Central questions asked in the do-
main of language as a cognitive system are:
How is language represented in the human
mind? How is it learned? How is it put to use
in speaking and understanding? How can we
simulate with machines the human learning
and use of language? This domain of language
study involves anthropology, artificial intel-
ligence, linguistics, philosophy, and psychol-


c) The Linguistics of a Particular Language or
Language Family: this specialization, which

provides a suitable preparation for foreign

LINGUISTICS 519
GRADUATE PROGRAMS
MASTER OF ARTS

The University's basic requirements for the master's degree are discussed in the "Degrees" section in this bulletin. The following are additional departmental requirements. Candidates should review departmental "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.

2. Courses: candidates must complete a minimum 40 units of graduate work in linguistics (see the graduate adviser for appropriate courses); a course in historical linguistics or the history of a language, and at least three courses in the student's area of specialization. Individual programs should be worked out in advance with the Linguistics Graduate Studies Adviser. A letter grade indicator (LGI) of at least 'B' must be maintained for all degree program course work.

3. Thesis: A.M. candidates are expected to present either a formal A.M. thesis, fulfilling the University requirements specified in the "Degrees" section of this bulletin, or a research paper of A.M. scope (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 "Degrees" section in this bulletin. Candidates should review departmental "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 guaran-
ees 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 (e.g., 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 '2' above), one foreign language requirement (see '1' above), and one qualifying paper (see '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 '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 Psycholinguistics
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, Poser)

4 units, not given 1993-94

54. Speech in Action — Open to sophomores only. Societies construct themselves in part through such interactive practices as promising, pledging, commanding, hypothesizing. These practices, known as "speech acts," define speaker-addressee relations, and legitimize certain contractual, political, pedagogical, and rhetorical activities. Topics: forms of "politeness" as exemplified by English and by Japanese "honorification:" evidence for changes from interactive, negotiated practices of pledging to individualist practices of promising (the development of "modern consciousness"), the role of speech acts in legitimizing discourse genres, spoken and written; and the speech acts of rap, including ritual insults.
4-5 units, Aut (Traugott)

60. Introduction to Language Change — (Same as Anthropology 178.) 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, not given 1993-94

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)

71. Linguistics and Literature — (Same as English 101.) Introduction to poetics, focusing on those aspects of verbal art which are rooted in the organization of language as a representational system. Principles of metrical form. English metrics: the canonical system, its varieties and offshoots. Metrical innovation and normative prosodic discourse: the play of tradition and ideology within constraints imposed by linguistic structure. Parallelism and syntactic theory. Figurative language in light of theories of linguistic interpretation and language use.
5 units, Spr (Kiparsky)

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, Win (Green, Rickford)

75. Introduction to the Germanic Languages — (Same as German 38A/138.) Survey of the oldest attested stages of the Germanic language family: Gothic, Old Norse, Old Saxon, Old English, Old High German, Old Dutch, Old Frisian. External history and internal relationships. DR:9(4)
3 units, Win (Robinson)

85A. Introduction to Methods of Teaching English as a Second Language — Practical approach to problems of teaching English to speakers of other languages, including a survey of features of English phonology, morphology, and syntax which present particular difficulties — presentation of problems, construction of exercises, and lesson planning. Each student serves as tutor to an individual learning to speak English.
4 units, Win (McChesney)

85B. Practical Training 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: 85A.
2 units, Spr (McChesney)

86. Preparing to Teach English Abroad — Practical approach to teaching English abroad: preparing lessons, supplementing textbooks, and answering questions. Tutoring of a non-native speaker.
3 units, Spr (McChesney)

97. Research in Linguistics — Introduction to research goals and methods in linguistics and related disciplines. Discussion of assigned readings, and presentation of senior thesis and other undergraduate research projects. Overviews by different faculty members of current research topics and methods in their sub-areas.
4 units, by arrangement

98A,B,C. Honors Research
2 units, Aut (Staff)
4 units, Win, Spr (Staff)
linguistics

99. Independent Study
1 or more units, any quarter (Staff)
by arrangement

102. The History of the English Language —
(Same as English 102.) Evolution of English in
Britain and the U.S.; colonial and post-colonial
English; the use of English world-wide. Emphasis
on issues in language contact, standardization, and
the development of English as a literary medium.
DR:9(4)
4-5 units, Aut (Traugott)

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, Spr (Poser)

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, articul-
ation, 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 (Leben)

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 linguis-
tic hypotheses, reading, and constructing rules.
4 units, Aut (Sells)

121. Intermediate Syntax — Introduction to mod-
ern syntactic theory and its relation to sentence
processing. Overview of selected grammatical prob-
lems from the perspective of post-transformational
syntactic theory. Emphasis on English grammar,
with some exposure to the syntax of other lan-
guages.
4 units, Spr (Green)

130. Introduction to Semantics and Pragmatics—
Linguistic meaning and its role in communica-
tion. 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 proposi-
tional 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 (Lasardides)

135. Basic Concepts in Mathematical Logic—
(Same as Philosophy 159.) Concepts and tech-
niques used in mathematical logic, primarily through
the study of the language of first-order logic. Top-
ics: formalization, proof, propositional logic, quan-
tifiers, sets, mathematical induction, and enumer-
ability. DR:4(6)
4 units, Aut (Wasow)

136. First-Order Logic — (Enroll in Philosophy
160A.) Syntax and semantics of sentential and first-
order logic. Introduction to basic concepts of model
theory. Gödel's Completeness Theorem and its con-
sequences: Löwenheim-Skolem Theorem and Com-
 pactness Theorem. Prerequisite: Philosophy 159 or
consent of instructor. DR:4(6)
4 units, Win (Staff)

139/239A. Introduction to Computational Lin-
guistics I — Introduction to the computational as-
pects of basic linguistic processes in morphology,
syntax, and semantics, and their integration in applica-
tions such as machine translation and man-ma-
chine interfaces. Grades based on computer pro-
grams implementing key algorithms for parsing,
generation, etc., done as homework exercises. Pre-
 requisite: introductory course in Prolog program-
ing.
4 units, Aut (Kay)

139/239B. Introduction to Computational Lin-
guistics II — Continuation of 139/239A. Prerequi-
site: 139/239A or consent of instructor.
4 units, Win (Kay)

145. Language and Thought — (Same as Psychol-
ogy 146.) The psychology of language, including
production and understanding of utterances, from
speech sounds to speaker's meaning, children's
acquisition of their first language, and psychologi-
cal 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 Psychology 1. DR:9(4)
4 units, Aut (H. Clark)

147. Ethnography of Communication — (Same as
Anthropology 167.) Language use in situations,
organizations, and by members of different cul-
tures. Speech events and the role of conversation,
narratives, and performance modes in different con-
texts. Focuses on ethnographic methods for the
study of verbal and non-verbal communication.
4 units, Win (Heath)

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, such as bilingual education or language rights with additional section meeting per week focusing on their field experience. DR: 9(5)

4-6 units, Aut (Rickford)

153. Inter- and Intra-Ethnic Variation in Urban Vernacular English — Literature on ethnic vernaculars in urban settings, concentrating on modern sociolinguistic studies of black and white vernaculars in New York City, Philadelphia, Detroit, Washington, D.C., Los Angeles, Atlanta, and London. Recent research findings that urban black and white vernaculars are diverging are compared with new research in the local (E. Palo Alto) community. Students innovate local research on their own. Implications for linguistics, the social sciences, and urban policy. DR: 3 or 9 (4 or 5)

4 units, not given 1993-94

154. Language and Culture of Urban Youth — (Same as Anthropology 4, Urban Studies 161.) Sosiocultural 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)


4-5 units, not given 1993-94

172. Linguistic Foundations of Racial Strife in American Education — (Same as Education 107X.) DR: 3

3 units, not given 1993-94

173. African-American English in Educational Context — (Same as Education 270.) Enrollment limited to graduate students. Examines linguistic and cultural conflicts that confront the majority of African-American students. Interdisciplinary re-

search 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.

3 units, Win (Baugh)

175. Linguistics and the Analysis of German — (Same as German Studies 252.) Introduction to linguistic theory and analysis, emphasizing modern German.

3-5 units, Aut (Robinson)

177. The Structure of Japanese — (Same as Asian Languages/Japanese 277.) 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, Spr (Matsumoto)

188. Teaching Asian Languages — (Same as Asian Languages/Chinese/Japanese 208.) 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, Spr (Sun) by arrangement

189/289. Linguistics and the Teaching of English as a Foreign/Second Language — (Same as Education 282.) 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, Aut (Hubbard)


4 units, Win (Leben)


4 units, not given 1993-94

207B. Morphosyntax — Role of morphology in a grammar: how word structure serves syntax in the expression of meaning. Universal properties and typology of morphological categories; proposals towards their principled explanation in a restrictive theory of language.

4 units, Spr (Kiparsky)
208. Advanced Phonology — Syllable structure and harmonic processes; their analysis in the framework of non-linear phonology. Prosodic lexical phonology.
   4 units, Aut (Kiparsky)

209. Issues in 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)

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)

221. Phrase Structure and Categorical Approaches to Grammar — 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, Win (Sag)

223. Theories of Non-Configurationality — Examines a variety of theoretical approaches to the problems posed by languages that appear to lack standard phrase structure.
   4 units, Aut (Bresnan)

224. Phrase Structure Typology — Resolution of the conflict between recent syntactic theories of phrase structure typology based on head movement and extended X-bar theory, and constraint-based lexical syntactic frameworks compatible with strong lexical morphological principles. How the currently accepted analyses of verb movement can be expressed within a constraint-based framework, its extension to languages that show a high degree of nonconfigurationality or exceptionally rich inflectional morphology, and the lexicalist and head-movement approaches to morphology in these languages.
   4 units, Spr (Sells, Bresnan)

225. Advanced Topics in Lexical-Functional Grammar — Nonlocal syntactic dependencies and their formal encoding in LFG, concentrating on relations expressible at the level of f-structure. The relation between an anaphor and its antecedent, and the relation between a clause containing an ellipsis and the clause that provides its interpretation.
   4 units, Spr (Dalrymple, Kaplan, Maxwell)

226. Structure of Australian Languages — Issues in morphosyntax of Australian Aboriginal languages, including case-marking, ergativity, switch-reference, configurationality and word order, concentrating on the Jiwarli language.
   4 units, Aut (Austin)

228A. Topics in Syntax and Semantics — Seminar on current issues relating to the syntax/semantics interface. Recommended: some knowledge of syntax and semantics.
   4 units, Aut (Sag)

228B. Topics in Syntactic Theory: Current Topics in Syntax — Survey of recent work in Government-Binding Theory and its relation to more general current theoretical issues.
   4 units, Win (Sells)

228C. Topics in Syntactic Theory — Critical analysis of significant current journal articles in syntax.
   4 units, Win (Bresnan)

229. Seminar in Syntax: Syntactic Constructions — Exploration of a framework for syntax that takes the construction as a fundamental notion, motivating and developing the framework in detail and analyzing some syntactic phenomena within the framework.
   4 units, Win (Zwicky)

230A. 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 (Peters)

230B. Semantics and Pragmatics — In-depth introduction to key areas in current research in semantics and pragmatics. Prerequisite: 230A.
   4 units, Spr (Lascarides)

231. Topics in Semantics and Pragmatics
   4 units, Aut (Peters)
232. Topics in Discourse Analysis  
4 units, not given 1993-94

233. Semantics Seminar: Lexical Semantics  
4 units, Spr (Peters)

234. Introduction to Discourse Analysis — (Same as Comparative Literature 234.) Survey of approaches to discourse analysis. Readings include functional intra-sentential analysis, narrative, oral vs. literate style, and conversational analysis.  
4 units, Win (Traugott)

236. Topics in Computational Linguistics — Hands-on practicum aimed at developing tools for some area of application such as machine translation. Prerequisite: background in computational linguistics.  
3 units, not given 1993-94

237. Phenomenological Foundations of Cognition, Language, and Computation — (Same as Computer Science 378.) Critical analysis of theoretical foundations of cognitive approach of language, thought, and computation. Readings contrast the rationalistic assumptions of current linguistics and artificial intelligence with alternatives drawn from phenomenology, theoretical biology, and socially-oriented speech act theory. Emphasis on relevance of theoretical orientation to the design, implementation, and impact of computer systems dealing with language.  
3-4 units, Win (Edwards)

239A. Introduction to Computational Linguistics I — (Same as Symbolic Systems 239A.) See 139A.  
4 units, Aut (Kay)

239B. Introduction to Computational Linguistics II — See 139B.  
4 units, Win (Kay)

240. Language Acquisition I — (Same as Psychology 240.) 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: Meaning — (Same as Psychology 241.) Focuses on theories of meaning acquisition, lexical structure, and lexical factors in the acquisition of syntax.  
4 units, Win (E. Clark)

246. Psycholinguistics — (Same as Psychology 214.) Prerequisite: graduate standing in Psychology or consent of instructor.  
3 units, Spr (H. Clark)

247. Seminar on Human Sentence Processing — Discussion of recent literature on how people parse and produce sentences. Emphasis on the relationship between sentence processing models and issues in contemporary syntactic theory.  
4 units, Win (Kiparsky)
262. Language Classification — Survey of genetic affiliations and the typological classification of languages.
4 units, Spr (Poser)

266. Topics in Historical Linguistics: Semantic Change — Meaning change, semantic vs. pragmatic change, metaphor vs. metonymic processes, lexical change vs. grammaticalization, subjectification.
4 units, Aut (Traugott)

267. Narrative and Genre — (Same as English 260A).
4-5 units, Aut (Heath)

271. The Structure of Korean — (Same as Asian Languages/Korean 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)

281. Japanese Pragmatics — (Same as Asian Languages/Japanese 281.) Japanese language from the point of view of pragmatics; focuses on sociocultural and discourse factors reflected in choice of linguistic forms and their theoretical implications. Prerequisite: one year of Japanese and one course in linguistics, or two years of Japanese, or consent of instructor.
4 units, not given 1993-94

4 units (Matsumoto) not given 1993-94

287. Methods in Field Research — Introduction to research methods including ear training, elicitation techniques, data reliability, equipment, database construction and ethical, cultural, and political issues.
4 units, Aut (Poser)

395A,B. Research Workshop — Restricted to students in the doctoral program. Student presentations of research toward qualifying papers.
395A. 2 units, Aut (Clark)
Spr (Staff)
395B. Spr (Traugott, Staff)

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 1993-94

16. Writing and Literacy
51. Language and Ethnicity
60. Introduction to Language Change
72. Point of View in Fiction: A Linguistic Approach
101/201. Writing Systems
107. Introduction to Morphology
160. Languages in Contact
162. English Transplanted, English Transformed: Pidgins and Creoles
187/287. Teaching Japanese as a Second Language
200. Foundations of Linguistic Theory
207A. Morphology
212. Metrics
218. Topics in Phonetics
251. Sociolinguistics and Pidgin/Creole Studies
253. Language Planning and Public Policy
255. Linguistic Anthropology
257. Language Variation
258. Educational Aspects of Sociolinguistics
259. Topics in Sociolinguistics
272. Introduction to Indo-European Linguistics
275. Germanic Syntax
285. Methods in Developmental Psycholinguistics
286. Sociolinguistic Field Methods
291. Structure of Modern Chinese

LANGUAGE PROGRAMS

The Special Language Program offers a number of foreign languages not otherwise taught at Stanford. Based on current funding and requests, the courses planned for 1993-94 are listed below; however, not every course listed will be taught. Additional languages may still be offered upon request provided funding is available. Requests for the 1994-95 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. “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. Normally, languages are taught for a two-year, three-quarter sequence.

AFRICAN LANGUAGES (600-619)

602A,B,C. Beginning Hausa
602A. 3 units, Aut (Staff)
602B. 3 units, Win (Staff)
602C. 3 units, Spr (Staff)

606A,B,C. Beginning Swahili — Successful completion of 606C may fulfill the foreign language 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. Beginning Balante
610A. 3 units, Aut (Staff)
610B. 3 units, Win (Staff)
610C. 3 units, Spr (Staff)

613A,B,C. Intermediate Wolof
613A. 3 units, Aut (Diame)
613B. 3 units, Win (Diame)
613C. 3 units, Spr (Diame)

615A,B,C. Intermediate Shona
615A. 3 units, Aut (Staff)
615B. 3 units, Win (Staff)
615C. 3 units, Spr (Staff)

618A,B,C. Beginning Zulu
618A. 3 units, Aut (Staff)
618B. 3 units, Win (Staff)
618C. 3 units, Spr (Staff)

OTHER LANGUAGES (620-679)

620A,B,C. Beginning Arabic — Successful completion of 620C may fulfill the foreign language 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 — 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.
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.
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.
4 units, Spr (Barhoum)

626A,B,C. Beginning Turkish
626A. 3 units, Aut (Ayanoglu)
626B. 3 units, Win (Ayanoglu)
626C. 3 units, Spr (Ayanoglu)

627A,B,C. Beginning Yiddish
627A. 3 units, Aut (Berman)
627B. 3 units, Win (Berman)
627C. 3 units, Spr (Berman)

628A,B,C. Beginning Hebrew
628A. 4 units, Aut (Ben-Meir Sikuler)
628B. 4 units, Win (Ben-Meir Sikuler)
628C. 4 units, Spr (Ben-Meir Sikuler)

629A,B,C. Intermediate Hebrew
629A. 4 units, Aut (Ben-Meir Sikuler)
629B. 4 units, Win (Ben-Meir Sikuler)
629C. 4 units, Spr (Ben-Meir Sikuler)

630A,B,C. Advanced Hebrew
630A. 3 units, Aut (Ben-Meir Sikuler)
630B. 3 units, Win (Ben-Meir Sikuler)
630C. 3 units, Spr (Ben-Meir Sikuler)

636A,B,C. Beginning Muscogee/Creek
636A. 3 units, Aut (Staff)
636B. 3 units, Win (Staff)
636C. 3 units, Spr (Staff)
637A,B,C. Beginning Siouan/Lakota
637A. 3 units, Aut (FastWolf)
637B. 3 units, Win (FastWolf)
637C. 3 units, Spr (FastWolf)

638A,B,C. Beginning Navajo
638A. 3 units, Aut (Staff)
638B. 3 units, Win (Staff)
638C. 3 units, Win (Staff)

644A,B,C. Beginning Tagalog
644A. 3 units, Aut (Staff)
644B. 3 units, Win (Staff)
644C. 3 units, Spr (Staff)

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)

657A,B,C. Intermediate Indonesian
657A. 3 units, Win (Burke)
657B. 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 (Staff)
660B. 3 units, Win (Staff)
660C. 3 units, Spr (Staff)

670A,B,C. Beginning Modern Greek—Successful completion of 670C may fulfill the foreign language requirement.
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)

672A,B,C. Advanced Modern Greek
672A. 3 units, Aut (Prionas)
672B. 3 units, Win (Prionas)
672C. 3 units, Spr (Prionas)

676A,B,C. Beginning Thai
676A. 3 units, Aut (Staff)
676B. 3 units, Win (Staff)
676C. 3 units, Spr (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 in English as a Foreign Language (ESF) 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 EFS 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 graduate 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. Focuses 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 (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 (McChesney, Hubbard) 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, Win, Spr (Staff) 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 (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 (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 (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 departmental listings for further information.

ASIAN LANGUAGES

GENERAL

113. Zhuang Zi

131. Chinese Poetry in Translation

132. Chinese Fiction and Drama in Translation

133. Modern Chinese Literature in Translation

134. Contemporary Chinese Fiction

135. Japanese Drama in Translation

136. Japanese Poetry in Translation

137. Japanese Fiction in Translation

138. Modern Japanese Literature in Translation

142. Constructing the Subject

181. Japanese Women Writers

195. Modern Intellectuals in Japanese Literature

CLASSICS

12. Greek Tragedy: Aeschylus, Sophocles, Euripides

65. Greek Philosophy — (Same as Philosophy 100)

FRENCH AND ITALIAN

GENERAL

206E. The Grail Legend in Modern Culture

208E. Female Saints

233. Dante’s Divine Comedy

240E. Baudelaire

250E. Proust

257E. Camus

266E. Women’s Voices in Contemporary Italian Fiction

270E. European Fiction

272E. Italo Calvino in Translation

273E. Women and Psychoanalysis

297E. Literature and Philosophy: Perspective of Self-Deception

281E. Pirandello, Sartre, and Beckett: Self as World in Modern Literature

GERMAN STUDIES

7A, 8A, 9A. Myth and Modernity

7A. Literature

8A. Logos

9A. Language

31A-33A. German Culture and Civilization I-II

38A. Introduction to the Germanic Language

64A. Writings of Franz Kafka

125A. The Epic Tradition

126A. Old Norse Literature in Translation

136A. Seminar: Monsters, Masochists, Tyrants: Embodiments of Authority in German Film
HUMANITIES

SPECIAL PROGRAMS

All 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 — (Same as History 315.)

SLAVIC LANGUAGES AND LITERATURES

130. Milan Kundera
145/245. Survey of Russian Literature in English Translation I: The Age of Experiment
146/246. Survey of Russian Literature in English Translation II: The Age of Realism
147/247. Survey of Russian Literature in English Translation after 1917: Invention of Tradition
151. Fyodor Dostoevsky
155/255. Anton Chekhov

SPANISH AND PORTUGUESE

SPANISH

170. Undergraduate Colloquium: Fiction and the Political Imagination
216. Don Quijote I
217. Don Quijote II
218. The Complete Don Quijote

PORTUGUESE

190. Masterpieces of Portuguese Literature in Translation
192. Lusophone African Literature in Translation: Cape Verde, Guinea-Bissau, São Tomé, Mozambique
Math. 104. Continuation of 103  
or Math. 114. Continuation of 113 3
Math. 109. Modern Algebra and its Applications  
or Math. 120. Modern Algebra 3
Math. 130. Ordinary Differential Equations 3
2. One of the following:
   Math. 115. Fundamental Concepts of Analysis 3
   Math. 160A. First Order Logic 4
   Computer Science 137. Fundamentals of 
   Numerical Computation 4

Computer Science (CS) (16-18 units)
1. CS 106X. Programming Methodology and 
   Abstractions (Accelerated) (CS 106A and B 
   may be substituted) 5
2. CS 109A,B. Introduction to Computer Science 8
3. One of the following:
   CS 107. Programming Paradigms 5
   CS 137. Fundamentals of Numerical 
   Computation 4
   CS 154. Introduction to Automata 
   and Complexity Theory 4
   or CS 254. Automata, Languages, 
   and Computability 4
   CS 260. Concrete Mathematics 3

Operations Research (OR) (8-9 units)
OR 152. Introduction to Operations Research I 
(Enroll in Engineering 62) 4
OR 153. Introduction to Operations Research II 
 or OR 241. Linear Programming 3
 (or OR 340. Linear Programming) 4
OR 243. Integer and Nonlinear Programming 3
OR 251. Probabilistic Models in 
Operations Research 3

Statistics (10 units)
Stat. 200. Introduction to Statistical Inference 3
Stat. 201. Statistical Methods 3 
or Stat. 203. Analysis of Variance 3

Electives (9 units)
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 3
Math. 131. Partial Differential Equations I 3
(Enroll in Engineering 110) 3
Op. Res. 252. Stochastic Models in 
Operations Research 3
Stat. 201B. Data Analysis II 3
Stat. 217. Introduction to Stochastic Processes 
and Its Applications 3

For Computer Science (CS), suggested electives 
include those courses not taken under ‘3’ of the 
above Computer Science list and the following:

CS 110. Introduction to Computer Systems and 
Assembly Language Programming
CS 112. Computer Organization 
(Enroll in Elect. Engr. 182)
CS 140. Concurrent Programming
CS 143. Compilers
CS 157. Logic and Automated Reasoning
CS 161. Data Structures and Algorithms
CS 211. Logic Design (Enroll in Elect. Engr. 381)
CS 212. Computer Architecture and Organization 
(Enroll in Elect. Engr. 282)
CS 221. Introduction to Artificial Intelligence
CS 225A. Declarative Programming
CS 237A. Advanced Numerical Analysis
CS 240A. Operating Systems
CS 243. Advanced Compiling Techniques

Elective:
Math. & Comp. Sci. 100. Mathematics of Sports

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 engi-
neering, industrial engineering, etc., that might be 
relevant to a mathematical sciences major, depend-
ing on the particular interest of the student. Ma-
jors must file with their advisers a plan for com-
pleting degree requirements at least three quarters 
before graduation. All courses used to fulfill ma-
or requirements must be taken for a letter grade 
with the exception of courses offered Satisfactory/
No Credit only. A course used to fulfill the require-
ments 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 
more intensive study of mathematical sciences than 
the Bachelor of Science program. In addition to 
meeting all requirements for the B.S. in Mathemati-
cal 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 sci-
cences in addition to the requirements for the major 
listed above. These courses should form a sus-
tained effort in one area and constitute a pro-
gram approved by the committee in charge of 
the Mathematical and Computational Science 
Program.

3. Include in the above 15 units at least one of: (i) an 
approved higher-level graduate course, (ii) 
participation in a small group seminar, or (iii) 
least 3 units of directed reading.

Prospective honors students should consult with 
their advisers by the last quarter of the junior ye
to prepare a program of study for approval by the committee in charge.

COURSES

100. Mathematics of Sports — The use of mathematics, statistics, and probability in the analysis of athletic performance, sports records, strategy, etc. Topics: mathematical analysis of physical and biological aspects of human performance, effects of variations in technique and equipment, determination of optimal strategies, traditional sports statistics and development of new statistics, calculation of probabilities of various outcomes, etc. in different sports. Prerequisite: Math. 43. Corequisite: Statistics 116.

3 units, not given 1993-94

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, Masaaki Furusawa, Hansjorg Geiges, Viktor Ginzburg, Eriko Hironaka, Ron Karidi, Rachel Kuske, Jun Li, Vincent Liu, Antonias Melas, Paul Milewski, Michael Slack

Courtesy Professor: Renata Kallosh

The Department of Mathematics offers programs leading to the degrees 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 '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.

* The new algebra requirement for mathematics majors applies to students who declared a Mathematics major Autumn Quarter 1991 and thereafter.
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 departmental Committee on Undergraduate Affairs.

Variations in the basic program described above are possible. In particular, students interested in applied mathematics may obtain the B.S. in Mathematics by taking a suitable program of courses in a field of application of mathematics in place of some of the courses prescribed above. Individual programs in such cases must be approved by the departmental Committee on Undergraduate Affairs.

To receive departmental 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 14 courses, these are required: 106, 114, 120, 134A, B, 171, and 173. 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 must be taken. 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 paragraph 4 above). Below is a typical mathematics curriculum of an honors Math. major:

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<tr>
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<th>Autumn</th>
<th>Winter</th>
<th>Spring</th>
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<tr>
<td>Freshman</td>
<td>43H</td>
<td>44H</td>
<td>45H</td>
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<td>Sophomore</td>
<td>120</td>
<td>134A</td>
<td>134B</td>
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<td>171</td>
<td>173</td>
<td>114</td>
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<tr>
<td>Junior</td>
<td>143</td>
<td>4 electives</td>
<td>from the 140s and 150s</td>
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<td>206</td>
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<td>Senior</td>
<td>205A</td>
<td>205B</td>
<td>205C</td>
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<td>Senior Thesis</td>
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Students with questions about the honors program should see Professors Cohen or Royden.

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 in this bulletin.

GRADUATE PROGRAMS

MASTER OF SCIENCE

The University's basic requirements for the master's degree are discussed in the “Degrees” section in this bulletin. The following are additional departmental requirements:

Candidates must complete an approved course program of 36 units beyond the departmental requirement 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.

For the degree of M.S. in Computer Science, see the “Computer Science” section in 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 in this bulletin.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the doctorate (residence, dissertation, examination, etc.) are discussed in the “Degrees” section in this bulletin. The following are additional departmental requirements:

To be admitted to candidacy, the student must have successfully completed 27 units of graduate courses (i.e., courses numbered 200 and above). In addition, the student must pass qualifying examinations given by the department.

Beyond the requirements for candidacy, the student must complete a course of study of at least 48 units approved by the Department of Mathematics and submit an acceptable dissertation. The course program should display substantial breadth in mathematics outside the student’s field of application of mathematics. The student must receive an LGI of ‘B’ or better in courses used to satisfy the Ph.D. requirement. In addition, the student must pass the University oral examination and pass a reading examination in two foreign languages, chosen from French, German, and Russian.

Experience in teaching is emphasized in the Ph.D. program. Each student is required to complete nine quarters of such experience. The nature of the teaching assignment for each of those quarters is determined by the department in consultation with the student. Typical assignments include teaching or assisting in teaching an undergraduate course or lecturing in an advanced seminar.

For the Ph.D. degree in Computer Science, see the “Computer Science” section in this bulletin.

Ph.D. MINOR

The student should complete both of the following:

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 ‘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 formal 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 (Staff) MWF 9, 10, 11, 1:15
TTh 1:15-2:30
Win (Staff) MWF 9, 10
Sum (Staff) MTWTh 10

4 units, Win (Staff) MWF 9, 10, 11, 1:15
TTh 1:15-2:30
Spr (Staff) MWF 9, 10

4 units, Aut (Staff) MWF 9
Spr (Staff) MWF 9, 10, 11, 1:15
TTh 1:15-2:30

41, 42, 43 — (Autumn, Winter, Spring Quarters respectively.) Consists of three large lecture classes per week together with 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 (Osgood) MTWThF 11, 1:15

42. Calculus — Continuation of Math. 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 (Carlsson, Staff) MTWThF 10, 11, 1:15

Win (White) MTWThF 11, 1:15, 2:15

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 (V. Liu, Schoen, Milewski, Melas) MTWThF 10, 11, 1:15, 2:15

Win (Hironaka, Furusawa, Staff) MTWThF 10, 11, 1:15

Spr (Geiges) MTWThF 11, 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. DR:4(6)

5 units, Aut (White) MTWTh 2:15-3:15

Win (Eliashberg) MTWTh 10-11

Spr (Li) MTWTh 2:15-3:15

44. Calculus — Continuation of 43. Topics: infinite sequences and series, line and surface integrals. The basic theorems of vector analysis (Green’s, Stokes, and Divergence). Prerequisite: 43 or equivalent.

3 units, Aut (Eliashberg, Slack) MWF 10, TTh 11-12:15

Win (Li, Karidi) MWF 10, TTh 11-12:15

Spr (Slack) TTh 1:15-2:30

Sum (Staff) MTWTh 11

104. Matrix Theory and its Applications — (Continuation of 103.) Determinants, eigenvalues, and eigenvectors. Positive definite matrices, extremum problems, computations with matrices, elements of linear programming and game theory.

3 units, Win (Mazzeo) MWF 1:15

Spr (Slack) TTh 1:15-2:30

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 (Hironaka) TTh 11-12:15

Spr (Karidi) TTh 11-12:15

Sum (Staff) MTWTh 11

109. Modern Algebra and its Applications—Same as 120, but emphasis on applications of modern algebra including symmetry groups, crystalgraphic groups, and error-correcting codes. Prerequisite: 103, 113, or equivalent.

3 units, Aut (R. Cohen) MWF 2:15

113. Linear Algebra and Matrix Theory — Algebraic properties of matrices and their interpretations in geometric terms. Relationship between the algebraic and geometric points of view and matrix fundamental to the study and solution of linear equations. Topics: linear equations, vector space, linear independence, bases and coordinate systems, linear transformations and matrices; similarity;
envectors and eigenvalues; diagonal and Jordan forms. DR:4(6)

3 units, Aut (Royden) MWF 10
Win (Ratner) TTh 3-4:15

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 (Royden) MWF 10


3 units, Aut (Hironaka) TTh 11-12:15
Win (Melas) MWF 2:15
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 (Li) MWF 2:15

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 (Bramfield) MWF 2:15

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 1993-94

126. Mathematical Models in Population Biology — (Same as 226, Biological Sciences 279.) For advanced undergraduates and beginning graduate students in biology and mathematics. Topics: elements of population genetics and ecology, models of the evolution of behavioral traits (kin, altruism, group selection), theoretical studies of mating patterns in natural populations, problems of optimality of population sex ratio, population, growth model, age structure, and life histories. Prerequisites: 43, 103. Recommended: 130.

not given 1993-94

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 (Simon, Papanicolaou) MWF 1:15
TTh 1:15-2:30
Win (Andrews, Dembo) MWF 1:15
TTh 11-12:15
Spr (Melas, V. Liu) MWF 11, 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 (Papanicolaou) TTh 1:15-2:30


3 units, Spr (Papanicolaou) TTh 1:15-2:30

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, and 171, or consent of instructor.

3 units, Win, Spr (P. Cohen) MWF 2:15

141. Higher Geometries — Study of various geometries, including projective, affine, and non-Euclidean geometry. Prerequisite: 113.

3 units, Aut (Royden) MW 2:15-3:30


3 units, Win (Geiges) TTh 11-12:15

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 1993-94

147. Differential Topology — Smooth manifolds, transversality, Sard’s theorem, embeddings, degree of a map, Borsuk-Ulam theorem, Hopf degree theorem, Jordan Curve Theorem. Prerequisites: 115 or 171, 173.

3 units, Spr (Kerckhoff) TTh 1:15-2:30
148. Algebraic Topology — Fundamental group, covering spaces, Euler characteristic, classification of surfaces, knots. Prerequisites: 120, 171.

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 (Bump) TTh 1:15-2:30

155. Geometrical Groups — The rotation and unitary groups emphasizing two, three, and four dimensions. Quaternions. The Lorentz group and SL(2,C). Prerequisites: 113, 120, or consent of instructor.

not given 1993-94

156. Group Representations

not given 1993-94

160A. First-Order Logic — (Enroll in Philosophy 160A.) 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.

4 units, Win (Staff) MWF 2:15

160B. Computability and Logic — (Enroll in Philosophy 160B.) 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

161. Set Theory — Non-axiomatic, informal approach. Operations on sets and Boolean algebra. Relations, orderings, equivalence relations, and functions. Set-theoretical characterization of the basic number systems. Equinumerosity of sets, the axiom of choice and cardinal numbers. Well-ordering relations and ordinal numbers. Transfinite arithmetic. Prerequisite: 44.

3 units, Spr (Ratner) TTh 3-4:15

162. Philosophy of Mathematics — (Enroll in Philosophy 162.) Introduction to 20th-century approaches to the foundations of mathematics. Background in mathematics, set theory, and logic. The programs of logicism, predicativism, formalism, platonism, and constructivism. Readings from leading thinkers. Prerequisites: 160A and 161, or consent of instructor.

3 units, Win (Feferman) MWF 2:15

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) MWF 11


3 units, Win (Kerkhoff) TTh 11-12:15

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 1993-94

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.

3 units, Spr (Mazzeo) TTh 1:15-2:30

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.)

195. Teaching Practicum — Students assist in an undergraduate course, lead problems sessions, and tutor. Some reading in topics in mathematics education is required.

not given 1993-94

197. Senior Honors Thesis

1-6 units, Aut, Win, Spr (Staff) by arrangement

199. Independent Work — Undergraduates pursue a reading program. Topics limited to those not in regular department course offerings. Credit can fulfill the elective requirement for math majors. Approval of Undergraduate Affairs Committee must be received to use credit for department’s area requirement. Consult academic secretary for help in finding an adviser.

(Staff) by arrangement
200. Graduate Problem Seminar

not given 1993-94


205A. 3 units, Aut (T. P. Liu) TTh 1:15-2:30
205B. 3 units, Win (Ratner) TTh 1:15-2:30
205C. 3 units, Spr (Ornstein) TTh 1:15-2:30

206A,B,C. Theory of Functions of Complex Variable—Complex integration. Cauchy’s theorem, calculus of residues; power series, infinite products, entire functions, Picard’s theorem; Riemann mapping theorem. Prerequisite: 171.

206A. 3 units, Aut (P. Cohen) MWF 11
206B. 3 units, Win (P. Cohen) MWF 11
206C. 3 units, Spr (Royden) MWF 11

210A,B,C. Modern Algebra—Groups, rings, and fields; Galois theory, ideal theory, introduction to algebraic geometry; representations of groups and algebras; multilinear algebra. Prerequisite: 120 or equivalent.

210A. 3 units, Aut (Bump) TTh 1:15-2:30
210B. 3 units, Win (Brumfiel) TTh 11-12:15
210C. 3 units, Spr (Brumfiel) TTh 11-12:15


217A. 3 units, Aut (Bump) TTh 11-12:15
217B. 3 units, Win (Brumfiel) TTh 11-12:15
217C. 3 units, Spr (Brumfiel) TTh 11-12:15


220A. 3 units, Aut (T. P. Liu) TTh 9:30-10:45
220B. 3 units, Win (Papanicolaou) TTh 9:30-10:45
220C. 3 units, Spr (Papanicolaou) 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 1993-94

221B. Calculus of Variations—Advanced topics in the calculus of variations. Prerequisite: 221A.

222. Integral Equations
not given 1993-94

226. Mathematical Models in Population Biology—(Same as 126, Biological Sciences 279.) not given 1993-94

228A,B,C. Introduction to Ergodic Theory—Introduction to measure theoretical dynamics; a measure preserving action of a group on a probability measure space, and the group either measure preserving transformation, and occasionally a more general group. Topics: the ergodic theorem in several versions, various notions of mixing, factors of dynamical systems, the structure of flows, entropy, applications to combinatorics. Prerequisite: 205A or equivalent.

3 units, Aut, Win, Spr (Ornstein) TTh 11-12:15


3 units, Aut (Dembo) MWF 11-12


234. Large Deviations—(Same as Statistics 374.) 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 1993-94

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. not given 1993-94

242. Difference Equations
not given 1993-94

244A. Riemann Surfaces—Compact Riemann surfaces: topological classifications, Hurwitz’ for-
mula. Riemann-Roch formula, uniformization theorem, Abel's theorem, Jacobian varieties. Also, some elements of harmonic analysis are developed with applications. Methods generally applicable to algebraic curves highlighted.

not given 1993-94


3 units, Aut, Win, (Mazzeo) MWF 11

248A,B. Analytic Number Theory — The theory of modular forms.

not given 1993-94


3 units, Win (Dembo)

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 1993-94

256A,B,C. Partial Differential Equations — Local solvability, regularity of weak solutions, Sobolev space methods and the $L^2$ theory of elliptic equations, potential theoretic methods and Schauder theory, nonlinear elliptic equations, a priori estimates and nonlinear functional analysis, the minimal surface equation and its properties, elliptic systems, variational problems. Topics from the theory of hyperbolic and parabolic equations.

not given 1993-94

257A,B. Symplectic Geometry and Topology — Linear symplectic geometry and linear Hamiltonian systems. Symplectic manifolds and their Lagrangian submanifolds — local properties. Symplectic geometry and mechanics. Contact geometry and contact manifolds. Relations between symplectic and contact manifolds. Hamiltonian systems with symmetries. Momentum map and its properties.

3 units, Aut, Win (Eliasberg) MW 1-2:15


not given 1993-94


not given 1993-94


3 units, Win, Spr (Katznelson) TTh 9-10:15


3 units, Win, Spr (Bump)

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, multiplicity transformations, and smoothness properties of functions: sets of uniqueness for trigonometric series spectral synthèses, thin sets, spectral theory of convolution operators, and applications. Prerequisite knowledge of the elements of Fourier analysis.

3 units, Aut, Win (Katznelson) TTh 1:15-2:30
272A,B. Topics in Partial Differential Equations
3 units, Win, Spr (Simon) TTh 9:30-10:45

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.

not given 1993-94

276. Nonlinear Vibrations — Vibrations of systems governed by nonlinear differential equations. Topics: subharmonic vibration, bifurcation, stability, periodic solutions, quasi-periodic solutions, limit cycles, attractors, chaos, etc. Examples from mechanics, electric circuits, chemical reactions, etc. Prerequisite: familiarity with ordinary differential equations.

not given 1993-94

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.

3 units, Aut (Kapouleas) TTh 11-12:15

281A,B,C. Introduction to Algebraic and Differential Topology — Fundamental group, covering spaces, embeddings and immersions of manifolds, transversality, homotopy theory, homology and cohomology of complexes, differential forms, fiber and vector bundles and their characteristic classes.

3 units, Aut, Win (Slack) MWF 1:15

283. Topics in Topology
3 units, Spr (Kerckhoff)

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.

3 units, Spr (White)

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.

not given 1993-94


not given 1993-94

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.

3 units, Aut, Win (Feferman) TTh 2:15-3:30

293A,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 1993-94

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). Prerequisite: 160B and 290, or equivalent.

3 units, Spr (Mints) M 3:15-5:05

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 1993-94

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: George H. Brown (Chair), Philippe Buc, Hester Gelber, Gavin Langmuir, William Mahrt

Affiliated Faculty: Theodore M. Andersson (German Studies), George H. Brown (English), Philippe Buc (History), Brigitte Cazelles (French and Italian), Hester Gelber (Religious Studies), Gavin I. Langmuir (History), Suzanne Lewis (Art), William Mahrt (Music), Jeffrey Schnapp (French and Italian and Comparative Literature)

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 in 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 in this bulletin. The major is normally declared by the beginning of the student’s third year.

The major combines interdisciplinary breadth with a disciplinary focus. The interdisciplinary emphasis is provided by 165, Introduction to Medieval Culture, by upper-level interdisciplinary colloquia, and by the requirement that students take courses in three different areas. Depth is ensured by the requirement that students take at least four courses in one area. A faculty adviser helps each student choose courses that integrate the requirements of breadth and depth. To that end the following guidelines are provided.

The student should take a minimum of 10 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 10 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 interrelationships among them. Lectures by faculty from various departments.

DR:7(2) or 8(3)

5 units, Spr (Brown, Staff)

RELATED AREAS

Courses suitable for self-designed majors in Medieval Studies are listed below. More detailed course descriptions are found under the various departmental headings. See quarterly Time Schedule for changes in listings.
ART
104. Early Middle Ages

ENGLISH
110. Masterpieces of English Literature I: Chaucer, Shakespeare, Milton, and Their Contemporaries
165B. Arthurian Literature
171A. Chaucer’s Canterbury Tales
171B. Chaucer’s Troilus and Criseyde and other Love Poems
209. Introduction to Paleography and Codicology
211. Readings in Middle English
301. Graduate Seminar: Literacy, Education, and the Medieval Book

FRENCH AND ITALIAN
206E. The Grail Legend in Modern Culture
208E. Female Saints
233E. Dante’s Divine Comedy

ITALIAN
127. Italian Literature I: The Middle Ages and the Renaissance

GERMAN STUDIES
125. The Epic Tradition
126A. Old Norse Literature in Translation
255B. Advanced Readings in Middle High German
257. Gothic
258. Introduction to Old Norse

HISTORY
8S. Introductory Seminar: The Land of Three Faiths — Medieval Spain
15S. Introductory Seminar: The Medieval Church and Violence
98S. Introductory Seminar: The Institutions of Early Medieval Japan
194A. Early Medieval Japan
194B. Late Medieval and Early Modern Japan, 1500-1840
206S. Undergraduate Seminar: Churches and the Kingdoms
210A. Undergraduate Colloquium: The Language of Politics in the Middle Ages

307. Graduate Core Colloquium in Medieval History
310A. Graduate Core Colloquium: The Language of Politics in the Middle Ages
395A. Graduate Colloquium: Early Medieval Japan
395B. Late Medieval and Early Modern Japan
406. Graduate Seminar: Medieval History

HUMANITIES
312. Medieval Seminar

POLITICAL SCIENCE
151A. History of Political Thought I: Ancient, Classical, and Christian Worlds

RELIGIOUS STUDIES
167. Medieval and Renaissance Religious Philosophy – (Same as Philosophy 101.)

SPANISH AND PORTUGUESE
150. Spanish Literature I

MODERN THOUGHT AND LITERATURE
Chair: Regenia Gagnier (English)
Committee in Charge: Joel Beinin (History, on leave Spring), Russell A. Berman (German Studies), Jane Collier (Anthropology), John Dupré (Philosophy), Regenia Gagnier (English), Barbara Gelpi (English), Theodore L. Glasser (Communication), Akhil Gupta (Anthropology, on leave 1993-94), Elizabeth Hansot (Political Science), Mary Louise Pratt (Spanish and Portuguese), Alice Rayner (Drama), Renato Rosaldo (Anthropology), Ramon Saldívar (English), Robert Weisberg (Law)

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 national 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 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, a course 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.
2. A “Petition for Admission to the Coterminal Program” from the Graduate Degree Support Section of the Registrar’s Office.
3. A statement giving the reasons the student wishes to pursue this program and its place in his/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.

Applicants are screened by the steering committee of the Program in Modern Thought and Literature. Students are expected to meet the standards of the program, and to pursue the equivalent course of studies.

GRADUATE PROGRAMS

The committee sponsors a program leading to the Ph.D. in Modern Thought and Literature. This degree is designed chiefly for students intending to pursue interdisciplinary careers of teaching, writing, and policy formation in the study of modern culture. It assumes competence in one or more disciplines, in addition to literature. Students are expected to acquire an extensive knowledge of a single literature, normally English or American (with more emphasis on one of the two), from 1750 to the present.

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 equiv
lent, in graduate study beyond the A.B. degree. He or she is expected to complete at least 90 units 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. Forty-five units of advanced work in literary studies in one language, usually English. (Literature in another language taught at Stanford may be substituted.) Of the 45 units, at least 30 must be regularly scheduled courses in literary studies focused on the period from 1750 to the present. 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 30 units. 396, 397, 399, 802 may not be counted among the 90 units of graduate work required for the degree.
3. Forty units of advanced work in non-literature departments comprising a coherent program. This component must be worked out individually with the student's adviser.
4. Qualifying Paper: by the end of the first year, the student organizes a colloquium developed from work done in a seminar, or submits a 25-30 page paper based on a term paper written during the first year. Either the colloquium or the paper must be competed 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. Annual Review: the program and progress of each student must be approved by the Committee-in-Charge at the end of each academic year.
8. 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.
9. 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.
10. 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 in this bulletin.

COURSES

Courses listed below are courses 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: e.g., 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.

blueswomen and forming resistant identities; early rock 'n' roll and cross-race appropriation and exploitation; 1960s girl groups and the construction of femininity; women's music and cultural feminism; cock rock, Madonna, Riot Girl, and female sexual expression; rappers and coalition politics; k.d. lang, RuPaul, androgyny, and queer theory; African-American divas, conflicting class/race allegiances and the effort to rewrite history.

3-5 units, Spr (Kozak)

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)

212. Psychiatry and Literature—(Same as Comparative Literature 212.) Seminar uses psychology as a tool in literary criticism and literature as a tool in developmental theory. Authors: Barrie, Erikson, Joyce, Mann, Shakespeare, Spark, Tolstoy.

3 units, Spr (Van Natta)

360. Seminar: Modern Mass Intermedia Studies—(Same as Drama 354M, English 360.) Integrates guest lectures with seminar discussions and screenings in the study of major issues in modern mass culture and 20th-century media.

4-5 units, Spr (Marsh)

361. The Modern Tradition: Criticism and Colonialism—(Same as Spanish 309.) Examines critical approaches to literature and the study of literature and culture in relation to colonialism, neocolonialism, and the postcolonial world. Topics: representations and hegemony, dynamics of transculturation, cultural dimensions of decolonization and resistance, psychoanalysis and colonial subjects, ideologies of masculinity and the feminine, the colonial discourse movement, 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, Win (Pratt)


2-3 units, Spr (Gagnier)

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, 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 (formerly, Freshman English). Each student is assigned as an apprentice to an experienced teacher and sits in on classes, conferences, tutorials, and, later, is given 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

MUSIC

Emeriti: (Professors) William L. Crosten, George Houle, Wolfgang E. Kuhn, Herbert B. Nannen, Leonard G. Ratner, Sandor Salgo, Harold C. Schmidt, Earl Schubert (by courtesy, School of Medicine), Leland C. Smith; (Professors, Performance) Arthur P. Barnes, Marie Gibson, Andor Toth; (Senior Lecturer) Naomi Sparrow; (Lecturers) Adolph Baller, Frances Blaisdell, Earl Blew, Edward C. Colby

Chair: Karol Berger

Professors: Karol Berger, John Chowning, Albert Cohen, William H. Ramsey
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.

Dentists 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 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.

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, 24A,B,C.
   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 chambers groups. 161C (Sports Activity Band) and 167 (University Singers) do 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 will demonstrate a student’s ability to hear music accurately and to perform it at sight. The successful completion of the examination is a prerequisite for all higher level theory and analysis courses (Music 121, 122A,B,C).

RECOMMENDED SCHEDULE FOR THE MUSIC MAJOR

The following sample schedule shows how a student may include substantial work on a major in music while also fulfilling the University 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

<table>
<thead>
<tr>
<th>Courses</th>
<th>A</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman English</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Music 21-23*, 24A,B,C</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Individual Instruction and/or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensemble</td>
<td>1-4</td>
<td>1-4</td>
<td>1-4</td>
</tr>
<tr>
<td>Cultures, Ideas, and Values</td>
<td>3-5</td>
<td>3-5</td>
<td>3-5</td>
</tr>
<tr>
<td>Choice of Foreign Language,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution Requirement,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>or Freshman Seminar</td>
<td>3-5</td>
<td>3-5</td>
<td>3-5</td>
</tr>
</tbody>
</table>

SECOND YEAR

| Music 40, 41, and 121        | 8 | 4 |
| Individual Instruction and/or|   |   |
| Ensemble                    | 1-4| 1-4| 1-4 |
| Distribution Requirement    | 3-5| 3-5| 3-5 |
| Elective (or Music 23 if not taken previously) | 3-5 | (3) |

THIRD AND FOURTH YEARS

| Three from Music 140-145 and two from 122A, B, or C | 4-8 | 4-8 | 4-8 |
| Elective                                           | (4) | (4) | (4) |

* The 21-23 sequences may begin in the Winter rather than Autumn Quarter. If so, 23 must be taken in Autumn Quarter of the second year.

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, 24A,B,C; 121, 151, 152, 220A,B; 220C (8 units); Physics 51 (or equivalent)
   b) History: Music 40, 41; 154
   c) Applied: individual studies in performance (2 quarters), or Music 192A,B and Ensemble or 192C (5 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 is 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.

Departmental 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 recognized as fulfilling the advanced degree requirements. Students may need to devote more than the minimum time in residence if preparation for graduate study is inadequate.

**MASTER OF ARTS**

*Residence* — A minimum of three quarters of full-time study in residence is required.

*Foreign Language Requirement* — Reading knowledge of German, French, or Italian 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>
</tr>
</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>
</tr>
<tr>
<td>223. Composition 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 German, French, or Italian, and the ability to translate from one of these languages into idiomatic English. Ph.D. candidates in musicology are required to demonstrate proficiency in German and may substitute Latin as a second language. All doctoral candidates except those in composition and computer theory are required to demonstrate a similar competence in a second language, chosen from the three above, 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>200. Graduate Proseminar</td>
<td>4</td>
</tr>
</tbody>
</table>

All doctoral candidates must take:

<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.

**REQUIRED COURSES**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>323. D.M.A. Projects in Composition</td>
<td>16</td>
</tr>
<tr>
<td>399. D.M.A. Final Project</td>
<td>8</td>
</tr>
</tbody>
</table>
DOCTOR OF PHILOSOPHY

General University regulations for the Ph.D. are discussed in the "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.

REQUIRED COURSES

Course No. and Subject                              Units
221. History of Music Theory                        8
341. Ph.D. Dissertation                              12

MUSICOLOGY

269 or one course in the series                     4
300. History of Notation                             8
310. Research Seminars in Musicology                16
312. Aesthetics and Criticism of Music               8

COMPUTER-BASED MUSIC THEORY AND ACOUSTICS

220A,B. Computer-Generated Music                    8
220C. Research in Computer-Generated Music          20
plus:                                               
320. The Discrete Fourier Transform                 4

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 in 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, Win (Bowen)

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 (Barnes)

2C. Opera                                       3 units (Mahrt)

3C. Medieval Music                               3 units (Mahrt)

3F. Franz Liszt and the Music of the Romantic Era—DR:7(2)
   3 units (Grey)

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 (Dreyfus)

5A. Music in America — Development of popular folk and art music in America from the Pilgrims to the present. DR:7(2)
   3 units, Aut (Cohen)

5C. Music and Culture at the Court of Louis XIV  3 units (Marshall)

5D. French Musical Culture from Leonin to Boulez 3 units (Marshall)

5E. African-American Women Making Music — Voices and Images of Change — Through a contextualized study of the musical styles African-American women-composers/performers (Casselberry-Dupree, Memphis Minnie, Bernice Reagon, Bessie Smith, Sister Rosetta Tharpe, and others), students become familiar with major African-American musical genres (blues, jazz, gospel, spirituals, rap), and examine expressions of Black female identity; issues of race, gender, and sexuality; and the significance of the images projected by African-American women musicians as they reflect, challenge, and transform the racist and sexist stereotypes which are the legacy of the minstrel tradition. Enrollment limited to 20.
   3 units, Win (Johnson) MW 10:30-12

ethnicity, class, and sexuality are taken as inseparable from questions around gender. Topics: 1920s blueswomen and forming resistant identities; early rock’n’roll and cross-race appropriation and exploitation; 1960s girl groups and the construction of femininity; women’s music and cultural feminism; cock rock, Madonna, Riot Girl, and female sexual expression; rappers and coalition politics; k.d. lang, RuPaul, androgyny, and queer theory; African-American divas, conflicting class/race allegiances and the effort to rewrite history.

3-5 units, Spr (Kozak)

7A. Explorations in World Music — Select musical traditions from several continents. Ways people make music and various functions music-making serves. Music as a dynamic aspect of culture and a reflector of society — its structures, social systems, values, and aesthetics. Issues and methods in ethnomusicology lead to a mini-fieldwork project.

3 units, Spr (Kozak)

18. Jazz History — Slides, recordings, and personal interviews trace the history of jazz from Black entertainment beginnings to a complex and varied art form.

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, Aut (Staff)

20A. Jazz Theory
3 units, Aut (Nadel)

20B. Advanced Jazz Theory
3 units, Spr (Nadel)

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 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, and simple harmony. 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)

3 units, Aut (Sterk, Binford-Walsh)
Win (Barnes)

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.

3 units, Win (Sano)
Spr (Cröbin)

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.

3 units, Aut (Gorman)
Spr (Barnes)

24. Ear Training — The development of aural skills through sight singing, dictation, and rhythm exercises and keyboard improvisations. Students are placed in a section at a suitable level by examination on the first day of class.

24A. Ear Training I
1 unit, Aut, Win, Spr (Staff)

24B. Ear Training II
1 unit, Aut, Win, Spr (Staff)

24C. Ear Training III
1 unit, Aut, Win, Spr (Staff)

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 (Cohen)

41. Music History since 1750
4 units, Spr (Mahrt)

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 (Rockmaker)

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 (Collins)

122B. Harmonic Materials of the 19th Century — Analysis of 19th-century music, with compositional exercises based upon 19th-century models. Prereq-
uisites: 121 and successful completion of the Ear Training Proficiency examination.

4 units, Spr (Rockmaker)

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 (Rockmaker)

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 (Peterson)

Win, Spr (Rockmaker)

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, Win (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 (Chafe, Chowning)

220C. Research — Research projects in composition, psychoacoustics, or signal processing. Prerequisite: 220B.

1-4 units, Aut, Win, Spr (Staff)

223. Seminar in Composition — May be repeated for credit.

4 units, Aut, Win, Spr (Rockmaker, Peterson)

HISTORY AND LITERATURE

50. Readings in Music and Music History — For students with a knowledge of German (one year or equivalent) who want to acquire German reading proficiency in music.

3-4 units (Staff) given 1994-95

140,141,142,143,144,145. Seminars in Music History — Seminars treating 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 1994-95

141. Studies in Renaissance Music — Prerequisite: 40.

4 units, Win (Mahrt)

142. Studies in Baroque Music — Prerequisite: 40.

given 1994-95

143. Studies in Classic Music — Prerequisite: 41.

4 units, Aut (Ratner)

144. Studies in Romantic Music — Prerequisite: 41.

4 units, Spr (Barth)

145. Studies in Modern Music — Prerequisite: 41.

given 1994-95

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 on salience and importance of various auditory phenomena in music. Prerequisite: some basic knowledge of music.

1-3 units, Aut (Chowning, Matthews, Pierce)

152. 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 theorems, and basic Fourier pairs. Prerequisites: Physics 51 (or equivalent); Music 151, and 220A,B,C.

2-4 units, Aut (J. Smith)

154. Introduction to Computer Music — Survey of recent works and computer-based techniques.

4 units, Spr (Chafe, Staff)

156. Technology and Musical Aesthetics — (Same as Engineering 165.) DR:6(8) or 7(2)

4 units, Spr (Adams) MW 2:15-4:05

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 (Oppenheim)

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)

72,73,74,75,76,77. Small Group Instruction — Minimum enrollment required.
172A/272A. Piano
(Baller, Barth, Weldy, Woo)
172B/272B. Organ
(Aut, Win, Spr (Dawson, Staff)
172C/272C. Harpsichord
(Staff)
172E/272E. Early Piano
(Barth)

73/273. Voice
(Ganz, Giovannetti, Wait)

174/274. Stringed Instruments
174A/274A. Violin
(Freier, Kleyman, Levy)
174B/274B. Viola
(Kleyman, Staff)
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
(Johnston-Hamilton)
176C/276C. Trombone
(Kenley)
176D/276D. Tuba
(Cooley)

177/277. Percussion
(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
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, Aut (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, Aut (Sano, Wait)

181. Performance of Vocal Literature
  1 unit, Aut, Win, Spr (Wait)

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 (Black)

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, Spr (Barnes) MF 12-1, W 7:30-9:30 p.m.

161B. Jazz Ensemble
  1 unit, Aut, Win, Spr (Berry) MW 4:15-6:05

161C. Sports Activity Bands
  1 unit, Aut (Barnes) MWF 4:15-5:30
  Win, Spr (Barnes) by arrangement

162. University Symphonic Chorus
  1 unit, Aut, Win, Spr (Sano) M 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 choir.
  1 unit, Aut, Win, Spr (Wait) MWF 12

166. Chamber Orchestra — Open to advanced players who have had orchestral experience.
  1 unit, Aut, Win, Spr (Lemon) T4:15-6:05, F 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)

191. Concert Production and Self-Promotion for the Musician — Basic principles of public relations, concert production, and professional presentation.
  1 unit, Win (McGee, 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 and B.
1 unit, Aut, Win, Spr (Kadis)

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 (Cohen, 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, Spr (Cohen)
221B. Baroque Through Modern
given 1994-95

242. Seminar: Topics in Computer Music
1-3 units (Staff)

269. Research in Performance Practices — Performance techniques, theoretical principles, aesthetics, and musical resources of various historical periods.
4 units, Aut, Win, Spr (Staff) by arrangement

299. Master of Arts Project
4 units, any quarter (Staff)

300. History of Notation
4 units (Mahrt) given 1994-95

301A. Modal Analysis
4 units, Aut (Mahrt)
301B. Tonal Analysis
4 units, Win (Ratner)
301C. Post-Tonal Analysis
4 units, Spr (Peterson)

302. Research in Musicology
4 units, Aut, Win, Spr (Staff) by arrangement

310. Research Seminar in Musicology
4 units, Win (Mahrt)
Spr (Pasler)

312A. 4 units, Aut (Berger)
312B. 4 units, Win (Berger)

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 (Peterson, Rockmaker)

330. D.M.A. Term Projects in Conducting
4 units, Aut, Win, Spr (Ramsey)

341. Ph.D. Dissertation
1-12 units, any quarter (Staff) by arrangement

369. D.M.A. Term Projects in Performance
369A. Early Music to 1800
4-6 units, Aut, Win, Spr (Staff)
369B. Music From 1800 to Present
4-6 units, Aut, Win, Spr (Staff)
369C. D.M.A. Recital
4 units, Aut, Win, Spr (Staff)

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 (J. Smith)

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 junc-
tions, 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: Maria Biege, Eckart Forster, David Freyberg, Dubravka Friesel-Kopecki, Therese Hörmigk, Karen Kramer, Hans-Peter Krüger, Christiane Lemke, Franz Neckenig, Maurice Rehm, Susanne Rohr, Jürgen Schütte, Jochen Wohlfelder

Stanford Program in Florence
Director: Ermelinda Campani
Faculty: Nicola Bellini, Patrizio Bianchi, Eve Borsook, Ermelinda Campani, Roberto D’Alimonte, Yair Guttmann, Ann Katherine Isaacs, Giuseppe Mammarella, Daniela Salvioni

Stanford Center for Technology and Innovation — Kyoto
Director: Terry MacDougall
Faculty: Toshiko Fujiwara, Fujioko Hotta, Tetry MacDougall, Haruka Ueda, Mariko Uemiya, Chihiro Yamaoka

Stanford Program in Oxford
Director: Geoffrey Tyack
Faculty: Nicholas Crafts, John Darwin, Paul David, Michael Gearin-Tosh, Oswald Hanfling, Thomas Hare, Anthony Kirk-Greene, Joss Lutz Marsh, Ruth Mateer, Ziba Moshaver, G. Bowen Thomas, Geoffrey Tyack, Jonathan Wordsworth, Morris Zelditch

Stanford Program in Paris
Director: Estelle Halevi
Faculty: Keith Baker, Jean-Claude Berchet, Monique Fouet, Gerard Grunberg, Estelle Halevi, Riva Kastoryano, Denis Lacorne, Rejean Legault, Antionette Le Normand-Romain, Nonna Mayer, Marie-Odile Ottenwaelter, Anne Pingeot

Stanford Program in Santiago
Director: Edmundo Fuenzalida
Faculty: Luis Barros, José Joaquín Bruner, Edmundo Fuenzalida, Dominique Hachette, Ernesto Hajek, Robert Packenham, Bernardo Subercaseaux, Manfred Wilhelmy

Stanford University believes that academic study abroad should be a normal part of every student’s educational options. There are study centers in Berlin, Florence, Kyoto, Moscow, Oxford, Paris, Rome, and Santiago with a variety of courses from art to zoology. Courses meeting Distribution Requirements in Areas 7(2) and 9(5) are usually offered every quarter at all centers. In some quarters, internship programs are available in Berlin and Kyoto. The Berlin, Kyoto, and Santiago programs require two quarters of the appropriate language instruction. The Moscow and Paris programs require one full year of the language. The Oxford program has no foreign language prerequisites. Students may enroll for one, two, or three quarters at most centers.

A special program is offered in Paris 1* for students fluent in French; students attend classes in local universities. Other opportunities through consortium programs exist in Rome and Kyoto. 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 in the Stanford Center, with families, or with local students in apartments or in local university dormitories. Courses offered abroad carry regular Stanford University credit; some also receive credit toward departmental 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 four times a year.

* The Paris 1 program is for students with two years of French; they take courses at Paris universities.

** The Paris 2 program consists of Stanford-initiated courses at the Stanford Center in Paris.

COURSES

BERLIN

12. Research Seminar
units by arrangement, Win (Kromer)

13. Directed Research in the Humanities and Social Sciences — Open to second or third quarter students only.
units by arrangement, Spr (Staff)

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 (Krüger)
101A. 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 back-stage facilities, attendance at a rehearsal, and discussions with actors, directors, or other theater professionals. DR:7(2)
4-5 units, Aut, Spr (Kramer)

106. Water Resources — (Same as Civil Engineering 106.) The natural, technological, legal, and socio-political systems that define our use of water. Hydraulic processes, including precipitation, infiltration, water uptake by vegetation, water movement in soils, and streamflow. Water use, including water supply systems, hydroelectric power generation, irrigation, and water and wastewater treatment. Comparisons between European and U.S. approaches and techniques, and examples and assignments from Europe (especially Germany) and the U.S. Prerequisite: Physics 21 or 51, or equivalent. Recommended: concurrent enrollment in Civil Engineering 106A. DR:6(8)
3 units, Aut (Freyberg)

106A. German Water Resources Infrastructure — (Same as Civil Engineering 106A.) Field trips to significant water resources infrastructure facilities in and around Berlin. Depending on class size and scheduling, sites include a run-of-river hydroelectric plant, a water supply dam and reservoir, a hydrometeorological station, a water or wastewater treatment plant, navigation locks, and an environmental remediation/restoration site. Includes orientation session and a follow-up discussion.
2 units, Aut (Freyberg)

117V. Industrial Revolution and Its Impact on Art, Architecture, and Theory — (Same as Science, Technology, and Society 117V; Art 173V.) The interlinking of architecture and painting with technological and scientific development. In a period of industrial revolution, the dominance of positivist thinking and empirical methods promotes in the cultural and artistic realm a response of euphoric orientation and a follow-up discussion. DR:7(2)
4 units, Spr (Kramer)

4 units, Spr (Förster)

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. Analyzes this complex change by focusing on 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, Spr (Schutte)

133. Hermeneutics and Critical Theory — (Same as Philosophy 133.) An introductory course to two important and influential schools in 20th-century German philosophy through the leading representatives of these schools: Habermas, Heidegger, Horkheimer, and Gadamer. DR:8(3)
4 units, Spr (Förster)

134B. East and West German Literature of the 1970s and 80s — (Same as History 229V, German Studies 134B; also listed as International Relations Cluster B.) E. and W. German societies and culture in the 1970s and 1980s through fictional texts, historical accounts and films. DR:7(2)
4 units, Aut (Hornigk)

during the 1870s, including the cityscape and the social and cultural issues of the new capital. Issues which describe the evolution of the city-dweller in the Middle Ages: social and cultural identity; economic skill and ability; political projects and theory; and cultural and artistic activity. The Enlightenment, when cities, bustling with bourgeois life, shaped the culture of the nation through the political dreams of a democratic society. Excursions to sites in Berlin and Brandenburg. DR:9(5)

4 units, Aut (Neckenig)

153X. From Socialism to Capitalism in East Germany: The Political Economy of Change — (Same as Political Science 153X, Economics 126X; also listed as International Relations Clusters A and C.) Analysis of the life and death of German socialism from the perspective of an economist. Topics: origins of the German Democratic Republic, starting conditions and emergence of the socialist system until the construction of the Wall. The character of the new Germany and its role in Europe. Interdisciplinary approach, including economic, political, and social issues. DR:9(5)

4-5 units, Spr (Krüger)

158C. An Introduction to Modern German Cinema — (Same as Drama 158C.) 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 Trümmerfilme ("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)

158T. Greek Tragedy and German Culture: An Artistic Symbiosis — (Same as Drama 158T.) The influence of Greek tragedy on Modern German artistic production from Goethe to Müller, beginning with the origins of Greek tragedy as understood today and contrasting that model with the one Nietzsche elaborated in The Birth of Tragedy out of the Spirit of Music. Compares a Greek tragedy with a German work that draws on the Greek original. Confronts the changing historical and social conditions that may account for the direction of the adaptation or re-interpretation. Greek authors: Euripides, Sophocles, and Aeschylus. German authors: Brecht, Goethe, von Hofmannsthal, Müller, Strauss, von Trotta, and Wagner,

5 units, Win (Rehm)

177U. From Modernism to Post-Modernism: Berlin Architecture, 1920-1990 — (Same as Urban Studies 177U.) How to reconstruct the Berlin cityscape without losing the beauty of the city left from the Imperial and Weimar periods? How should architecture represent or symbolize the new function of Berlin as the capital of Germany? Integrates the stylistic analysis of architectural monuments and the aesthetic relationship between new architecture and existing cityscape. The 1970s and 1980s, the classic decades of Post Modernism. The Late Modernism of the 1960s (International Style) and 1950s. The classical period of Modernism, and Functionalism or Bauhaus Architecture of the 1920s. The Late Historicism and New Sobriety from around 1910. Contrasts of Functionalism and Nazi architecture to separate Avant-garde from Arrieregarde. The International Architecture Exhibitions of 1957 and 1982 and international avant-garde architecture (Gropius, Mies, Le Corbusier) offer material to analyze and evaluate.

4 units, Spr (Neckenig)

220X. The Politics of European Integration — (Same as Political Science 220X.) The historical and institutional setting of the European Community, its major policy areas and the external relations of the Community, notably with potential new members and the U.S. The history, origin, and development of the European Community after 1957. Central aspects of the European integration process.

4-5 units, Win (Lemke)

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, Win, Spr (Staff)

21B. Intermediate Conversation — (Same as German Studies 21B.)

2 units, Aut, Win, Spr (Staff)

23B. Intermediate German — (Same as German Studies 23B.) 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 (Staff)

90B. Advanced German I — (Same as German Studies 90B.) 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 (Staff)
100B. Contemporary Berlin: Public Media—(Same as German Studies 100B.) Conversation course using radio, television, advertisements, etc. as a basis for the discussion of current events. Vocabulary is expanded in the fields of politics, economics, sports, and the arts.
2 units, Aut, Win, Spr (Staff)

101B. Advanced German II—(Same as German Studies 101B.) For the most advanced students. Offered depending upon demand.
4 units, Aut, Win, Spr (Staff)

FLORENCE

19. Intensive Italian—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.
units by arrangement, Aut (Staff)

25. Research Seminar—The intellectual, artistic, and literary movements influential in turn-of-the-century Italy. Students choose one scholar, artist, or intellectual movement for a concentrated research project, possibly from the archives of two influential journals which were published in Florence during that time, Leonardo and LaVoce.
5 units, Win (Guttmann)

29. Research Seminar: Local and Regional Responses to the EEC—Familiarizes students with field research in Political Science. Each student adopts an Italian group (e.g., the Tuscan regional government, labor unions, business associations) and researches how this group has responded thus far and how it intends to respond in the future to the single European market and to the Maastricht agreement, emphasizing local and regional concerns. Students employ qualitative methods for collecting primary material (in-person interviews, questionaire-type interviews, and locating primary documents). Introduction to qualitative social science research methods followed by study of the literature on what the EEC means to local and regional groups.
units by arrangement, Win (Salvioni)

30. Representations of Italy Through the Eye of the Camera—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.
4 units, Win (Campani)

106V. Italy: From an Agrarian to a Post-Industrial Society—(Same as History 106V, Political Science 158X.) Italian History from the Risorgimento to the present. Italian society, crises, evolution, values, and relation to the political institutions existing in different periods. Ideologies and political doctrines, and historical events which contributed to the formation of modern Italy's predominant subcultures, Catholic and Socialist. DR:9(5)
4 units, Aut (Mammarella)

107V. States and Society in Renaissance Italy—(Same as History 107V.) Seminar on the social and political evolution of Northern and Central Italy in the 15th and early 16th centuries, providing the essential tools for future research. Emphasis on Florence, and Tuscany in general and comparison with other Italian states, particularly Venice, Genoa, Mantua, and Naples. Visits to the Florentine State Archives. Original documents are read, in xerox copy, translated, and commented. Some reading in Italian, but ample bibliography in English.
4 units, Win (Isaacs)

110Y. Italian Painting and Sculpture as Historical Documents—(Same as Art 110Y.) Taking advantage of original material in situ in central Italy, examines works of art as documents of life between 1200 and 1600. Aspects of public, domestic, and ecclesiastical life. DR:7(2)
4 units, Win (Borsook)

110Z. Florentine Painting and Sculpture from 1260 to 1530—(Same as Art 110Z.) Monuments in Florence form nuclei for understanding 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.
4 units, Aut (Borsook)

120P. Humanism: The Intersection of Philosophy, Art, and Science in the Renaissance—(Same as Philosophy 120P.) The central ideas of humanism (the revival of ancient philosophy, the questioning of the absolute authority of the church, and moral and aesthetic values) as developed by philosophers, artists, and scientists such as Dante, Galileo, Leonardo, Machiavelli, and Vico. Focus is on the Italian Renaissance.
4 units, Aut (Guttmann)

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)
560 School of Humanities and Sciences

173P. Philosophy of Art — (Same as Philosophy 173P.) Develops the concept of a theory of art production. Theoretical discussion is applied to various modern Italian artistic movements.
4 units, Aut (Guttman)

212X. The European Community: Institutions and Policies — (Same as Political Science 212X.)
The origin and achievements of European integration. The historical development of the European community from the Schumann Plan to the Maastricht Agreements on monetary and political union. The role of Community institutions (Commission, Council, Parliament, Court), and the policies the Community has enacted. Emphasis is on the policies related to the “internal market.” Problems the European community faces on the path toward monetary and political union: Which countries should be part of the union? What kind of policy will emerge at the end of this process? DR:9(5)
4-5 units, Aut (D’Alimonte)

Italian Language Program

20F. Second-Year Italian, First Quarter — (Same as Italian 50F.)
5 units, Aut, Win (Staff)

24F. Second-Year Italian, Second Quarter — (Same as Italian 54F.)
5 units, Aut, Win (Staff)

101F. Advanced Grammar and Composition — (Same as Italian 101F.)
4 units, Aut, Win (Staff)

Kyoto

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)
4-5 units, Spr (MacDougall)

Japanese Language Program

3K. First-Year Modern Japanese — (Same as Asian Languages/Japanese 3K.)
5 units, Spr (Fujiwara)

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

1. Russian Politics — 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 interrelationship between 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.
units by arrangement, Aut (Bratersky)

2. The History of Russia in the Context of Modernization — Russia belongs simultaneously to the European and Asian communities, providing a unique perspective. Focus is on the interaction between modernization and Westernization.
units by arrangement, Aut (Khoros)

units by arrangement, Aut (Portnoy)

4. Religion and Rationality in the History of Russian Culture — Problems in religious development are a key in understanding Russian history and provide a new perspective for understanding semi-Western or non-Western civilizations of the modern and post-modern periods, and Western civilization itself. Topics: universal claims and local identities, modern needs and traditional heritage, the search for local socio-cultural resources of development, and the need to explore different extremities of rationalism and nationalism. The interplay of Orthodox, dissident, and non-Church trends and the interplay between socio-cultural, economic, and legal trends in European and Russian history.
units by arrangement, Aut (Rashkovsky)

5. Sociology and Social Psychology of Modern Russian Society — Focuses on 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 ne-
tion and science and education in Russia. Goal is to provide a base of knowledge to support further exploration of problems concerning Russian society and the Russian mentality. units by arrangement, Aut (Yurevitch)

RUSSIAN LANGUAGE PROGRAM

6. Second-Year Russian I
6 units, Aut (Staff)

7. Second-Year Russian II
6 units, Aut (Staff)

8. Third-Year Russian
6 units, Aut (Staff)

OXFORD

12. Research Seminar: International Relations of the Middle East — Seminar on: ideological politics (nationalism, pan-Arabism, Nasserism, Ba'thism, radical Islam); Islamic politics and society; Judaism, Zionism, and the state of Israel; inter-Arab relations after the Gulf War; the UN and the Middle East; and the Middle East in the world economy. Prerequisite: Political Science 40X or equivalent. units by arrangement, Win (Moshaver)

13. Philosophy of the Arts — The definition and evaluation of art. What is art? Is art even definable? What is the function of art? Is the evaluation based on subjective principles, or is “beauty truly in the eye of the beholder”? To what extent, if any, should art be judged by its social or moral effects? What should be our attitude toward imitations? Comparisons to different arts (visual, musical, literary, etc.). units by arrangement, Win (Hanfling)

14. Research Seminar: Art and Society in Britain 1850-1939 — Topics: 18th-century landscape gardening, the Gothic revival and the tradition of romantic medievalism, the Arts and Crafts movement, the origins of modernism in Britain, British Art and WWI, the writings and designs of John Ruskin and William Morris. Prerequisite: Art 120Y or equivalent. units by arrangement, Spr (Tyack)

15. Research Seminar: The Economics and Politics of the European Economic Community — Seminar on origins and motivation; European integration; the institutions and policy-making mechanisms; the government, politics, and political party systems of Western Europe; and possible political, judiciary, economic, and social consequences. Prerequisite: Political Science 147X or equivalent. units by arrangement, Spr (Thomas)

40X. International Relations of the Middle East — (Same as Political Science 40X; also listed as International Relations Cluster A.) Analysis of the disintegration of the Ottoman Empire and European intervention in the Middle East after WWI. Topics: territorial division and the rise of the independent Arab states; nationalism in the Middle East and pan-Arabism in the Arab world; regional and international significance of the Suez and the Arab-Israeli conflict; and the Persian Gulf Crisis. DR:9(5) 5 units, Aut (Moshaver)

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)

102V. International Politics in the Era of Two World Wars — (Same as History 102V; also listed as International Relations Cluster A.) The global conflict and the international rivalry of the great powers, pursuit of power, militarism, and the use of force. Origins of WWI and II. The end of WWII to the beginning of the Cold War. DR:9(5) 5 units, Spr (Moshaver)

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. Survey of 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. Survey of 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)

120Y. Art and Society in Britain: 1730-1914 — (Same as Art 120Y.) Themes: social change in 19th-century art; effects of social and economic change on art, architecture, and design. How historical factors influence the type of art and architecture produced in a period of confused taste, experimentation, and uneven achievement. Field trips to buildings and paintings are discussed. DR:7(2) 4 units, Win (Tyack)

131W. English Social History from 1800 to the 1980s — (Same as Sociology 131W, History 140V.) Beginning with the onset of industrialization at the end of the 18th century, change has gradually affected all aspects of English life: material standard of living, the 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, Aut (Tyack)

139W. English Society in Film and Literature — (Same as Sociology 139W.) Post-war film and literature are used to study politics, economy, and society in contemporary England. Topics: the English sense of the decay of its landed gentry, the loss of its empire, the decline of its industrial spirit, and post-war changes in class, race, and gender. DR:9(5)
5 units, Spr (Zelditch)

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: Europe, the U.S.A, and the World — (Same as Political Science 147X; also listed as International Relations Clusters A and C.) The European Community made another step toward complete political union in 1992. What institutional arrangements have been made, and how must industry and the average citizen adapt to this? DR:9(5)
5 units, Win (Thomas)

148Z. Modern Drama and Its Roots — (Same as English 148Z, Drama 158M.) Drama, even in its most contemporary manifestations, uses the Greeks for inspiration. Reviews the thread of continuity in drama, beginning with the Greeks, through various approaches: genres of tragedy and comedy, feminist theater, and political theater. DR:7(2)
4 units, Aut (Mateer)

150Z. Poetic Appreciation: The 19th Century — (Same as English 150Z.) Open only to students majoring in English. Critical appreciation of poetry through a close study of the works of selected 19th-century British poets, from Tennyson to Yeats.
5 units, Aut (Wordsworth)

154Z. English Literature 1740-1832 — (Same as English 154Z.) Open only to students majoring in English and related subjects. Taught jointly for Stanford students and second-year St. Catherine’s undergraduates. Survey of English romantic literature. The poetry, prose, and drama of the period is placed in its literary, cultural, and historical contexts, and key texts are read closely.
5 units, Spr (Wordsworth)

155A. Practical Criticism — (Same as English 155A.) Close study and analysis of a variety of poems and short pieces of English prose of widely differing dates.
5 units, Spr (Wordsworth)

160Z. Victorian Women — (Same as English 160Z, Feminist Studies 184X.) From the “Angel in the House” to the “New Woman”, investigates the ideology of gender; the struggle for liberation; the inflection and creation of literary forms (both “serious” and “popular”); and what it felt like in human terms to be (and to be seen as) a woman in Victorian society. Texts gives male and female perspectives. Critics and theorists include Nina Auerbach, Sandra Gilbert, Susan Gubar, Julia Kristeva, and Elaine Showalter. DR:7(2)
5 units, Win (Marsh)

161Z. Literature, Cinema, and Society in 1940s Britain — (Same as English 161Z.) Through a survey of the renaissance of British cinema in the 1940s, interwoven, by topic, with the study of selected works of literature, investigates the human imaginative experience of the “People’s War” and its aftermath from the British perspective. Emphasis on issues of gender-roles and romance; class and war-work; propaganda and betrayal; and “serious” and “popular” literature/cinema. DR:7(2)
5 units, Win (Marsh)

162Z. Under the Dominion of Translation — (Same as English 162Z, Comparative Literature 150, Asian Languages 143.) Works of outstanding British translators of a range of literature from the Ancient World, the Middle East and India, and East Asia to understand the attitudes of translators toward their work; how they proceeded; what they considered valuable; for whom they worked; how their work was received; and how they established a canon of important writing from outside the familiar frame of “England and English.” Texts: the Bible, the Kama Sutra, Arabian Nights, The Tale of Genji, and The Story of the Stone.
3 units, Aut (Hare)

163Z. England in Egypt and Egypt in England — (Same as English 163Z.) The British have been among the world’s foremost scholars of Ancient Egypt, and the intellectual achievements of British Egyptology have been important to modern understanding of Ancient Egypt. The network of relations between Britain and Egypt from the vantage point of Oxford University, particularly the Ashmolean Museum and the Griffith Institute. The political, intellectual, and cultural contexts in which British
Egyptology has developed. Varying perspectives on the ancient civilization of the Nile valley.
3 units, Aut (Hare)

167X. European Economies in a Changing World—(Same as Economics 167X; also listed as International Relations Cluster C.) The applied economics of Britain and how policy has been and may be affected by relationships with Europe. Topics: impact of EEC on production in Europe; evaluation of common agricultural policy; implications of European monetary union; Britain’s major postwar economic problems: demand management, balance of payments, industrial concentration, and economic inequality. Recommended: Economics 1 or equivalent. DR:9(5)
3 units, Aut (Hare)

168X. Economic Analysis and History of Technological Change—(Same as Economics 168X.) The integration of economic analysis of technology with historical studies of technological change. Enables analytical and empirical substantiation for an “evolutionary” view of technological change as a cumulative and historically contingent process, driven by local, goal-seeking human behaviors.
3 units, Aut (Crafts)

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 (Tosh)

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 Shakespeare. 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 Shakespeare. Focus is on the sources of the plays, their historical context, their dramatic content and their use of language.
5 units, Spr (Gearin-Tosh)

210X. Social Class in British Social Thought—(Same as Sociology 231W.) The meaning of fruitfulness, and the concept of “class” as it applies to the Scottish enlightenment. (Fergusen, Hume, Smith).
3-5 units, Spr (Zeldich)

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, Spr (Mateer)

PARIS

6. Love: A Comparative Study in Classic and Modern French Novels—A selection of French novels, from the 17th to the 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 study progresses thematically and covers the emergence of love, confession, death as dénouement, and narrative variants (form of narrative, the narrative statement and point of view). Enables students to trace common references, and to comprehend the evolution of French culture and sensibility. (In English and French)
4 units, Aut (Ottenwaelder)

7. French Romanticism (1800-1870)—The intellectual life in France from the end of the French Revolution to the Second Empire. Political instability, economic and social transformation, rich literary activity, bringing to the fore in history, fiction, theater, and poetry issues touched upon by the crisis of the Enlightenment, illustrated by analysis of literary texts. Recommended: good reading of French. (In English and French)
4 units, Win (Berchet)

8. Democratic Socialism in Western Europe: Past and Present—The transformation of the Socialist parties throughout the 20th century. Although differences exist, Socialist parties present common organizational and historical characteristics, and a common destiny which leads to the inquiry of the origins of their identity, of the transformation they have undergone and their ability to adapt to the social and political upheavals which with which they are confronted. The crisis of democratic Socialism, its various ideological, political, and organizational aspects. Is the identity of this political entity in question? (In English and French)
4 units, Win (Grunberg)

120X. French Painting from 1780-1900—(Same as Art 120X.) 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)

122X. 20th-Century French and European Economies—(Same as Economics 122X; also listed as International Relations Cluster C.) France's economy and economic relations with other countries, using international models for comparison. DR:9(5)
  5 units, Win (Fouet)

123Y. 19th-Century French Sculpture—(Same as Art 123Y.) Sculpture was a major art form in 19th-century France. The economic, social, and political reasons for its expansion, and the individual works of David D'Angers, Barye, Bourdelle, Carpeaus, Camille Claudel, Dalou, Daumier, Degas, Gauguin, Maillol, Rodin, Rude, and others. Weekly visits to French museums, working "around" the sculpture discussed. (In English and French)
  4 units, Win (LeNorm, Romain, Pingeot)

132V. Foundations of French Political Culture: The Old Regime and the French Revolution—(Same as History 132V.) Introduces salient features of French political culture as they appeared in the efforts of the French Revolution to destroy the absolute monarchy that preceded it. Field trips to historical sites and monuments in and around Paris. DR:8(3) and 9(5)
  5 units, Aut (Baker)

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 are surveyed; emphasis is on their specific contribution to the formation of the city landscape. Discussion complemented by site visits, readings from the literature, 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. Colloquium: Political Theory of the French Enlightenment—(Same as History 230V.) Classic works of 18th-century French political theory, including texts by Voltaire, Montesquieu, and Rousseau. The nature of the Enlightenment redefinitions of human nature, individual subjectivity, politics, society, gender, and implication of these definitions for modern culture. Students analyze a critical issue or theme arising from readings and discussions. Discussions in English, readings in English and French. DR:8 (3) and 9(5)
  5 units, Win (Baker)

233V/234V. Humanities Seminar—(Same as History 233V.) Two-quarter seminar from November to March gives students in the Paris I program the opportunity to write a research paper on a topic related to the course work and intellectual interests they are pursuing in Paris. Common readings address aspects of the French approaches to the humanities. Winter Quarter: students present a proposal describing research topic. Draft papers are circulated for group discussion at the end of Winter Quarter. Discussions are in French and English; readings are in French.
  4 units, Aut (Baker)
  3 units, Win (Baker)

FRENCH LANGUAGE PROGRAM

23P. Intermediate French I—(Same as French 23P.)
  5 units, Aut, Win (Green)

24P. Intermediate French II—(Same as French 24P.)
  5 units, Aut (Grée)

25P. Intermediate French III—(Same as French 25P.)
  5 units, Win (Grée)

123P. Advanced French I—(Same as French 123P.)
  5 units, Aut (Ricci)

124P. Advanced French II—(Same as French 124P.)
  5 units, Win (Ricci)

  3 units, Aut (Green)

SANTIAGO

5. Director's Seminar—Weekly seminar with presentations on current issues or events in Chilean political and cultural life.
  2 units, Aut (Fuenzalida)

9. Core Seminar: Ecology-Policy Studies—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)

10. Core Seminar: Political Economy of Higher Education and Human Resource Development—Provides students the intellectual depth and background to carry on research in the field and expose
them to the environment of functioning research groups.

5 units, Win (Brunner)

11. Research Preparation Seminar — 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.

2 units, Win (Staff)

12. Research Paper — Independent research with a research supervisor in Santiago or elsewhere in Chile to develop an extended paper associated with the central topic of the research module.

5 units, Win (Staff)

13. Director's Seminar — For all students participating in the research modules.

3 units, Win (Fuenzalida)

14. Core Seminar: Cultural Studies — 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 (Subercaseux)

106H. Man-Environment Interactions: Case Studies from Central Chile — (Same as Human Biology 106H, Biology 106Z.) 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)

113A. Politics and Development in Latin America — (Same as Political Science 113A.) Lectures/readings survey the systems in Latin America: Argentina, Brazil, Cuba, Mexico. Patterns of economic and social development in each country and theoretical and policy topics: authoritarianism and democracy, transitions from authoritarian rule, state/market relations, mercantilism and the informal economy, and the relations among equality, poverty, and efficiency and national autonomy, dependence and interdependence.

5 units, Aut (Packenham)

124X. The Transformation of the Global Economy and its Implications for Latin American Growth — (Same as Economics 124X; also listed as International Relations Cluster C.) Compares 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)

224X. States and Markets in Latin American Development — (Same as Political Science 224X.) Research-oriented seminar/workshop on economic liberalization in Latin America. What are the dimensions of economic liberalization? Why have most Latin American governments reversed the direction of their policies for economic and social development that had been in place since the 30s? Why are these policies implemented more fully in some countries than others? How should one evaluate these trends? Emphasis is on the student research, facilitated by lectures, readings, seminar discussions and individual consultations, and utilizing opportunities to pursue these topics in Santiago.

5 units, Aut (Packenham)

SPANISH LANGUAGE PROGRAM

6. Oral and Written Spanish for Foreigners: Level I — Instituto de Letras, Catholic University of Chile.

5 units, Aut (Staff)

7. Oral and Written Spanish for Foreigners: Level II — Instituto de Letras, Catholic University of Chile.

5 units, Aut (Staff)

8. Oral and Written Spanish for Foreigners: Level III — Instituto de Letras, Catholic University of Chile.

5 units, Aut (Staff)

PHILOSOPHY

Emeriti: (Professors) John D. Goheen, Stuart Hampshire, Georg Kreisel, David S. Nivison, Patrick Suppes, James O. Urmson

Chair: Michael Bratman

Director of Graduate Study: P.J. Ivanhoe

Director of Undergraduate Study: Marlene Rozemond

Professors: Michael Bratman, Fred Dretske (on leave), John Etchemendy, Solomon Feferman, Dagfinn Föllesdal (Spring), Wilbur Knorr, Grigori Mints, Julius Moravcsik (on leave Winter, Spring), John Perry, Thomas Wasow

Associate Professors: John Dupré, Eckart Förster

Assistant Professors: Rachel Cohon, Peter Godfrey-Smith, Yair Guttmann, Philip J. Ivanhoe, Marleen Rozemond, Debra Satz (on leave)
Philosophy concerns itself with fundamental problems. Some are abstract and deal with the nature of truth, justice, value, and knowledge; others are more concrete and their study may help guide our conduct or enhance our understanding of other subjects. In addition, philosophy examines the efforts of past thinkers to understand the world and our experience of it.

Although it may appear to be an assortment of different disciplines, there are features common to all philosophical enquiry. These include an emphasis on methods of reasoning and the way in which our judgments are formed, on criticizing and organizing our beliefs, and on the nature and role of fundamental concepts.

Students of almost any discipline can find something in philosophy which is relevant to their own specialties. In the sciences, it provides a framework within which the foundations and scope of a scientific theory can be studied, and it may even suggest directions for future development. Since philosophical ideas have had an important influence on human endeavors of all kinds—artistic, political, even economic—students of the humanities will find their understanding deepened by some acquaintance with philosophy.

Philosophy is an excellent major for those planning a career in law, medicine, or business. It provides analytical skills and a breadth of perspective helpful to those called upon to make decisions about their own conduct and the welfare of others. Philosophy majors who have carefully planned their undergraduate program have an excellent record of admission to professional and graduate schools.

The Special Program in the History and Philosophy of Science enables students to combine interests in science, history, and philosophy. Students interested in this program should see the special adviser.

The Joint Major in Philosophy and Religious Studies combines courses from both departments into a coherent theoretical pattern.

The Tanner Memorial Library of Philosophy contains an excellent working library and ideal conditions for study.

Graduate students and undergraduate majors in philosophy have formed associations for discussion of philosophical issues and reading of papers by students, faculty, and visitors. These associations elect student representatives to department meetings.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

There are two ways of majoring in philosophy: the “General Program” and the “Special Program in the History and Philosophy of Science.” A student completing either of these receives an A.B. degree in Philosophy. There is also a major program offered jointly with the Department of Religious Studies. To declare a major, a student must consult with the Director of Undergraduate Study. The student is assigned an adviser to work out a coherent plan. The department strongly urges proficiency in at least one foreign language.

GENERAL PROGRAM

1. Course requirements:
   a) Preparation for the major: an introductory course (under 100) and 80.
   b) The core: 24 additional philosophy units as follows.
      1) Logic: 57, or 159, or 160A.
      2) Philosophy of Science: any course from 60, 61, 163-168.
      3) Moral and Political Philosophy: one from 170-173.
      4) Metaphysics and Epistemology: one from 170-173.
      4) Metaphysics and Epistemology: one from 170-173.
   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, for a total of 55 units.

   2. Units for Tutorial or Directed Reading (Philosophy 196, 197) may not be counted in the 55-unit requirement. No more than 10 units completed with grades of “Satisfactory” may be counted in the 55-unit requirement.

   3. Transfer units must be approved by the Director of Undergraduate Studies, in writing, at the time of declaring a major. In general, transfer courses cannot be used to satisfy the five area requirements or the undergraduate seminar requirement.
PHILOSOPHY 567
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. 61 units are required for the sub-major, to be taken according to requirements 1-5 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 (e.g., 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 57 or 159
   b) Philosophy 80
   c) Philosophy 60
   d) Philosophy 164

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. Use of transfer courses to satisfy major requirements is strictly limited.

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 an undergraduate philosophy seminar in Spring Quarter of the junior year or Autumn Quarter of the senior year and 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 honors committee. A tutor is assigned on the basis of this proposal.

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. Two copies of the essay must be given to the honors committee by the end of the fourth full week of the Spring Quarter. Another copy must be given to Tanner Library.

The honors committee reviews applications, assigns tutors and second readers, and makes the final determination as to whether students receive honors.

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 must be discussed with the director of undergraduate studies in the appropriate department at the time of declaring the major.

CORE REQUIREMENTS

1. Philosophy courses:
   a) Philosophy 80.
   b) 16 units, including at least one course from each of the following areas:
      2) Ethics and value theory: Philosophy 170 or 171.
      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 (e.g., an Eastern and a Western, or a liter-
ate 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, e.g., 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 Support 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 departmental advisers as early as possible.

Applications to graduate programs in the Department of Philosophy can be obtained from the Graduate Admissions Section of 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 15 of the academic year preceding entry into the program. 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 departmental 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. (Student
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 of 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 requirements 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 THE PHILOSOPHY OF LANGUAGE

Admission is limited to students with substantial preparation in philosophy or linguistics. Those whose primary preparation has been in linguistics may be required to satisfy all or part of the undergraduate core requirements as described in the General Program. Those whose preparation is primarily in philosophy may be required to take additional courses in linguistics.

COURSE REQUIREMENTS

1. Philosophy of language: two approved courses in the philosophy of language numbered 180 or higher.


3. Logic: at least two approved courses numbered 160A or higher.

4. An approved graduate-level course in mathematical linguistics or automata theory.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the Ph.D. degree (residence, dissertation, examination, etc.) are discussed in the “Degrees” section of this bulletin. The requirements detailed here are departmental requirements. There are six basic areas (Philosophy of Science, Ethics, Metaphysics and Epistemology, Philosophy of Language, Logic, and History) in which students should have proficiency in order to obtain a Ph.D. Demonstrating proficiency takes the form of course work, intensive seminars, and papers, as detailed below.

Students must have completed this work by the end of their second year and all courses must be passed with a letter grade indicator (LGI) of ‘B’ or better (no Satisfactory/No Credit) to be advanced to candidacy.

At the end of the first year, the department reviews the progress of each first-year student to determine whether the student may continue in the program.

Any student in one of the Ph.D. programs may apply for the A.M. when all University and departmental requirements have been met.

PROFICIENCY REQUIREMENTS

1. Course requirements, to be completed during the first two years:

a) Seven of the eight items listed below:

1) Four “core” graduate courses and seminars, in philosophy of language (281); philosophy of mind, metaphysics, and epistemology (280); value theory (270); and philosophy of science (260). To enroll, the student must be a Ph.D. student in Philosophy or have special permission of the instructor.
6. Dissertation work and defense: the third and fourth years are devoted to dissertation work. The seven-out-of-eight requirement must include at least one history unit in ancient philosophy, one in modern.

3) Philosophy 160A
b) Philosophy 159 or the equivalent.
c) Breadth requirement: a course in Eastern or Continental philosophy, or some other course establishing breadth.
d) A total of at least 39 units of course work in the Department of Philosophy, numbered above 110 but not including Teaching Methods (Philosophy 239). Units of Individual Directed Reading (Philosophy 240) may be included only with the explicit approval of the Director of Graduate Studies.

2. Teaching assistance: a minimum of four quarters of teaching assistance at 25 percent time, usually during the second and third years.

3. Candidacy: to continue in the Ph.D. program, each student must be approved for candidacy during the sixth academic quarter (normally the Spring Quarter of the student’s second year). Students may be approved for candidacy on a conditional basis if they have only one or two outstanding deficiencies, but are not officially advanced to candidacy until these deficiencies have been removed. Approval for candidacy indicates that in the department’s judgment the student can successfully complete the Ph.D. In reaching this judgment, the department considers the overall quality of the student’s work during the first six quarters and the student’s success in fulfilling course requirements.

4. During the third year of graduate study, and after advancement to candidacy, a Ph.D. student should successfully complete at least three graduate-level courses/seminars, at least two of which must be in philosophy. Courses required for candidacy are not counted toward satisfaction of this requirement. Choice of courses/seminars outside philosophy is determined in consultation with a student’s adviser.

5. During the summer of their second year, students are eligible to attend a Dissertation Development seminar given by the department.

6. Dissertation work and defense: the third and fourth and sometimes fifth years are devoted to dissertation work.

a) Dissertation Proposal: by Spring Quarter of the third year, students select a dissertation topic, a reading committee, and some possible thesis relative to that topic. The topic and thesis should be sketched in a proposal of three to five pages, plus an annotated bibliography indicating familiarity with the relevant literature. The proposal should be approved by the reading committee before the meeting on graduate student progress late in Spring Quarter.

b) Departmental Oral: during Autumn Quarter of the fourth year, students take an oral examination, called the “Departmental Oral,” based on at least 30 pages of written work, in addition to the proposal. The aim of the exam is to help the student arrive at an acceptable plan for the dissertation and to make sure that the student, thesis, topic, and adviser make a reasonable fit. In cases where such an exam is deemed inappropriate by the reading committee, the student may be exempted by filing a petition with the Director of Graduate Studies, signed by the student and the members of the reading committee.

c) 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 departmental 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 seven items listed in '1a.'
2. Philosophy 160A (but then they must take Philosophy 57 or 159).
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 these 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 (b) five areas.
3. A faculty member from the Department of Philosophy (usually the student's adviser) serves on the student's doctoral oral examination committee and may request that up to one third of this examination be devoted to the minor subject.
4. Paperwork for the minor must be submitted to the departmental 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 in 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 Courses and Degrees, 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: i.e., Philosophy 289, 326, 396, etc.
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.
   c) 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 departmental 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 — Examines 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 philosophical argument and themes. Origins of philosophical thought traced in Greek and Chinese classical periods and situated within other forms of understanding. 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 10 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, Hobbes, Jacobs, Locke, Mill, Newton, de Pizan, Rousseau, Wollstonecraft, and Native American narratives. DR:1 (three-quarter sequence)

5 units, Win (Staff) MW 10 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 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 10 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, Spr (O'Rourke) MWF 11 plus section

20. Introduction to Moral Theory — Classic questions in moral philosophy through the works of traditional and contemporary authors. Reading Plato, Aristotle, Hume, Kant, and Mill. Topic: 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 a
tions are right? What sort of person is it best to be? What is the role of happiness in a good life? DR:2(*) or 8(3*)

30. Introduction to Political Philosophy — (Same as 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, Aut (Tomasi) 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:8(3*)

5 units, Spr (Yearley) MW 11-12:30 plus section

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)

4 units, Aut (Gelber) MWF 11 plus section

46. Introduction to Chinese Thought — (Same as 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, Ivanhoe (not given) 1993-94

57. Logic, Reasoning, and Argumentation — Study of propositional and predicate logic, emphasizing translating English sentences into logical symbols and constructing derivations of valid arguments. DR:4(6)

5 units, Win (O’Hair) MTWThF 9

Spr (Shin) 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:2(*) or 8(3*)

5 units, Spr (Godfrey-Smith) MWF 1:15

61. Introduction to the Philosophy of Social Science — (Same as Education 111.) For majors 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 in the social sciences: explaining human action, the functional explanation of social phenomena, and holistic vs. reductionist orientations. Examples from contemporary social sciences research literature.

3 units (Phillips) not given 1993-94

77. The Ethics of Social Decisions — (Same as Ethics in Society 77.) Abortion and euthanasia, comparing new and traditional approaches to these problems pursued from American and international perspectives. Instead of questions about rights (e.g., “Does the fetus have a right to life?”), shifts the debate to questions about the intrinsic value of life. When and why is human life valuable? Can a woman sometimes best respect the value of life by choosing to have an abortion? Can an elderly person ever best respect her/his life by choosing to die? Discussion.

4 units, Win (Tomasi) MWF 11

78. Medical Ethics — (Same as Human Biology 173.) Philosophical analysis of moral dilemmas in health care from the perspective of the health care professional and the concerned layman (patient, family member, or observer). Traditional insights about rights, compassion, respect for persons, and other moral matters illuminate such issues as euthanasia, informing vs. lying to seriously ill patients, treatment of deformed newborns, and the just allocation of scarce lifesaving therapies.

4 units, Win (Wilburn) MWF 1:15

80. Mind, Matter, and Meaning — Intensive survey of some central and perennial topics in philosophy: free will and determinism, the mind-body problem, and personal identity. Writing focus course. Prerequisite: one course in philosophy other than logic. DR:8(3)

5 units, Win (Bratman) MWF 11

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 — (Same as Classics 65.) The philosophies of Plato and Aristotle, with some pre-Socratic background. DR:8(3)

4 units, Win (Segvic) MWF 1:15

101. Medieval and Renaissance Religious Philosophy — (Same as Religious Studies 167.) Survey

4 units, Win (Gelber) MWF 1:15

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, Spr (Perry) TTh 1:15-2:30

103. 19th-Century Philosophy — Ideas and conceptions that shaped 19th-century philosophy. Fichte, Hegel, Marx, Kierkegaard, Nietzsche.

4 units (Forster) not given 1993-94

104. Introduction to Chinese Thought — (Same as 46.) For philosophy majors.

113. Zhuang Zi — (Graduate students register for 213; same as Asian Languages 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 knowledge of Chinese required. Separate readings for those who know Classical Chinese. Prerequisite: 46 or consent of instructor.

4 units, Spr (Ivanhoe) MWF 10

114. Neo-Confucianism — (Graduate students register for 213; 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, Ju Xi, Wang Yangming, Dai Zhen, and Zhang Xuecheng. Prerequisite: 55 or consent of instructor.

4 units, Win (Ivanhoe) MWF 10

116. Plato’s Philosophy — (Graduate students register for 216.) The development of Plato’s metaphysical theories.

4 units, Aut (Moravcsik) MWF 1:15

117. Aristotle’s Ethics: Eudaemonism — (Graduate students register for 217.) Topics: happiness as the supreme good, the nature of moral virtue, the role of habituation in becoming virtuous. The differences between Aristotle’s eudaemonism and modern moral theories.

4 units, Win (Segvic') MW 3:15-4:30

118. Aristotle’s Ethics: Practical Rationality — (Graduate students register for 218.) Is there, according to Aristotle, such a thing as the art of living, and is practical wisdom that art? Two theses: practical wisdom and moral virtue entail one another; and resisting temptations is no part of virtue.

4 units, Spr (Segvic') Th 3:15-5:05

119. Hellenistic Philosophy — (Enroll in Classics 165.)

4 units, Spr (Wigodsky)

120. 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.

4 units, Win (Yearley) MW 2:15-4:05

121. Descartes’s Philosophical System — (Graduate students register for 221.) Examination of central themes in Descartes’s philosophical system, emphasizing related secondary literature.

4 units, Spr (Rozemond) TTh 1:15-2:30

125A. 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 (Forster) not given 1993-94

125B. 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, Aut (Forster) TTh 11-12:15

129. Pragmatism — (Graduate students register for 229.) Introduction to Peirce, 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, Aut (Godfrey-Smith) TTh 3:15-4:30

130. Kierkegaard — (Graduate students register for 230; same as Religious Studies 274C.) Examination of 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 metaphysical epistemology, ethics?

5 units, Aut (Harvey) MW 4:15-6:05

131. 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, Spr (Follesdal) M10-12

132. Existentialism — (Graduate students register for 232.) Systematic examination of the basic philosophical ideas of Sartre and Heidegger.
4 units, not given 1993-94

133. Hermeneutics and Critical Theory — 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. DR:8(3)
4 units (Förster) not given 1993-94

134A. Thinking Difference I: Nietzsche — Seminar on Nietzsche’s concept of genealogy as developed in the Genealogy of Morals.
3 units, Aut (Düttmann) T 10-12

134B. Thinking Difference II: Heidegger — Seminar on Heidegger’s idea of an ontological difference as developed in Being and Time and Identity and Difference.
3 units, Win (Düttmann) T 10-12

134C. Thinking Difference III: Derrida — Seminar on Derrida’s notion of “differance” as developed in his deconstruction of phenomenology (Introduction to Husserl’s Origin of Geometry, Speech and Phenomenon).
3 units, Spr (Düttmann) T 10-12

135. Wittgenstein: Meaning and Modernity — (Graduate students register for 235.) Close reading of Wittgenstein’s Philosophical Investigations against the background of philosophy of mind from Descartes through Fodor, emphasizing the Post-Kantians.
3 units, Win (Eldridge) Th 1:15-3:05

HISTORY OF SCIENCE


138A. Ancient Period — DR:8(3); also satisfies Area 4(6) when taken in sequence with 138B or 138C.
4 units, Aut (Knorr) MWF 2:15

138B. Science and Technology in the Scientific Revolution — DR:8(3); also satisfies Area 4(6) when taken in sequence with 138A.
4 units, Win (Knorr) MWF 2:15

138C. Modern Period: Newton to Einstein — DR:8(3); also satisfies Area 4(6) when taken in sequence with 138A.
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) TTh 2:15-3:30

145. Scientific Revolution — (Graduate students register for 245; same as History 139, History and Philosophy of Science 145.) 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. DR:8(3)
4 units, Win (Nelson) TTh 11-12:15

150. Origins of Life — (Same as History 133D, History and Philosophy of Science 156.) 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 main lines of research, one originating with A. I. Oparin’s (1924) The Origins of Life emphasizing a biochemical-metabolic approach to life, the second emphasizing a genetic-informational approach beginning with H. J. Muller’s (1926) The Gene as the Basis of Life. 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 (Lenoir) 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 the Species. Difficulties the theory had to overcome and their resolution in the union of evolutionary biology and population genetics. DR:9(4)
4 units, Aut (Lenoir) MW 11-12:15
LOGIC AND PHILOSOPHY OF SCIENCE

155. Philosophy of Social Science — (Graduate students register for 255.) The philosophy of social science examines the fundamental concepts, methods, assumptions, and implications of the study of human society. Survey of a number of the issues generated by such inquiry, emphasizing the nature of the explanation in the social sciences and the relationship between the social and natural sciences. Prerequisites: two previous courses in philosophy.
4 units, Aut (Gasper) MW11-12:15

156. Popper, Kuhn, and Lakatos — (Same as Education 214X.) Popper, Kuhn, and Lakatos are major 20th-century philosophers of science who interacted quite vigorously. They 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, Spr (Phillips) Th 7-9:30 p.m.

157. Logic, Reasoning, and Argumentation — (Same as 57.) For graduate students.

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.
4 units, Aut (Wasow) MWF 9 plus section

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 Löehnheim-Skolem Theorem and the Compactness Theorem. Prerequisite: 159 or consent of instructor. DR:4(6)
4 units, Win (Shin) MWF 2:15 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) MWF 9

162. Philosophy of Mathematics — Introduction to 20th-century approaches to the foundations and philosophy of mathematics. Background in mathematics, set theory, and logic. The schools and programs of logicism, predicativism, platonism, formalism, and constructivism. Readings from leading thinkers. Prerequisites: 160A, 161, or consent of the instructor.
3 units, Win (Feferman) MWF 2:15

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 1993-94

164. 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, Win (Dupré) TTh 1:15-2:30

165. Philosophy of Physics — (Graduate students register for 265.) Methodological and philosophical issues in modern physics.
4 units, Spr (Guttmann) T 2:15-5:05

166. Topics in Philosophy of Physics: Philosophy of Space and Time — (Graduate students register for 266.) 17th-century disputes on the nature of space and time. How the disputes are altered in the context of 20th-century physics. Topics: the connection between matter and space; substantival and relational theories of space, time, and spacetime; and the “direction” of time.
3 units, Win (Nelson) MW11 -12:15

167. Philosophy of Biology — Questions about explanation and theory construction in evolutionary biology. Analysis of key concepts: adaptation, fitness, function, units of selection, species.
4 units, Aut (Godfrey-Smith) TTh 11-12:15

168. Philosophy of Logic — (Graduate students register for 268.) Basic issues in philosophy of logic: logical truth, logical consequence, quantifiers, theories of truth, etc. Prerequisite: some familiarity with first-order logic, such as 160A.
3 units, Win (Shin) T 3:15-5:05

169. Intensional Logic — Logical analysis of intensional notions like modality, time, conditions, 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 new developments: partiality, dynamics, type structure.
ETHICS, AESTHETICS, AND SOCIAL AND POLITICAL PHILOSOPHY

170. Ethical Theories — The ethical theories of Hume, Kant, and the classical utilitarians. Issues in 20th-century moral theory that have their roots in these works: the roles of reason and emotion in moral judgment, sources of moral motivation, and the normativity of ethics.
4 units, Spr (Cohon) MWF 11

171. Political Philosophy — Highlights of the re-birth of liberal political theory in the last 25 years, with emphasis on the concerns of liberalisms’ critics. Topics: Rawlsian liberalism, libertarianism, communitarianism, and feminism. The question of special rights for ethnic minorities, and the question of secession.
4 units, Aut (Tomasi) MW 3:15-4:30

172. Topics in Moral Philosophy — (Graduate students register for 272.) Moral realism and anti-realism. 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, Win (Cohon) MWF 1:15

173. Philosophy of Art — (Graduate students register for 279.) The concept of philosophical art as it has been discussed by 20th-century artists and philosophers.
3 units, not given 1993-94

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, and pacifism. DR:8(3)
5 units, Spr (Jackson) MWF 1:15 plus section

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, Win (Jackson) TTh 4:15-6:05

175A. Problems in Political Theory: Obligation — (Same as Political Science 263.) Seminar on the concept of obligation, drawing on moral, legal, and political theory. Moral philosophers on the obligation to keep promises. Readings in contract law on which, if any, moral obligations (promises) the state should legally enforce. Political theorists on whether, under what circumstances, and why citizens have an obligation to obey the law, or pay taxes. Obligations some think we have, not to promises, or fellow citizens, but to future generations.
5 units, Win (Tunick)

175B. History of Political Thought II: Pre-Renaissance to Enlightenment — (Same as Political Science 151B.) The secularization of political thought and the development of liberal and republican ideas between the 14th and 18th centuries. Readings from Calvin, Hobbes, Locke, Luther, Machiavelli, Marsilius, Montesquieu, and Rousseau.
DR:8(3)
5 units, Win (Okin)

175C. 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.
5 units, Aut (Okin) WF 1:15-3:05

175D. Contemporary Theories of Justice — (Graduate students register for 275D; same as Political Science 268.) 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, Aut (Okin) Th 1:15-3:05

3-4 units, Spr (Dupuy)

177. Feminism and Philosophy — Over the last two decades feminist philosophers and political theorists have been developing and refining a variety of feminist approaches to public policy issues. The controversies that have emerged between feminists over such issues as abortion, reproductive technologies, pornography, militarism, and the environment. Analysis of these feminist theories to assess their adequacy in contemporary ethical issues.
4 units, Spr (Gruen) TTh 11-12:15

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 (Tomasi) T 1:15-3:05
181. Philosophy of Language — Examination of the notions of meaning, reference, and language use; with relations to psycho-linguistics and formal semantics. Prerequisites: 80 and some background in logic. DR:9(4)
4 units, Aut (Taylor) MWF 2:15

183. 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, Spr (Follesdal) MWF 1:15

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, Aut (Perry) MW1:15-2:30

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, Spr (Taylor) MWF 2:15

187. Metaphysics — Other than physical laws and physical identities, what kinds of principles and entities must we appeal to in order to describe the world? Considered are principles concerning events, mathematical objects, states of affairs, situations, propositions, concepts, ideas, universals, possibilia, and the “objects” of discredited scientific theories and other fictions.
4 units (Dupré) not given 1993-94

188. Philosophical Issues in Connectionism and Neurobiology — (Same as Symbolic Systems 188.) Topics in connectionism and neuroscience of current interest to philosophers. Emphasis is on the explanatory value the disciplines of connectionism and neuroscience have for philosophers interested in mental representation, concept formation, and the relationship between mind, brain, and hardware.
3 units, Spr (Rumelhart, Skokowski) T3:15-5:05

194. Undergraduate Seminars in Philosophy — Preference given to undergraduate majors. A series of advanced undergraduate seminars. Enrollment limited to 14 in each seminar. For those in the Philosophy honors program, seminars serve as preparation for writing an honors thesis.
194A. Deontology: Recent Development, Pro and Con — Survey of the contemporary dis-avowal of deontology by those (Sam Scheffler and Barbara Herman) who might have been thought most charitable to it. Survey of a student form of deontology. Deontological views that exist in a wide range of philosophical domains.
4 units, Aut (Vania) Th 2:15-5:05

4 units, Aut (Colombetti) Th 2:15-5:05

3 units, Aut (Guzeldere) Th 2:15-4:05

194D. Modernity Blues — The connection between blues art (music, dance, literature, etc.) and the philosophical claims of modernism, emphasizing the development of the blues as an expression of the transition from agrarian to industrial culture. The assumptions of modernity which concern race and nationality (including socialization through labor and housing) from the early Delta blues through the Harlem Renaissance, focusing on shifts in African American economic and cultural paradigms. Comparisons to other art forms/movements concurrent with the rise of modernity.
4 units, Win (Williams) Th 2:15-5:05

194E. Feminist Epistemology — The intersection of feminist theory with traditional epistemology, discussing problems such as the nature of knowledge, epistemic agency, methods of justification, notions of objectivity and rationality, and how these problems are seen through feminist lenses. “Is knowledge gendered?”
4 units, Spr (Gruen) Th 2:15-5:05

194F. Epistemology: Perception and Belief — Perceptual belief acquisition and its relationship to more general epistemological problems. Early sense-data theories contrasted with modern causal theories. Alternative responses to these approaches to the problem, including ordinary language and Wittgensteinian views.
4 units, Spr (Kaplan) Th 2:15-5:05

195. Undergraduate Reading Groups in Philosophy — Preference given to undergraduate majors.
Advanced, intensive undergraduate reading groups. Enrollment limited to five in each group.

195A. Nietzsche's Übermensch Ideal — A critical study of Nietzsche's Übermensch (overman), or ideal person.  
2 units, Win (Franklin) Th 2:15-4:05

195B. Theories of Rights — Consideration of competing theories of rights.  
2 units, Spr (Dwyer) Th 2:15-4:05

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

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.  
4 units (Ivanhoe) not given 1993-94

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.  
4 units (Ivanhoe) not given 1993-94

213. Zhuang Zi — (For graduate students; same as 113.)

214. Neo-Confucianism — (For graduate students; same as 114.)

216. Plato's Philosophy — (For graduate students; same as 116.)

217. Aristotle's Ethics: Eudaemonism — (For graduate students; same as 117.)

218. Aristotle's Ethics: Practical Rationality — (For graduate students; same as 118.)

220. Aquinas' Ethics — (For graduate students; same as 120.)

221. Descartes's Philosophical System — (For graduate students; same as 121.)

225B. Kant's Second Critique — (For graduate students; same as 125B.)

228. Kant's Opus postumum — In-depth study of Kant's last major work, in relation to his earlier writings.  
3 units, Aut (Förster) Th 3:15-5:05

229. Pragmatism — (For graduate students; same as 129.)

230. Kierkegaard — (For graduate students; same as 130.)

231. The Structure of Cognition: Introduction to Husserl's Phenomenology — (For graduate students; same as 131.)

235. Wittgenstein: Meaning and Modernity — (For graduate students; same as 135.)

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, Spr (Godfrey-Smith) Th 3:15-5:05

245. Scientific Revolution — (For graduate students; same as 145.)

255. Philosophy of Social Science — (For graduate students; same as 155.)

260. Core Seminar in Philosophy of Science — For first- and second-year students in the Philosophy Ph.D. program.  
4 units (Godfrey-Smith, Guttmann) not given 1993-94

264. General Topics in the Philosophy of Science — (For graduate students; same as 164.)

265. Philosophy of Physics — (For graduate students; same as 165.)

266. Topics in Philosophy of Physics: Philosophy of Space and Time — (For graduate students; same as 166.)

267. Philosophy of Biology — (For graduate students; same as 167.)

268. Philosophy of Logic — (For graduate students; same as 168.)
270. Core Seminar in Moral Philosophy — For first- and second-year students in Philosophy Ph.D. program.
4 units, Aut (Bratman, Cohon) MW 3:15-5:05

271. Graduate Seminar in Political Philosophy — Investigation of a major theme in contemporary political theory. Reading and intensive discussion of selected issues in the recent literature.
3 units, Spr (Tomasi) Th 1:15-3:05

272. Topics in Moral Philosophy — (For graduate students; same as 172.)

273. Topics in the Philosophy of Economics
4 units (Dupré, Satz) not given 1993-94

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 1993-94

275D. Contemporary Theories of Justice — (For graduate students; same as 175D.)

3 units, Spr (Bratman) T 1:15-3:05

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, Aut (Moravcsik) 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, Spr (Dupré) MW 3:15-5:05

281. Core Seminar in Philosophy of Language — For first- and second-year students in the Philosophy Ph.D. program.
4 units, not given 1993-94

282. History of Philosophy of Mind — The mind-body problem and personal identity in early modern philosophy. Readings from the works of Descartes, Locke, the Clarke-Collins correspondence.
3 units, Spr (Perry, Rozemond) T 10-12

283. Meaning and Experience — (For graduate students; same as 183.)

284. Graduate Seminar in Metaphysics
3 units, Win (Taylor) Th 10-12

290A,B. Model Theory — (Enroll in Math. 290A,B) Language and models of the first-order predicate calculus. Validity and definability. Complete and decidable theories. Saturated models, ultraproducts, categoricity in power. Infinitary languages. Prerequisites: 159 and 160A,B, or equivalent.
290A. 3 units, Aut (Mints) MW 3:15-4:30
290B. 3 units, Win (Mints) MW 3:15-4:30

291. Logic and Cognitive Science — Parallels between key topics in logic, linguistics, and computer science. Dynamic logic of interpretation and cognition (anaphora, discourse instructions, belief revision), varieties of inference (classical, dynamic, and minimal reasoning with their various structural properties), polymorphism and general type structure (properties and types in natural languages and programming languages).
4 units (van Benthem) not given 1993-94

292A,B. Set Theory — (Enroll in Math. 292A,B)
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: Math. 160A,B and 162, or equivalent.
3 units, Aut, Win (Feferman)

293A,B. Proof Theory — (Enroll in Math. 293A,B) 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
3 units, not given 1993-94

294. Topics in Logic — (Enroll in Math. 294) 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 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: appropriate background from one of Math. 290A,B, through 293A,B, or equivalent.
3 units, Spr (Mints) M 3:15-5:05

3 units (Etchemendy) not given 1993-94

298. Topics in Logic, Language, and Computation — Logical analysis of common concerns on
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) T 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, Phillips) not given 1993-94

314. Advanced Classical Chinese Texts

4 units, Aut (Ivanhoe) Th 10-12

322. Leibniz — Analysis of Leibniz’ philosophical system with an emphasis on his metaphysics.

3 units, Win (Rozemond) T 3:15-5:05

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, Aut (Dretske) T 3:15-5:05

382. Seminar in Philosophy of Language

3 units (Føllesdal, Perry) T 3:15-5:05

395A. Philosophy of Computation — (Same as Symbolic Systems 294.) 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)

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, Scarle, Taylor, Winograd); the role of connectionism (Cussins, Fodor, Smolensky); and anti-representationalism (Brooks, Chapman, Dretske, Rosenschein).

3 units, alternate years, given 1994-95

450. Thesis

any quarter (Staff) by arrangement

Emeriti: (Professors) Stanley S. Hanna, Walter E. Meyerhof, David M. Ritson, Arthur L. Schawlow, J. Dirk Walecka

Chair: Douglas D. Osheroff

Director of Graduate Study: Robert V. Wagener

Director of Undergraduate Study: Mason R. Yearian


Associate Professors: Peter F. Michelson (on leave Autumn), Soucheng Zhang

Assistant Professors: Mark A. Kasevich, Bryan W. Lynn (on leave Autumn), Charles M. Marcus, Roger W. Romani

Professors (Research): John A. Lipa, Todd I. Smith, John P. Turneaure

Acting Professor: Mark I. Dykman

Acting Assistant Professor: David Spooner

Consulting Professors: Theodor W. Hänsch, Marc D. Levenson, Stephen Libby, Melvin Schwartz

By Courtesy: Peter A. Sturrock, 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 lab which has as its principal tools a two-mile-long 50-GeV electron accelerator and a 6-GeV electron-positron storage ring. Also at SLAC are a 30 GeV electron-positron storage ring (PEP) and the Stanford Synchrotron Radiation Laboratory (SSRL). A high-energy facility, the Stanford Linear Collider (SLC), provides electron-positron collisions at about 100 GeV in the center of mass.

Professor Yearian is director of HEPL, and Professors Cabrera, Lipa, Michelson, Schwettman, Smith, and Turneaure are on the staff. 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 also consult the "Astronomy Course Program" section in this bulletin.

Three introductory series include labs in which undergraduates carry out individual experiments. The Intermediate and Advanced Physics Laboratories offer facilities for increasingly complex individual work. Undergraduates are also encouraged to participate in research; most can do this through honors program.

Graduate students find opportunities for research in the fields of astrophysics, atomic physics/laser science, coherent optical radiation, condensed matter physics, high energy physics, intermediate energy physics, low temperature physics, and theoretical physics. Opportunities for research are also available with the faculty at SLAC in the areas of theoretical and experimental particle physics and accelerator design, and with the faculty in Physics and Applied Physics in the areas of astrophysics, materials research, novel imaging technology, photon science, quantum electronics, and theoretical and experimental condensed matter physics.

The number of graduate students admitted to the Department of Physics is strictly limited. Students should complete application by January 1 for the following Autumn Quarter. Graduate students may normally enter the department only at the beginning of Autumn Quarter.

UNDERGRADUATE PROGRAMS

The study of physics is undertaken by three principal classes of undergraduates: those including physics as part of a general education; those preparing for careers in professional fields that require a knowledge of physics, such as medicine or engineering; and those preparing for teaching or research careers in physics itself. Physics courses numbered below 200 are planned to serve all three of these groups. The courses numbered above 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, 172, 181, 204, or 262. Math. 43H, 44H, and 45H may be substituted for Math. 43, 44, and 130. The department advises the study of some Chemistry, e.g., 31 or 32, 33, and 35; some Computer Science, e.g., 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 can 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 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 1
FIRST YEAR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
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<tbody>
<tr>
<td>Math. 42, 43, 44, Analytic</td>
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<tr>
<td>Geometry, Calculus</td>
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<tr>
<td>Physics 61, 63, 65. Advanced</td>
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<tr>
<td>Freshman Physics</td>
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<td>Physics 64, 66. Advanced</td>
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<tr>
<td>Freshman Laboratory</td>
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SECOND YEAR*
Math. 130, 131, 132. Ordinary Differential Equations, Partial Differential Equations I and II 3 3 †3
Physics 70. Modern Physics 3
Physics 105, 107. Intermediate Physics Laboratories 3 3
Physics 110, 111. Intermediate Mechanics 3 3
Physics 120, 121, 122. Intermediate Electricity and Magnetism 3 3 3

THIRD YEAR*
Math. 103, 106, or 109. Linear Algebra and Matrix Theory, Complex Variables or Modern Algebra †3 †3
Physics 130, 131, 132. Quantum Mechanics 3 3 3
Physics 160. Introduction to Stellar and Galactic Astrophysics **3
Physics 170, 171, 172. Thermodynamics, Kinetic Theory and Introduction to Statistical Mechanics, Physics of Solids 3 3 **3
Physics 181. Optics **3
Physics 201/202. Advanced Physics Laboratories 3 3 3
Physics 262. Essential General Relativity **3

FOURTH YEAR*
Physics 135. Computational Physics **3
Physics 203. Advanced Physics Laboratory 3 †3 †3
Physics 204. Senior Seminar in Theoretical Physics **3
Physics 205. Honors Program †3 †3 †3
Physics 210, 211, 212. Advanced Mechanics (Particle and Continuum, Nonlinear Statistical) †3 †3 †3
Physics 220, 221. Classical Electrodynamics †3 †3

SEQUENCE II
FIRST YEAR*
Math. 41, 42, 43. Analytic Geometry and Calculus 5 5
Physics 51, 53. Mechanics, Electricity, Magnetism 4 4
Physics 54. Electricity, Magnetism, Laboratory 1

SECOND YEAR*
Math. 44, any additional math course numbered 100 or higher 3 3
Math. 130, 131, 132. Ordinary Differential Equations, Partial Differential Equations 3 3 †3
Physics 55. Light and Heat 4
Physics 56. Light and Heat Laboratory 1
Physics 70. Modern Physics
Physics 110, 111. Intermediate Mechanics 3 3

THIRD YEAR*
Math. 103, 106 or 109. Linear Algebra, Matrix Theory, Complex Variables, or Modern Algebra †3 †3
Physics 105, 107, 201. Intermediate and Advanced Physics Laboratories 3 3 3
Physics 120, 121, 122. Intermediate Electricity and Magnetism 3 3 3
Physics 130, 131, 132. Quantum Mechanics 3 3 3

FOURTH YEAR*
Physics 135. Computational Physics **3
Physics 160. Introduction to Stellar and Galactic Astrophysics **3
Physics 170, 171, 172. Thermodynamics, Kinetic Theory, and Introduction to Statistical Mechanics, Physics of Solids 3 3 **3
Physics 181, 204. Optics, Senior Seminar in Theoretical Physics **3 **3
Physics 202, 203. Advanced Physics Laboratory 3 †3
Physics 210, 211. Advanced Mechanics, (Particle and Continuum, Nonlinear) †3 †3
Physics 262. Essential General Relativity **3

* 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 departmental counseling and tutoring center called the Reference Frame. The center is staffed Monday through Thursday, 9-5 p.m. and 7-9 p.m. and Fridays 9-3:15 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.
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 “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 departmental 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 units of requirements 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 “Degrees” section of this bulletin. The minimum departmental 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, 294, and 330. 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 be aware of the Ph.D. granted independently by the Department of Applied Physics and by the Biophysics Program administered through the Department of Chemistry. Students interested in astronomy, astrophysics, or space science should also consult the “Astronomy Course Program” section in 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 in this bulletin or address 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 in 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 physics majors.

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 1993-94


3 units, not given 1993-94

15. 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 (Romani) MW 2:15-3:30
Sum (Walker) MW 2:15-3:30
discussion by arrangement

19. An Introduction to Physics (Physics for Poets) — A non-technical viewpoint of the aims, methods (experimental and theoretical), and achievements in the attempts to understand the basic principles governing the physical world. Topics are introduced through historical background, emphasizing present knowledge and current problems. Possible topics: classical mechanics, relativity, and quantum mechanics. High school level algebra and trigonometry are used. DR:5(7)

3 units, Aut (Yearian) TTh 9
one-hour discussion by arrangement

21. Mechanics and Heat — Introduction to Newtonian mechanics, fluid mechanics, theory of heat. Intended for biology, social science, pre-medical students. Calculus is used as a language and developed as needed. Prerequisites: working knowledge of elementary algebra and trigonometry. DR:5(7)

3 units, Aut (Dimopoulos) MWF 10 or 11
one-hour discussion by arrangement
Sum (Gillespie) MTWThF 10-12
two-hour discussion by arrangement


1 unit, Aut (Dimopoulos) by arrangement
Sum (Gillespie) W or Th 2:15-4:05

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 (Schwettman) MWF 10 or 11
one-hour discussion by arrangement
Sum (Gillespie) MTWThF 10-12
two-hour discussion by arrangement

24. Electricity and Optics Laboratory — Pre- or corequisite: 23.

1 unit, Win (Schwettman) by arrangement
Sum (Gillespie) W or Th 2:15-4:05

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 (Little) MWF 10 or 11
one-hour discussion by arrangement
26. Modern Physics Laboratory — Pre- or corequisite: 25.
1 unit, Spr (Little) by arrangement

3 units, Aut (Petrosian) TTh 11-12:15
discussion by arrangement

49. Physics Problem Solving — Prerequisite: enrolled in the SEMAP courses.
1 unit, Aut (Hawthorne-Searight) WF 2:15-3

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 (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 (Cabrera) lec MWF 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 (Michelson) lec MWF 9 or 10
discussion by arrangement

54. Electricity and Magnetism Laboratory — Pre- or corequisite: 53.
1 unit, Spr (Michelson) 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 (Wagner) 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 7-7:25

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 — Two courses in experimental techniques required of all Physics majors. Must be taken in sequence. Format is a one-hour weekly lecture usually Friday noon and one to two afternoons a week in lab. Topics: electronics, detectors and radioactive sources, optics and lasers, statistics and data handling. Prerequisites: 54 or 64 and 66; prior or concurrent registration in 56 and the 120 series

105. Laboratory Seminar I: Electronics
3 units, Aut (Spoonn) F 12
107. Laboratory Seminar II
3 units, Win (Chu) 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, Langrangian 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. 3 units, Win (Yearian) MWF 9
111. 3 units, Spr (Yearian) 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. 3 units, Aut (Dykman) MWF 11
121. 3 units, Win (Dykman) MWF 11
122. 3 units, Spr (Dykman) 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. 3 units, Aut (Chu) TTh 1:15-2:30
131. 3 units, Win (Chu) TTh 1:15-2:30
132. 3 units, Spr (Zhang) 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 1993-94

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 (Romani) MW 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)

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. 3 units, Aut (Laughlin) MWF 10
171. 3 units, Win (Laughlin) MWF 10

3 units, Spr (Cabrera) MWF 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 (Little) MWF 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

198. History and Philosophy of Physics — (Enroll in History and Philosophy of Science 168; Philosophy 148; Science, Technology, and Society 126.)
5 units, Win (Dresden) MTWTh 10 (Hecht)

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 (Schwettman)
202. 3 units, Aut (Osheroff)
203. 3 units, Win (Walker)
Spr (Schwettman)

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 physics. Prerequisite: 132 or consent of instructor. Offered occasionally.
3 units, Spr (Susskind)

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.
1-3 units or by arrangement
Aut, Win, Spr (Yearian)
Sum (Staff)

207,208. Laboratory Electronics — (Enroll in Applied Physics 207, 208.) Prerequisites: some undergraduate-level device and circuit exposure.
207. 3 units, Win (Fox)
208. 3 units, Spr (Fox)

3 units, Aut (Pescin) 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 (Kapitulnik) MW 1:15-2:30
221. 3 units, Win (Kapitulnik) 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, Spr (Wojcicki)
alternate years, not given 1994-95

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. Prerequisites: 111, 122. Recommended: concurrent enrollment in 211.

3 units, Win (Wagner) 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. Topics: sliding charge density waves in layer compounds, the first pressure-induced Mott transition, the first organic superconductor, the discovery of superfluid 3He, quasicrystals, the Sharvin effect, the quantum hall effect, and re-entrant superconductivity. Journal club format, with presentations by students on assigned topics.

3 units, Spr (Laughlin)

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.

0-1 unit, Aut (Marcus) TTh 12:15-1:15

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.

any quarter (Staff) by arrangement

294. Teaching of Physics — Required of all teaching assistants in Physics; registration not required. Techniques of teaching physics by means of lectures and lab.

0-3 units, Aut (Friedmann)

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)

3 units, Sum (Walker)

312. Basic Plasma Physics — (Enroll in Applied Physics 312.)

3 units (Staff) given 1994-95

315. Topics in Computational Physics — (Enroll in Applied Physics 315.)

3 units, Win (Doniach)
alternate years, not given 1994-95

320. Quantum Optics and Selected Topics in Atomic Physics — Quantization of the electromagnetic field, photon states, and vacuum fluctuations and atomic transitions of real atoms. Two-level atoms, the Optical Bloch Equations, dressed states, coherent transients, resonance fluorescence, laser cooling and trapping of atoms and ions, tests of quantum mechanics and Bell’s Theorem, photon statistics, coherence, antibunching, squeezed states, and parity non-conservation and time-reversal invariance tests in atomic physics.

3 units (Chu) alternate years, given 1994-95

30. 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, Spr (Petrosian)
alternate years, given 1994-95

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 (Bloom, Marsiski)


3 units, Win (Sturrock)
alternate years, not given 1994-95


3 units, Spr (Wagoner) TTh 9:30-10:50

365. Extragalactic Astrophysics and Cosmology — Basic observational data and theories of the structure and evolution of the universe, emphasizing the relevant physical processes. Cosmic background radiation, gravitational lensing. Observational properties and theoretical models of galaxies, quasars, and other galactic activity. Prerequisite: 221 or equivalent.

3 units (Wagoner)
alternate years, given 1994-95


3 units, Win (Zhang)
alternate years, not given 1994-95


3 units, Win (Harrison)
373. Solid State Theory: Continuation — (Enroll in Applied Physics 373.)
   3 units, Aut (Harrison)
374. Electronic Structure — (Enroll in Applied Physics 374.)
   3 units (Harrison) alternate years, given 1994-95
375. Cooperative Phenomena — (Enroll in Applied Physics 375.)
   3 units Win (Beasley)
   3 units (Fetter) alternate years, given 1994-95
383. Introduction to Atomic Processes — (Enroll in Applied Physics 383.)
   3 units (Harris) alternate years, given 1994-95
387 Quantum Optics I — (Enroll in Applied Physics 387.)
   3 units, Win (Yamamoto)
388 Quantum Optics II — (Enroll in Applied Physics 388)
   3 units, Spr (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. 3 units, Aut (Dinopoulos)
   451. 3 units, Win (Susskind)
   452. 3 units, Spr (Quinn)
453A. Special Topics in Elementary Particle Physics
   Win (Lynn)
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 — (Formerly Applied Physics 463.) 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. Phenomenology of Type II Superconductors
   3 units, Aut (Doniach)
473B. Advanced Seminar on Disordered Systems
   1 unit, Spr (Kapitulnik)
473C. Correlation Effect in Condensed Matter Survey
   3 units, Spr (Shen)
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 (on leave Spring)
Assistant Professors: Geoffrey Garrett (on leave), Kurt T. Gaubatz, Nina P. Halpern, Scott D. Sagan (on leave), Mark Tunick
592 SCHOOL OF HUMANITIES AND SCIENCES

Courtesy Professors: David Baron, Steven H. Chaffee, Philip E. Converse, Gerald Dorfman, Jean-Pierre Dupuy, Lawrence Friedman, Roger Noll

Courtesy Associate Professors: Jonathan B. Bendor, Coit D. Blacker, Keith Krehbiel

Courtesy Assistant Professors: Susanne Lohmann, Debra Satz

Senior Lecturer: Elisabeth Hansot

Acting Assistant Professor: Michael A. McFaul

Visiting Professor: L. Sandy Maisel

Affiliated Professors: David P. Baron, Michael W. Kirst, Walter Lohnes, Michael M. May

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

A total of 60 units is required for the degree of A.B. in Political Science. These may be composed of:

1. Completion of 45 units of political science which must include an advanced course in three different areas chosen from:
   a) Public Administration and Public Policy (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.)

2. At least one seminar (which could at the same time fulfill an area requirement).

3. If no more than the minimum of 45 political science units is completed, the remaining 15 units (of the total of 60) may be in other departments which 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 used to fulfill the major requirements must be taken for the standard letter grade, although units in excess of the required 60 may be taken Satisfactory/No Credit.

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 to substantive courses in public policy. For further information, consult with the Chair of Undergraduate Studies in Political Science.

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. Leavelle Memorial Prize for the best paper written 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 Undergraduate Studies, who supervises the 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 3.3 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 two 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 of 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 that the pro-
posed project is viable, then the honors thesis 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 and (2) 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 the Graduate Admissions Support Section of 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. There is no financial aid 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 “Degrees” section in 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.

MASTER OF ARTS IN TEACHING

The A.M. degree 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 political science courses and 12 units in the School of Education. A student’s program must be approved by the Director of Graduate Studies before the courses are taken. Detailed program requirements are outlined in the “School of Education” section in this bulletin. Not offered in 1993-94.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the Ph.D. degree are discussed in the “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, e.g., 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, or at least 5 quarter units of political theory, he or she must take 5 quarter units of undergraduate instruction in political theory.

4. By the start of the fourth quarter in residence, each first-year graduate student submits to the student’s adviser a statement of purpose. This statement indicates the student’s proposed major concentrations of study, the courses taken and those planned to be taken to cover those fields, the student’s plan for meeting language and/or skill requirements, plans for scheduling of comprehensive examinations, and/or research papers, and, where possible, dissertation ideas or plans. This statement is discussed with, and must be approved by, the student’s adviser. In the Autumn Quarter following completion of their first year, students are reviewed at a regular meeting of the department faculty. The main purposes of this procedure are, in order of importance: to advise and assist the student to realize his or her educational goals; to provide an incentive for clarifying goals and for identifying ways to achieve them; and to facilitate assessment of progress toward the degree.

5. When both the student and adviser feel that the student is ready, he or she takes comprehensive examinations in two concentrations and completes one research paper. Comprehensive examinations are offered at the discretion of the faculty. If scheduled, they are given in the third week of Autumn and Winter Quarters, and in the seventh week of Spring Quarter. Students should normally expect to complete these examinations and the research paper by the end of their second year.

6. Upon completion of one research paper and two comprehensive exams in his or her two major concentrations, the student files an Application for Admission to Candidacy for the Ph.D. which details program plans and records. This document, along with a student’s examination performance, is reviewed by the faculty at a regular meeting. If it is approved, the student is advanced to candidacy. Students must be approved to candidacy by the completion of their sixth quarter as a full-time student.

7. During the third year, a formal dissertation proposal is submitted by the student to a thesis committee of three faculty members, including the principal adviser.

8. A candidate for the Ph.D. in Political Science is required to serve as a teaching assistant (TA) in the department for a minimum of two quarters.

9. Doctoral candidates who apply for the A.M. degree are awarded that degree upon 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 and Degrees goes to press; however, students should be aware that there may be changes and should check the quarterly Time Schedule for up-to-date information.

INTRODUCTORY

1. Major Issues of American Public Policy — Alternative public policies in selected areas, including control of monopoly, poverty, and foreign policy. Political process: influence of cultural, economic, and political factors and the location of political power on determination of public policy. DR:9(5)
   5 units, Win (Brady)

10. American National Government — The role and importance of the ideal of democracy in the evolution of the American political system. American political institutions (the Presidency, Congress, and the Court) and political processes (the formation of political attitudes and voting) are examined against the backdrop of American culture and political history. Major areas of public policy in the current practice of the ideal of democracy. DR:9(5)
   5 units, Aut (Maisel)

20. Introduction to Comparative Politics — Introduction to basic concepts and theories of comparative 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 (Halpern)

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*)
   5 units, Win (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 normative and policy implications of different theories. DR:9(5)
   5 units, Aut (Krasner)

38. 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)

60. The American Dream — Critical analysis of America’s dominant ideology, the American Dream, as experienced by women, minorities, labor, Indians, and immigrants. DR:3
   5 units, Win (Manley)

   5 units, Spr (Manley)

80. Crucial Decade: Politics of the 1960s — Role and interaction of individuals, interests, and institutions in shaping and responding to major developments in the 1960s: the Civil Rights Movement, the Warren Court revolution, the Vietnam War, and urban disorders.
   5 units (Barker) given 1994-95

92. Introduction to Chicano Life and Culture — (Same as Anthropology 110, Chicano Studies 110, English 124C, Spanish 281.) Interdisciplinary focus on the history and culture of Mexican Americans from the settling of the Spanish borderlands to today. Historical perspectives are balanced with
anthropological and literary views of the cultural diversity of Mexicans in the U.S. DR:3
5 units, Aut (Fraga, Saldivar)

98. Dialogues Tutorial: Promises and Moral Obligation — (Same as Ethics in Society 98.) Addresses abstract issues of moral philosophy by focusing on a familiar, concrete, and accessible topic, “promising.” Intention is to make ethical and political theory exciting to sophomores by showing its connections to everyday life.
2 units, Spr (Tunick)

99B. Peters Seminar: Evolution of Sovereignty — Series of presentations by the instructor and students. 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 cooperation in the coordination of macro-economic policy, and the wisdom of open vs. closed trade policies.
3 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 — Introduction to data analysis and statistical methods with applications to political science. Topics: probability theory, estimation, confidence intervals, hypothesis testing, contingency tables and linear regression models. Must be taken simultaneously with 3 units of Statistics 190.
2 units, Aut (Rivers)

100B. Statistical Modeling for Political Science — Specification and estimation of statistical models of political processes. Topics: linear and nonlinear regression, discrete choice, simultaneous equations, measurement error, misspecification and aggregation bias, model selection, panel data, time series analysis.
5 units, Win (Rivers)

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.

101. Political Analysis — (Same as Business 338.) Introduction to some ideas used in the analysis of political processes: rational actors, information, cognitive analysis of choice.
5 units, Win (Bendor)

101P. Politics and Public Policy — (Same as Public Policy 101.) The domestic policy-making process, emphasizing how elected officials, bureaucrats, and interest groups shape governmental 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)

104. Seminar: Urban Policy — Issues of public finance, housing, education, transportation, and crime in major metropolitan areas in the U.S. Classes meet regularly first half of quarter. In the second half, students are placed in an internship in local government and contribute to a policy report being written by a local government agency.
5 units, Aut (Fraga)

107. Organizational Decision-Making — (Same as Sociology 163, Business 371.)
5 units (March) given 1994-95

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 Public Administration — 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 political and economic instability, Mrs. Thatcher and her Conservative Party established in 1979 a one-party dominance that persists today. Changes in British policy, and the revival of political competition in the years ahead.
5 units, Aut (Dorfman)
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 (Packenham) given 1994-95

113E. Latin America and Global Environmental Politics — (Same as Anthropology 163, Latin American Studies 185.) From the international system to the global system; the environment-development nexus and the politics of sustainability; the main issues in global environmental politics (global warming, depletion of the ozone layer, loss of biodiversity and transboundary air and water pollution); the domestic-international nexus in environmental politics; case studies (Brazil, Chile, Colombia, Costa Rica, Mexico, Venezuela); Latin America and the incipient agenda of global governance.
5 units, Win (Viola)

113V. The Politics of Environmental Degradation in Latin America — (Same as Anthropology 166, Latin American Studies 136.) A typology of environmental problems in Latin America (urban, rural and natural ecosystems); the main players in environmental politics in Latin America (the environmental movement, the state environment and natural resource agencies, popular organizations, private entrepreneurial groups); the politics of urban-industrial pollution (Mexico, Brazil, Venezuela, Chile); the politics of topsoil depletions and rural pollution (Argentina, Brazil, Mexico); the politics of biodiversity (Brazil, Colombia, Costa Rica, Mexico); the participation of Latin American countries in the UNCED process (Brazil, Colombia, Mexico, Venezuela).
5 units, Spr (Viola)

5 units (Okimoto) given 1994-95

114K. The Political Economy of Development — Introduction to major theories of political development, emphasizing interaction between economic and political processes, and national and international factors from Latin America, and also Africa and Asia. Cases include Brazil, China, Cuba, El Salvador, India, Taiwan, Nigeria, and Venezuela DR:2(*) or 9(5*)
5 units, Aut (Karl)

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 (Halpern)

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). Whether this historical diversity has diminished in recent decades and, if so, whether this convergence can be attributed to the process of regional integration.
5 units, Aut (Schmitter)

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 (Diamond) given 1994-95

117R. The Role of the Military in Politics — The interaction between military and political leaders in western-industrial, communist, and developing states. Questions of military professionalism, the role of the military in political processes, and problems of the allocation of resources to defense. Diverse cases including the U.S., the former U.S.S.R., and countries of the developing world. DR:9(5)
5 units (Rice) given 1994-95

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, Spr (Abernethy)

118B. The Politics of Race and Class in Southern Africa — The political history of the region’s 10 countries, emphasizing relations among racial and ethnic groups. Diplomatic, economic, and military interactions among these states. The impact of movements, corporations, and international organizations based outside the region. Domestic politics in S. Africa, emphasizing struggles over the character of post-apartheid society. DR:2(*) or 9(5*)
5 units (Abernethy) given 1994-95

119A. Soviet History 1917-1993 (“From Coup to Coup”) — (Same as History 123A.) Survey of major trends and events in the Soviet Union since the Revolution. Political leadership, social change, and
problems of change. Alternative approaches and interpretations. DR:9(5)
5 units, Spr (Dallin)
122G. The Political Economy of Contemporary Europe — Analysis of two fundamental issues in contemporary European politics: the balance of political and economic power between the left and right within individual countries, and the emerging European Community polity. The decline of social democracy and the rise of market-liberalism in the 1970s and 1980s. The reinvigoration of the EC since the mid-1980s: “1992” and the creation of the internal market, economic and monetary union, and, the enlargement of the EC. DR:9(5)
5 units, Spr (Dorfman)
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 (McFaul)
124. Seminar: Latin American Dependency — Basic concepts and theoretical frameworks, single-country case studies, and research and political strategies regarding dependency and development in Latin America.
5 units (Packenham) given 1994-95
125. The Rise of Industrial Asia — (Same as Economics 130; Science, Technology, and Society 152.) The political, economic, security, 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)
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 in this bulletin, which lists international relations courses in other departments.

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, Dornbusch, Drekmeier, Holloway, Moses, Noddings, Ross) MTW 1:15 and by arrangement

134A. Strategy, War, and Politics — Problems of contemporary nuclear and conventional strategy in historical perspective. 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, maritime strategy, involvement in Third World conflicts, and NATO military doctrine. DR:9(5)
5 units, Spr (Staff)

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 Engineering-Economic Systems 170; Science, Technology, and Society 171.) Examines critical decisions made by the U.S., including development of the A-bomb and H-bomb, the crash ICBM program after Sputnik, and the military space program. Current issues, e.g., demilitarization and defense conversion in the post-cold war era, proliferation of weapons of mass destruction, and ballistic missile defense against potential threats from
135. International Politics — See 35. Limited to students with graduate standing.
5 units, Aut (Krasner)

136. Soviet Foreign Policy since 1917 — Foreign and domestic determinants of policy; intentions and capabilities; continuity and change since 1917; institutions and personnel; war and peace; perceptions, priorities, and attitudes; alternative futures.
5 units (Dallin) given 1994-95

136P. The Role of Technology in Policy Decisions — (Same as Engineering Economic Systems 171.) Same objectives and use of relevant case studies as Engineering Economic Systems 170. Emphasis is on cases which involve policy decisions not directly affecting national security. How information on technologies crucial to the formulation of rational policies in energy, environment, health care, manned space exploration, and international competitiveness gets to the executive or legislative branch, and how the judicial branch is increasingly seeking technical advice in reaching its decisions.
3 units, Spr (North, May)

138B. Seminar: Security and Diplomacy
5 units, Spr (Lewis)

139. Seminar: Chinese Foreign Policy — Chinese foreign policy and its sources: historical, ideological, strategic, political, economic, and the decision making process. Relations with the two superpowers and the Third World. Prerequisite: 115 or equivalent, or consent of instructor.
5 units, Spr (Halpern)

139A. Japanese Foreign Policy — Analysis of the origins of WWII in the Pacific; Japan's role in international security; and the U.S.-Japan trade conflict.
5 units, Aut (Okimoto)

140A, B, C. Ethics of Development in a Global Environment (EDGE) — (Same as Engineering 297A, B, C, Anthropology 133A, 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 peacekeeping efforts, 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 are from Stanford and other institutions and are experts who directly deal with world policy makers through research and advisory activities.
1-4 units, Aut, Win, Spr (Lusignan, Packenham) lecture W 7:30-9:30 p.m., workshops by arrangement

141K. Ethics and International Relations — How moral claims function in the foreign policy process and in relations between states. Arguments for and against normative approaches to making and studying policy. Consideration of the moral dimensions of selected foreign policy issues. Prerequisite: 35, or consent of instructor.
5 units, Win (Gaubatz)

5 units, Win (Staff)

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, Aut (Gaubatz)

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). Focus is mostly recent organizational approaches (e.g., new institutionalism, cultural approaches) and recently published or forthcoming work on security issues.
5 units, Spr (Eden)

144J. Seminar: America in Vietnam — The history and politics of American involvement in the Vietnam War. Emphasis is on the historic roots of the war, its impact on politics in the 1960s, disengagement, and the long term effects of the war on contemporary foreign policy.
5 units, Aut (Goldstein)
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.

   5 units, Aut (Hansot)

151B. History of Political Thought II: Pre-Renaissance to Enlightenment—(Same as Philosophy 175B.) 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, Win (Okin)

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:8(3) 
   5 units, Spr (Tunick)

153. Utopian Political Thought—How utopias function as blueprints for social change or as thought experiments. Examination of classical and modern utopias (Plato, More, Bellamy, Gilman, Piercy) and anti-utopias (Orwell, Le Guin, Borges). Limited enrollment. 
   5 units (Hansot) given 1994-95

154. Feminist Political Theory: Gender, Power, and Justice—(Same as Philosophy 175C.) 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:8f(3) 
   5 units, Aut (Okin)

155. Seminar: Hegel's Political Philosophy—Critical reading of Hegel's Philosophy of Right, emphasizing his concept of freedom, criticism of Kantian morality, and distinction between state and civil society. Aim is a lucid account of Hegel's text, and an understanding of its relevance to current controversies in political theory. Some additional readings in Aristotle, Kant, and other works by Hegel. 
   5 units (Tunick) given 1994-95

156. Problems in Political Theory: 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 (Tunick) given 1994-95

161S. 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 60 or consent of instructor. 
   5 units, Spr (Manley)

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. 
   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: nature of court as a political-legal institution, judicial recruitment and selection, nature and dynamics of judicial decision-making in individual and collegial contexts, and the differential role and responsiveness of the court as compared to other governing institutions. Prerequisites: 170 or 171 and junior standing, or consent of instructor.

5 units (Barker) given 1994-95

177. Seminar: Courts, Politics, and Public Policy—The role and interaction of courts with other political institutions and interests in the formulation and implementation of public policy. Prerequisites: 170 or 171 and junior standing, or consent of instructor.

5 units, Win (Barker)

181. African Americans and the Political System—African Americans as political actors and the development and use of political resources as 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 (Barker)

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) MTWTh 9

184M. Political Parties and Elections in the United States—Analysis of partisan politics and elections in the U.S.; emphasis on the role of parties, candidates, their staffs, the electorate, and the media.

5 units, Win (Maisel)

186. Urban Politics and Policy—Introduces the major actors, institutions, processes, 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 related to federalism, representation, voting, race, poverty, housing, and finances.

5 units (Fraga) given 1994-95

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 schooling have? What are the prospects for reform in public education? Lectures and small group discussions.

3 units, Aut (Kirst, Tyack)

187. Introduction to the Politics of Education—(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 policies of reform emphasized. Prerequisite: Political Science or Public Policy major.

4 units, Win (Kirst)

190A, B. Seminar: Voting Research—Uses the 1992 election as case study of voting in the American electoral system. Basic literature on voting behavior helps devise a research plan in the Autumn Quarter as individual research proposals, Winter Quarter is devoted to the presentation of papers as they develop.

5 units, Aut, Win (Brody)

192F. Seminar: Politics of Race and Ethnicity in the United States—Examines the historical and contemporary politics of selected communities of color to comprehensively understand American political development and 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 required.

5 units (Fraga) given 1994-95

194C. Political Communication—(Same as Communication 160/260.) Analysis of the role of the mass media and other channels of communication in political and electoral processes.

4 units, Win (Chaffee)

194R. Seminar: Law of Politics and Elections

5 units, Win (Rivers)

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 (Fraga)

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 departmental 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 (Staff)

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)

203C. Seminar: Advanced Topics in Statistical Modeling — Possible subjects: measurement models, multidimensional scaling, multivariate analysis, causality testing, Bayesian methods, semiparametric and robust methods.
5 units (Rivers) given 1994-95

POLITICAL ORGANIZATIONS

206. 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. The Political Economy of Institutions — Survey of economic approaches to organization, emphasizing theory and application, with attention to politics.
5 units, Spr (Moe)

207M. Cross-National Perspectives on Organizations — (Same as Sociology 265, Business 380.) 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, Win (Schmitter)

213. Seminar: Issues in Chinese Politics — For students with knowledge of the political history of the PRC; analyzes some of the major theoretical and empirical issues in the study of contemporary Chinese politics. Prerequisite: 115 or consent of the instructor.
5 units, Win (Halpern)

215. Seminar: Japanese Political Economy — Research seminar aimed at acquiring the skills needed to complete a term paper on a subject related to the Japanese political economy. Prerequisite: consent of instructor.
5 units (Okimoto) given 1994-95
220. Seminar: Legitimacy, Consensus, and Conflict in European Democracies — The performance and the normative basis of the political process and of key political institutions in Western democracies have become the subject of public criticism and critical scholarship, particularly in the realms of representation and policy. Using France and W. Germany as examples, analyzes the sources and symptoms of this phenomenon. Recommended: reading knowledge of French or German.
5 units (Weiler) given 1994-95

222K. Seminar: Research on Latin America — (Same as Latin American Studies 200.) Restricted to graduate students and undergraduates preparing senior honors theses after research in Latin America. Develop and present research and prepare a field paper. Prerequisite: consent of instructor.
5 units (Karl) 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 (Okimoto) given 1994-95

224. Seminar: Political Economy of Latin American Development — Theoretical readings, comparative analyses, and case studies assess strategies of economic, social, and political development in Latin America. Emphasis is on recent trends away from socialism and state capitalism toward more liberal policies and models.
5 units (Packenham) given 1994-95

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. Introduction to Political Economy — Basic theoretical and empirical issues in the political economy of capitalist democracy: the applicability of rational choice — microeconomic perspectives (social choice, collective action, non-cooperative game theory) to the study of politics; the dynamics of democratic political competition; the operation of the capitalist economy; the politics of international economic cooperation. Prerequisite: consent of instructor.
5 units (Garrett) given 1994-95

226C. Major Problems in Soviet History and Politics
5 units, Win (Dallin)

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, Spr (Diamond)

227P. Seminar: Democratization — East, West, and South — Open to advanced undergraduates and graduate students. Comparison of political changes possibly leading to more democratic institutions in Eastern and Southern Europe, with reference to Latin America 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, Win (Schmitter)

229. Directed Reading in Comparative Politics
any quarter (Staff) by arrangement

INTERNATIONAL RELATIONS

234. 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, 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 globalism 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. Research on Decision Making and Strategic Interaction in International Relations — Examines theories of decisionmaking and strategic interaction in international security affairs. Prerequisite: 243A or consent of instructor.

5 units, Win (Gaubatz)

243C. Seminar: Theoretical Issues in International Political Economy — Examines major contemporary theories affecting global economic relations and related national policies.

5 units, Spr (Krasner)

243D. Theories of European Imperialism — Examines 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, Aut (Abernethy)

246. Colloquium: Nuclear Weapons and International Relations — Theories and History — (Same as History 261.) 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)

247. Seminar: The Causes of War — Review of the theoretical literature on the causes of war and the implications for its prevention. Case studies of specific wars and consideration of different proposals for controlling war. Prerequisites: 35, 243A, or consent of instructor.

5 units, Aut (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 1994-95

258B. Perspectives on Self-Deception — (Same as Comparative Literature 297E, French and Italian 297E, Philosophy 176B.) The possibilities of cross-fertilization between analytic philosophy (Davidson, Mele, Peers) and continental philosophy (Bourdieu, Camus, Girard, Ricoeur, Sartre) on the topic of self-deception. Interdisciplinary potential of this concept: philosophy of mind and literature, psychoanalysis and rational choice, game theory and social philosophy.

3-4 units, Spr (Dupuy)

259B. Limits of Economic Rationality II: Individualism and Social Justice — (Same as French and Italian 296E, Economics 100C.) Examination of several attempts to conceive of the "good society" in terms akin to economic rationality. Contemporary Anglo-American theories (David Gauthier, Friedrich Hayek, Robert Nozick, John Rawls) in light of the French liberal tradition (Constant, Montesquieu, Tocqueville).

3-4 units, Spr (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 role of knowledge as a factor of production.

5 units, Spr (Drekmeier)

263. Seminar: Problems in Political Theory — Obligation — (Same as Philosophy 175A.)

5 units, Win (Tunick)


5 units (Hansot) given 1994-95

266. Seminar: Gender and Political Theory — Reads/analyzes major works and parts of works from the Western tradition of political thought, viewing them through the prism of gender. The ideological roots of inequality between the sexes. Ways in which assumptions about sexual difference have shaped the essential concepts of our tradition, including reason, nature, politics, justice, and the separation of public from private life. Compares
different and sometimes contrasting interpretations of the primary works read. Prerequisite: introductory course in political theory or consent of instructor.

5 units (Okin) given 1994-95

267. Seminar: Relativism and Justification — Open to advanced undergraduates and graduate students. How can we justify practices? The "nonfoundationalist" perspective, that there are no universally valid standards grounding our practices; arguments of those who reject this view because it leads to an ethical relativism; and whether there is some compromise position. Readings in political theory (Strauss, Arendt, MacIntyre, Walzer), philosophy (Kant, Wittgenstein, Kuhn, Goodman, Rawls, Harmon, Scanlon), anthropology, and political science.

5 units. Win (Tunick)

268. Seminar: Contemporary Theories of Justice—(Same as Philosophy 175D.) 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, Aut (Okin)

269. Directed Reading in Political Theory
any quarter (Staff) by arrangement

AMERICAN POLITICS

275. Courts as Policy Institutions — The relative nature, capacity, and limitations of courts and judges, as compared to other governing institutions and actors, in the formulation of public policy. Review of basic readings. Students are expected to develop and report on research projects dealing with topics related to particular policy areas.

5 units (Barker) given 1994-95

291F. Seminar: Urban Politics and Policy — Graduate and undergraduate seminar examines the major theoretical approaches used in the analysis of urban politics and policy. Assesses fundamental conclusions about American politics reached by urban scholars as to how subsequent interpretations continue to set the context for scholarly debate and understanding about American political development generally.

5 units (Fraga) given 1994-95

292C. Seminar: American Political Institutions — Overview of the state of American political institutions with attention to bureaucracy, the Presidency, and Congress.

5 units, Spr (Moe)

294A,B. Seminar: Media and Politics — The intersection of media and politics in non-electoral settings. Winter Quarter: studies of the influence of government on the formation of media content, on the resistances and acquiescence of the media in this process, and the effects of media content on public opinion ending in a research plan for turning this political process into a research paper. Spring Quarter: the development of these papers.

5 units, Win, Spr (Brody)

296. Seminar: Racial and Ethnic Politics in the U.S. — Focuses on the evolution of racial and ethnic politics in the U.S. to examine the political development of the American polity generally. Goal: the construction of a comprehensive theory of American political development which can incorporate race and ethnicity.

5 units (Fraga) given 1994-95

298. Directed Reading in American Politics
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 and Theory Development — The use of single and comparative case studies as a research strategy for the development of theory. Readings/discussion of general descriptions of the research strategy that appears in literature. Examples of a number of studies that have employed some variant of this approach to identify the requirements for making successful use of this research strategy. Students develop research designs in substantive problems of interest to themselves, employing "controlled comparison" and the method of "structured, focused comparison."

5 units, Spr (Staff)

306. Social and Political Processes in Organizations — (Same as Business 676, Sociology 365.)

5 units, Win (March)

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 (Schmitter)
312. Pro-Seminar for Comparative Politics
5 units (Schmitter) given 1994-95

314K. Political Economy of Development — Seminar 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, Aut (Karl)

315. Workshop on Democratic Theory — Graduate students only. Selected topics in theory and practice of modern political democracy: its antecedents, causes, processes, types, consequences, and future.
5 units, Spr (Schmitter)

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) given 1994-95

323. Seminar: Theories of 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 (Packenham) given 1994-95

328. Knowledge and Legitimation: The National and International Politics of Social and Educational Research — (Same as Education 307.) For doctoral students. Research seminar. The theoretical core is the relationship between knowledge and power, construed as a relationship of reciprocal legitimation. Readings, discussions, and projects focus on the politics of research support, cooperation, and dissemination. Prerequisite: consent of instructor.
5 units (Weiler) given 1994-95

371. Research Seminar: Judicial Politics and Constitutional Law
5 units (Barker) given 1994-95

380A,B,C. Workshop on Political Economy
5 units, Aut, Win, Spr (Staff)

390. Graduate Seminar: Overview of the Study of American Politics
5 units, Win (Sniderman)

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); W. Brian Arthur (Food Research), Carl Djerassi (Chemistry), William Durham (Anthropology), Paul R. Ehrlich (Biological Sciences), 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

161A. Indigenous Peoples and Forest Conservation — (Same as Human Biology 139.)
5 units (Durham, Irvine) given 1994-95

163. Latin America in Global Environmental Politics — (Same as Human Biology 127, Latin American Studies 185, Political Science 113E.)
5 units, Spr (Viola)

164. Ecological Anthropology — (Same as Human Biology 134.)
3-5 units, Win (Charnley)

166. The Politics of Environmental Degradation in Latin America — (Same as Human Biology 147, Latin American Studies 136, Political Science 113L)
5 units, Win (Viola)
168. Medical Anthropology — (Same as Human Biology 168.)
   5 units, Aut (Barnett)

169. Indigenous Peoples and Environmental Problems — (Same as Human Biology 149, Latin American Studies 129.)
   3-5 units (Charnley, Durham)
   not given 1993-94

254. Indigenous Knowledges
   5 units (Gupta) not given 1993-94

263. Political Ecology
   5 units (Durham) not given 1993-94

BIOLOGICAL SCIENCES

117. Biology and Global Change — (Same as Earth Systems 111.)
   3 units, Win (Vitousek, Mooney)

175H. Problems in Marine Biology
   15 units, Spr (Block, Denny, Epel, Gilly, Powers, S. Thompson)

176. Principles of Ecology — (Same as Geophysics 176.)
   3 units, Aut (Roughgarden)

183. Colloquium on Population Studies — (Same as Human Biology 60.)
   1 unit, Win (Feldman)

190. Population Biology of Butterflies
   2-5 units (Ehrlich)
   alternate years, given 1994-95

195. Applied Ecology
   1-3 units, Aut, Win, Spr (J. Thomas, Field, Vitousek)

216. Ecosystem Ecology and Global Biogeochemistry
   3 units, Spr (Vitousek)

279. Mathematical Models in Population Biology
   3 units (Feldman) not given 1993-94

349. Seminar in Population Ecology
   1-3 units, Aut, Win, Spr (Ehrlich)

354. Seminar in Population Biology
   1-3 units, Aut, Win, Spr (Ehrlich, Roughgarden, J. Thomas, Vitousek, Watt)

383. Seminar in Population Genetics
   1-3 units, Spr (Feldman)

384. Seminar in Theoretical Ecology
   1-3 units, Spr (Roughgarden)

ECONOMICS

119. Development and Population Interactions in the Third World — (Same as Food Research 121.)
   5 units, Win (Yotopoulos)

133. Population, the Environment, and the Third World — (Same as Food Research 136/236, Human Biology 136, Sociology 153.)
   5 units, Spr (Arthur)

ENGINEERING

297A,B,C. The Ethics of Development in a Global Environment (EDGE) — (Same as Political Science 140A,B,C.)
   1 or 4 units, Aut, Win, Spr (Lusignan, Fagan)

FOOD RESEARCH INSTITUTE

121. Development and Population Interactions in the Third World — (Same as Economics 119.)
   5 units, Win (Yotopoulos)

136/236. Population, the Environment, and the Third World — (Same as Economics 133, Human Biology 136, Sociology 153.)
   5 units, Spr (Arthur)

327. Natural Resource and Environmental Economics in Developing Countries
   5 units, Win (Albers)

HEALTH RESEARCH AND POLICY

270. International Health
   2-4 units, Spr (Basch)

HUMAN BIOLOGY

60. Colloquium on Population Studies — (Same as Biological Sciences 183.)
   1 unit, Win (Feldman)

120. Human Nutrition
   4 units, Aut (Butterfield)

127. Latin America in Global Environmental Politics — (Same as Anthropology 163, Latin American Studies 185, Political Science 113E.)
   5 units, Spr (Viola)

134. Ecological Anthropology — (Same as Anthropology 164.)
   3-5 units, Win (Charnley)

136. Population, the Environment, and the Third World — (Same as Economics 133, Food Research 136/236, Sociology 153.)
   5 units, Spr (Arthur)

139. Indigenous Peoples and Forest Conservation — (Same as Anthropology 161A.)
   5 units (Durham, Irvine) given 1994-95

147. The Politics of Environmental Degradation in Latin America — (Same as Anthropology 166, Latin American Studies 136, Political Science 113L.)
   5 units, Win (Viola)

148. Environmental Policy
   3 units (A. Ehrlich) not given 1993-94
149. Indigenous Peoples and Environmental Problems — (Same as Anthropology 169, Latin American Studies 129.)
   3-5 units (Charnley, Durham)
   not given 1993-94

150. Gender-Specific Perspectives on Birth Control — (Same as Feminist Studies 145.)
   6 units (Djerassi)
   alternate years, given 1994-95

168. Medical Anthropology — (Same as Anthropology 168.)
   5 units, Aut (Barnett)

LATIN AMERICAN STUDIES
128. Agrarian Change, Marginality, and Human Rights in Latin America — (Same as Political Science 128R.)
   5 units, Aut (Stavenhagen)

129. Indigenous Peoples and Environmental Problems — (Same as Anthropology 169, Human Biology 149.)
   3-5 units (Charnley, Durham)
   not given 1993-94

136. The Politics of Environmental Degradation in Latin America — (Same as Anthropology 166, Human Biology 147, Political Science 113L.)
   5 units, Win (Viola)

185. Latin America in Global Environmental Politics — (Same as Anthropology 163, Human Biology 127, Political Science 113E.)
   5 units, Spr (Viola)

MATHEMATICS
126/226. Mathematical Models in Population Biology — (Same as Biology 279.)
   3 units, not given 1993-94

PSYCHOLOGY

Emeriti: (Professors) Leo Ganz, Albert H. Hastorf, Ernest R. Hilgard, Douglas H. Lawrence, Eleanor E. Maccoby
Chair: Mark R. Lepper
Associate Professors: Anne Fernald (on leave Winter, Spring), Susan Nolen-Hoeksema (on leave)

Assistant Professors: Laura L. Carstensen, John D. E. Gabrieli, David J. Heeger, Felicia Pratto


Senior Lecturer: Lyn Carlsmith

Director, Bing Nursery School: Jeanne Lepper

Affiliated Faculty: Albert Ahumada, Jr., Douglas Daher, Vincent D'Andrea, Sam Edwards, Marilyn Hoskins, Edward Leland, Alejandro Martinez, Robert Matano, Barbaranne Shepard, Fernando I. Soriano, Andrew B. Watson

Visiting Lecturers: Arthur Aron, 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 (i.e., 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.
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 coterminous 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, law, medicine, and business.

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 presented orally at the seminar for discussion. A written copy of the proposal is turned in at the end of Autumn Quarter. During Winter and Spring Quarters, students are primarily involved in completing research and writing the dissertation. Students present completed projects at a convention at the end of Spring Quarter, attended by other students, faculty, and graduate students.
GRADUATE PROGRAMS

There are no specific course requirements for admission to the doctoral program. However, an applicant should have research experience as an undergraduate, as well as the equivalent of an undergraduate major in psychology. The major focus of the doctoral program is on research training, and admission is highly selective.

Applicants for admission must submit the following: (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 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 257A (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 first year of graduate study to the completion of the Ph.D.
normally taking no more than 9 units of course work each quarter. At the end of the first year of graduate study, the student must file with the department a written report of the first-year research activities.

Second-Year Course Requirements—During the second year of graduate study (or as additional courses during the first year) the student must show competence in three additional areas selected from the core group and in a second approved graduate course in statistics. Of the five core courses selected during the first and second years of graduate study, at least two must be selected from Group A and at least two from Group B. The student may meet these requirements either by taking the courses listed above, or by special examination. Further course work prior to admission to doctoral candidacy should be arranged under guidance of the student’s adviser.

Third-Year Major Area Paper—During the first week of Autumn Quarter of the fourth year, the student turns in a Conceptual Analysis of the Dissertation Area (CADA). This paper provides a general framework for the research topic of the dissertation, addresses the central issues within the specialty area, and reviews the pertinent literature(s). Typically, the analysis has the kind of scope found in the opening chapters of the more traditional dissertations, but the exact format and scope of the paper is a joint decision made by student and adviser.

At this same time, the student selects two faculty members to read the paper and give feedback and commentary on it. These should be two faculty members most likely to serve on the later orals committee of the dissertation.

A portion of the paper, revised as appropriate, can then become the first section of the actual dissertation proposal. Thus, the student receives additional feedback on CADA at the oral examination itself.

If the student should radically change the area of the dissertation research after CADA has been written, the 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.

Dissertation Reading Committee—The candidate must select a dissertation reading committee satisfactory to the department. The minimum membership of this committee must be (1) the principal dissertation adviser, (2) a second member from within the department, and (3) a third member chosen from Psychology or another department.

Orals—The candidate must pass the University oral examination, which is based on the dissertation proposal, not on the defense of the dissertation itself. The reason for this policy is to permit the oral to serve the function of guiding and improving the proposed research. This function can best be served if the oral is scheduled early in the year in which the dissertation research is conducted. It is therefore expected that the oral will be taken by the end of the Autumn Quarter of the fourth year.

Dissertation Requirements—The candidate must complete a dissertation satisfactory to the dissertation reading committee.

Ph.D. candidacy expires five years after admission to candidacy by the University Committee on Graduate Studies. Reapplication requires departmental reexamination.

STUDENT EVALUATIONS

First-year Evaluation—It is the department’s policy to evaluate the progress of each graduate student at the end of the first year of graduate study. As part of the procedure, each student is required to file with the department a report of the first-year research activities.

Students should discuss this report and the evaluation procedures with their adviser as early as possible in their first year. The report is due on June 1.

If the student fulfills the academic promise displayed upon entrance, he or she is invited to continue to the doctorate.

The first-year evaluation is primarily based on three factors:

1. The quality of research carried out in the first year.
2. Performances in courses (especially required courses).
3. Recommendations of the adviser (including a commitment on the part of that adviser to continue in that role).

Second-year Evaluation—A similar evaluation is conducted at the end of the second year of graduate training involving the same criteria as the first year; however, the student is not required to submit a paper. Students who do not make satisfactory progress during the second year may be dropped from the program.

THE DOCTORAL TRAINING PROGRAM

As indicated by the requirements described above, a student may concentrate in any one of several areas within psychology. Regardless of area, however, the training program places emphasis on the
development of research competence, and students are encouraged to develop those skills and attitudes that are appropriate to a career of continuing research productivity.

Two kinds of experience are necessary for this purpose. One is the learning of substantial amounts of technical information. A number of courses and seminars are provided to assist in this learning, and a student is expected to work out a program, with his or her adviser, that attains such knowledge in the most stimulating and economical fashion.

A second aspect of training is one that cannot be gained from the courses or seminars. This is first-hand 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. Up to two courses at the 100-level may be used to satisfy this requirement. The remaining units must be from courses numbered 200 or above, 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 announced in the bulletin Summer at Stanford issued annually in January.
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 (Aron) MWF 11-12:15
5 units, Win (Zimbardo) MWF 11-12:15
4 units, 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

2. Current Research in Psychology — Weekly seminars by faculty members on current research topics in psychology. Enrollment limited to declared or prospective Psychology majors. Prerequisite: prior or 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 (Heeger) MTWThF 9
Win (Thomas) MTWThF 9

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, Win (Wandell) MWF 9

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

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 — Broad, balanced introduction to the field of personality study. Personality is complex and is best considered from many, often conflicting, points of view. Topics: overview of diverse theoretical approaches and some empirical evidence related to these approaches. Social-learning, psychometric-trait, biological, and psychodynamic concepts related to the study of personality. Introduction to personality disorders and psychopathology. Prerequisite: 1 or equivalent.
3 units, Aut (Aron) MW 2:30-3:45

114. Ion Transport and Intracellular Messengers — Ion channels, carriers, and ion pumps, and their regulation by intracellular messengers in a variety of cell types. Recommended: introductory course in biology or human biology, or Psychology 107.
3 units, Spr (Wine) TTh 3:15-4:30

115. Social Development — Socialization and the development of social behaviors. Review of research concerning conscience and conduct, altruism and aggression, cooperation and competition, achievement and self-control.
3-4 units (M. Lepper) not given 1993-94
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:9t(4)
3 units, Spr (Carstensen) MW 9:30-10:50

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 (Immordino) 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 four hours per week in Bing classrooms throughout the quarter; 4 units require seven 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, Win, Spr (J. Lepper) Th 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:9t(4)
3-4 units, Aut (Markman) MWF 11

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:9t(4)
4 units, Aut (Steele, 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 and as indicators of where our society is headed. Modernist and postmodernist conceptions of self, and the importance of cultural influence on the self. Changes in the nature and phenomenological experience of the self as a function of historical periods. Prerequisites: 1, 60, 121.
3 units (Steele) alternate years, given 1994-95

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. Psychological Perspectives on the Self—Evolution of scientific conceptions of the self, developmental approaches to the self, motivational and cognitive self processes, applications of self and self-regulation theory to such issues as depression, gender roles, and achievement outcomes. Modernist and postmodernist conceptions of self, and the importance of cultural influence on the self. Prerequisites: 1, 121.
3 units, Win, Spr (J. Lepper) Th 4-5:30 and by arrangement

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 upon 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—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. Four units involve workshops and paper focusing on social policy issues related to early development. Prerequisite: 1 or Human Biology core.
3-5 units (A. Fernald) not given 1993-94

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, laboratory 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
13A. Laboratory Section for Psychology 132 — Required concurrent enrollment in 132. 2 units (A. Fernald, Flavell, Markman) not given 1993-94

134. The Affective Disorders — (Graduate students register for 234.) Current evidence on the experience of depression and mania in adults and children, including gender differences, socioeconomic class differences, 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 (Nolen-Hoeksema) not given 1993-94

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(5) 3 units, Win (Butler) TTh 10-11:30

137. The Interpersonal Basis of Abnormal Behavior — The role of interpersonal problems and processes in producing different forms of psycho-pathology, 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 upon 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 NREM 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 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 (Gabrieli) 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. Goal: 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, Dornbusch, Drekeimer, 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, given 1994-95

146. Language and Thought — (Same as Linguistics 145.) 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 adaptions in animal systems. 3 units (R. Fernald) alternate years, given 1994-95

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 11:15-2:30

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 (Gabrieli) alternate years, given 1994-95


3 units, Aut (Rumelhart) TTh 9-10:15

164. Mathematical Representation of Structures in Psychological Data — See 218. not given 1993-94

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, auditory localization, music perception, attention. Prerequisite: 102 or 103.

1 unit, Win (Heeger) Th 4-5:15

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. Instruction includes lectures, individual training, group exercises, discussion, role play, and videotaped 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 — Preference is given to students who make a commitment to staff at the Sexual Health Resource Center (formerly CIC) in subsequent quarters, but all interested students are encouraged to enroll as space permits. Trains staffers for the student-run SHRC at Cowell. Instructors and guest speakers provide a thorough training in all aspects of sexual reproductive health with an emphasis on contraception. Topics: reproductive anatomy and physiology; the effectiveness, mechanism of action, and usage of available birth control methods; pregnancy; adoption, or abortion; and counseling techniques. Also, sexually transmissible diseases including HIV, future methods of contraception, and sexuality.

2 units, Aut, Win, Spr (Schupay) T 7-10 p.m.

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.

1 unit, Aut (Huang) W 3:15-4:45

168A. B. Tutor Skills Training — (Same as Education 100A, B.) For undergraduates who want to tutor or coach in local schools and educational programs. Opportunities for first-hand experience exist at all grade levels and in a wide variety of subjects. Students discuss experiences and learn relevant interpersonal, analytical, and instructional skills. Student must have concurrent tutoring placement. (Contact UPSE, Upward Bound, or the Public Service Center, or attend the first class meeting.)

168A. Skills Training for Elementary Level Tutors — (Same as Education 100A.)
2-3 units, Aut, Win (Takemoto) W 4:15-5:45

168B. Skills Training for Secondary Level Tutors — (Same as Education 100B.)
2-3 units, Aut, Win, Spr (Staff) T 7-8:30 p.m.

169. Statistics for Social Scientists — (Enroll in Economics 80, Statistics 190.) 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 (Martin) MTWF 1:15
Win (Staff)

171. Psychological Aspects of Addiction — The medical, psychological, and social issues involved with alcohol and drug abuse, and dependence. Students are trained to identify, assess, intervene upon, and refer alcohol and drug problems. 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, Aut (A. Fernald) M 1:15-3

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 — The application of social psychological theory and research to a variety of issues and problems, including: evaluating the impact of social interventions, strategies, and shortcomings in personal and social decision making, effects of mass media and other sources of social persuasion, problems of conflict resolution and negotiation, applications of social psychology in legal, medical, educational, and business settings. Prerequisites: 1 and 60, or consent of instructor.
4 units, Win (Ross) TTh 1:15-2:45

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, Win (Hastorf, Scott) TTh 11-12:15

179. Theoretical Approaches in Social Psychology — 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, Win (Steele) MW 1:15-2:30

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 campus projects, educational presentations and/or community workshops.
2 units, Win (Pertofsky) Th 3:15-5

180B. Alcohol Training Education — The Freshman Alcohol Training 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 students’ 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 6-8 and by arrangement
181C. Studies of Animal Behavior — Evolution of behavior, providing a model for understanding features of human activities. Origins of study of animal behavior and development up to present by analyzing and discussing original research papers. Use and misuse of parallels between animal and human behavior. Purpose is study and observation of animals in lab. 
2 units, Aut (R. Fernald) W 3-5:30

181D. How Infants See the World — How does the newborn infant make sense of the world? How can researchers discover what goes on in an infant’s mind? Discusses original research on infant development. Students design and run an experiment at the Center for Infant Studies. Prerequisite: 1.
2 units, Aut (A. Fernald) T 2-4

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. Variety of 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 provided. No previous experience required, but internships demand a generous commitment of time and energy (8-12 hours per week) for two consecutive quarters. Weekly seminar explores diversity of clinical opportunities and covers specific therapeutic techniques.
1-5 units, Aut, Win, Spr (Carlsmith) T1-2:30
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. Also, the roles of doctor, therapist, special education teacher, counselor, and other professionals involved in the life of the disabled person. Weekly seminars; students also teach swimming and/or other skills to children and adults with different disabilities (mental, physical, emotional, learning, etc.) for at least 3 hours each week, 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

186. Social Psychology of Social Problems: A Focus on Chicanos — (Same as Chicano Studies 108, Education 186S.) Develops cultural sensitivity and familiarity with Chicano populations and their cultures, providing understanding of salient social problems affecting Chicanos and other populations, namely violence, delinquency, substance abuse, poor education, and health challenges. Social-psychological theoretical models and perspectives are used to explain the development of these dominant social problems. Critiques existing prevention and intervention programs developed to address these social problems. Required participation in community service. Limited enrollment.
3-4 units, Aut (Soriano) TTh 3:15-4:30

187. Gangs and Violence: Application to Chicanos — (Same as Chicano Studies 107, Education 187S.) Chicano populations, their cultures, and their violence and gangs. Social-psychological theoretical approaches and perspectives, focusing on prevention, intervention models and efforts addressing gangs and violence. Required participation in community service. Limited enrollment.
3-4 units, Win (Soriano) MW 1:15-2:30

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, Win (Levine) TTh 4:15-5:30
alternate years, not given 1994-95

190. Early Experience — (Same as Human Biology 143.) Experimental literature related to the effect of pre- and postnatal environmental factors on development and adult function. Animal and human research, and behavioral and psychological function. Prerequisite: consent of instructor.
3 units (Levine) alternate years, given 1994-95

191. Undergraduate Seminar: Personal and Social Change — Analysis of social cognitive approaches to personal and social change. Applica
tions to the modification of psychological dysfunctions in familial, educational, and organizational settings. Ethical and value issues in behavior change. 3 units (Bandura) not given 1993-94

192. Undergraduate Seminar: Aggression — Analysis of the causes and modification of individual and collective aggression. Major issues in aggression: the 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.
3 units, Win (Bandura) T 1:15-3:05

193. Undergraduate Seminar: The Psychology of Group Relations — Social and psychological influence on group relations, including stereotyping, group identity, self-esteem, prejudice, sociopolitical ideology, group cohesion, and status. Prerequisite: 121.
3 units, Aut (Pratto) M 2:15-5:05

194. Undergraduate Seminar: Development of Children's Knowledge about the Mind — Prerequisite: consent of instructor.
3 units, Spr (Flavell) M 1:15-3:05

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) M 1:15-3:45

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 are reviewed. Prerequisites: 1, 60.
3 units, Win (Leland) TTh 11-12:15

198. Undergraduate Topical Seminar on the Psychology of Gender — (Same as Feminist Studies 186.) In-depth coverage of a specified topic related to psychology of gender. Prerequisite: 116.
3 units, Win (Carstensen) M 1:15-2:45

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 (Zimbardo) not given 1993-94

PRIMARILY FOR GRADUATE STUDENTS

Undergraduate students admitted only by consent of instructor.

1-3 units, Aut (Rumelhart) MW 9:30-10:45

1-3 units (Gabrieli) alternate years, given 1994-95

203. Perception — Topics in visual and auditory perception, emphasizing quantitative and physiological approaches.
1-3 units, Aut (Wandell) MW 11-12:15

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 (Wandell, Wine) alternate years, given 1994-95

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 (Thomas) TTh 10-11:30

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, Win (Bower) TTh 10:30-12

211. Developmental Psychology — Prerequisite: graduate standing in psychology or consent of instructor.
1-3 units, Win (Flavell, Markman) TTh 3-5
212. Social Psychology — Prerequisite: 121 or graduate standing in Psychology.
   1-3 units, Aut (M. Lepper, Ross) TTh 1:15-3:05

213. Personality — Survey of theory and research in personality. Prerequisite: graduate standing in psychology.
   3-4 units (Staff) alternate years, given 1994-95

214. Psycholinguistics — (Same as Linguistics 246.) Prerequisite: graduate standing in Psychology or consent of instructor.
   1-3 units, Spr (H. Clark) TTh 1:15-2:30

216. Abnormal Psychology — Selected 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 (R. Shepard) not given 1993-94

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, Spr (Markman) by arrangement

221. Foundations of Vision Science — Topics in basic visual science including the physiology of human vision, basic human visual performance, and computational algorithms that characterize physiology and performance.
   1-3 units, Spr (Wandell) TTh 9:30-10:45

225. Psychology and Law — (Same as Law 345.) 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.
   1-4 units, Aut (Rosenhan) TTh 1:45-3
   plus section T 12:40-1:40

226. Psychological Perspectives on the Self — See 126.
   1-3 units (Steele) alternate years, given 1994-95

228. Ion Transport and Intracellular Messengers — Ion channels, carriers, and ion pumps, and their regulations by intracellular messengers in a variety of cell types. Lab demonstrations, and brief hands-on introduction to some techniques (e.g., patch clamping).
   1-3 units, Spr (Wine) TTh 3:15-4:30

229. Psychological Assessment — (Same as Education 237.) Administration and interpretation of commonly used measures of interest, aptitude, achievement, intelligence, and personality for purposes of individual diagnosis and treatment.
   1 unit (Staff) alternate years, given 1994-95

232. Science and Research in Counseling/Health Psychology — (Same as Education 232.) What constitutes scientific research in theory and in practice. Disconfirmatory logic, social constructivist theory, limits of statistical significance testing meta analysis, qualitative perspectives in research. Emphasis on improving writing skills.
   1-4 units (Thoresen) alternate years, given 1994-95

234. The Affective Disorders — See 134. not given 1993-94

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 interventions, and the process of culturally adapting counseling interventions. Emphasis on cross-cultural counseling competence with ethnic minorities.
   1-3 units (LaFramboise) alternate years, given 1994-95

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, Win (Carstensen) M 1:15-2:45

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, Win (Flavell) M 3:15-5:05

240. Language Acquisition I—(Same as Linguistics 240.) Survey of present knowledge of processes of language acquisition from a linguistic point of view. Recent and past literature.

1-4 units, Aut (E. Clark) TTh 2:15-3:45

241. Language Acquisition II: Meaning—(Same as Linguistics 241.) Focus is on theories of meaning acquisition, lexical structure, and lexical factors in the acquisition of syntax.

1-4 units, Win (E. Clark)

242. Conceptual Organization and Development—Theories and research in conceptual organization and development critically evaluated. Topics: the acquisition of categories and category terms informed by the general problem of induction, by philosophical and psychological analyses of the nature of human categories (natural kind terms, family resemblances), by recent arguments how the acquisition of category terms is guided by constraints children place on possible word meanings, and by more traditional theories of cognitive development. Prerequisite: graduate standing in psychology or consent of instructor.

1-3 units (Markman)
alternate years, given 1994-95

243. General Development Seminar—Prerequisite: consent of instructors.

1-2 units, Win (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, Aut (Carstensen) T 2-4:30

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, Spr (Haertel) MW 9-10:50

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.

1-3 units (Haertel) 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.

1-3 units (Staff) alternate years, given 1994-95

252. Statistical Methods for Behavioral and Social Sciences—(Undergraduates register for 152; same as Education 257.) For students with prior experience and training in empirical research. Analysis of data from experimental designs 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 and education student; Statistics 190; Education 191X.

1-6 units, Win (Brenner, Lyubomirsky)
MWF 11-12:30 plus section by arrangement

253. Statistical Theory, Models, and Methodology—(Undergraduates register for 153.) Practical and theoretical study of advanced data analytic techniques such as exploratory data analysis, research design, trend analysis, canonical correlation, factor analysis, discriminant analysis, and multivariate analysis of variance. Students analyze and report on several data sets, including their own (if possible). Prerequisite: 252 or Education 257.

1-3 units, Spr (Pratto) WF 1:15-2:30

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 wide variety of phenomena, notably the origin and escalation of conflict.

1-3 units, Win, Spr (Ross)

260. Cognition and Thought—Survey of higher mental processes. Topics: every-day and formal
reasoning, problem solving, representation of knowledge, and the development of expertise.

1-3 units, Win (Rumelhart) W 12-3

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.

1-3 units, Spr (Greeno) MW 1:15-2:40

262. Memory Systems — Recent findings indicating 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, Win (Gabrieli) TTh 2:15-3:30

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, Spr (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 (Rumelhart) alternate years, given 1994-95

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, auditory localization, music perception, attention.

1 unit, Win (Heeger) Th 4-5:15

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, binocular stereopsis, color, texture analysis, and synthesis.

1-3 units, Spr (Heeger) TTh 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 of synthesized sound, in music. Introduction to elementary concepts; no previous background assumed. Listening to sound examples is important. Emphasis is on the salience and importance of various auditory phenomena in music. Prerequisite: some basic knowledge of music.

1-3 units, Aut (Chowning, Matthews, Pierce) 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 (Horowitz) 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 (Steele, Ross) not given 1993-94

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. (Staff) by arrangement

276. Doctoral Research — For dissertation. Prerequisite: consent of instructor. (Staff) by arrangement
281. Practicum in Teaching — Enrollment limited to students serving as teaching assistants in selected psychology courses. Can be repeated for credit.

3-5 units, Aut, Win, Spr (Staff) by arrangement

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, Ayres, 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 (Zimbardo) not given 1993-94

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 human responsibility, deterrence, desegregation, fair employment, copyright, 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, Spr (Rosenhan) Th 1-3

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 the affect-cognition interface. Students read a text and two to three research articles per week for class discussions, writing one-page summaries of week's readings 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) alternate years, given 1994-95

293. The Psychology of Group Relations — Social and psychological influence on group relations, including stereotyping, group identity, self-esteem, prejudice, socio-political ideology, group cohesion, and status.

1-3 units, Aut (Pratto) M 2:15-5:05

294. See 194.

296. Methods in Personality and Social Psychology — Focus is on developing and consolidating a broad set of methodological skills in personality and social psychology and in allied disciplines such as 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, Spr (Pratto, Steele, Thomas) TTh 1:15-2:30

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

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 1993-94

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 1993-94

PUBLIC POLICY PROGRAM

Director: Roger Noll
Associate Director: David Brady
Affiliated Faculty: Lucious Barker (Political Science), Timothy Bresnahan (Economics), Richard Brody (Political Science), John Cogan (Hoover Institution), George Collier (Anthropology), Marcus Feldman (Biology), John Ferejohn (Political Science), Luis Fraga (Political Science), Lawrence Friedman (Law), Victor Fuchs (Economics), Judith Goldstein (Political Science), Carl Gotsch (Food Research), Lawrence Goulder (Economics), Michael Kirst (Educuation), Stephen Krasner (Political Science), Henry Levin (Education), Robert Mcginn (Science, Technology, and Society), Milbrae McLaughlin (Education), Terry Moe (Political Science), Leonard Ortolano (Civil Engineering), A. Mitchell Polinsky (Law), Douglas Rivers (Political Science), Nathan Rosenberg (Economics), Geoffrey Rothwell
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.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The core courses in the Public Policy Program develop the skills that are necessary for understanding the political constraints faced by policy makers, assessing the performance of alternative approaches to policy implementation, evaluating the effectiveness of policies, and appreciating the sharp conflicts in fundamental human values that often animate the policy debate. After completing the core, students apply these skills by focusing their studies in one of several areas of concentration. The areas of concentration may deal with a specific field of public policy, with types of institutions, or with deeper development of the tools of policy analysis. A list of recommended courses for each concentration is available in the Public Policy Program office. Areas of concentration are:

- Advanced Methods of Policy Analysis
- Design of Public Institutions
- Developing Areas in Education
- Health Care
- International Relations and Trade
- The Law and Legal System
- Population
- Resources and Environment
- Science and Technology Policy
- Social Policy: Poverty, Discrimination, Crime

Urban and Regional Policy

Completion of the program in Public Policy requires 78 units of course work:

1. Thirty-five units of prerequisite courses: Political Science 1 or 10; Economics 80; Statistics 61 or Economics 102; Economics 1, 51, and 52; and Sociology 160 or Industrial Engineering 100. In addition, students are encouraged to take at least one year of course work in calculus and linear algebra.

2. The 25-unit sequence of 5-unit core courses, which students should plan to complete by the end of their junior year (see below for descriptions).

3. During the senior year, majors must complete 15 units of course work in a problem-focused area. The 15 units of post-core course work must be approved by an adviser, who is appointed when the student selects an area of concentration. This usually is done midway through the junior year, and must be done no 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 write 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.

5. A maximum of 10 units may be taken on a Satisfactory/No Credit basis in fulfillment of the major requirements, but the five core courses must be taken for a letter grade.

6. The Public Policy Program offers several courses to prepare students for making effective academic use of an internship (Public Policy 179, 181, 182, 184). Students may also participate in the Integrated Scholar Intern Program combining directed reading and research with an internship.

7. Students must complete the Public Policy core and their concentration area courses with an average letter grade indicator (LGI) of 2.0 or higher.

8. 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) 723-4551.

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. 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 3.

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.
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 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)

179. Preparation for Internship Learning — Provides students with 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)


2 units, not given 1993-94

182. Policy Making and Problem-Solving at the Local and Regional Level — Public policy issues, processes, and organizations at 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) not given 1993-94

197. 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)

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. Also, a limited number of lectures and seminars in which the question of how to conduct "good" research in public policy is discussed. Prerequisites: completion of core courses in Public Policy or consent of the instructor.

200A. 3 units, Aut (Staff)

200B. 3 units, Win (Staff)

200C. 3 units, Spr (Staff)

RELIGIOUS STUDIES

Emeriti: (Professors) Edwin M. Good, David S. Nivison (Asian Languages, Philosophy, Religious Studies)

Chair: Lee Yearley

Professors: René Girard (French and Italian and, by courtesy, Religious Studies), Van A. Harvey, Lee Yearley

Associate Professors: Carl W. Bielefeldt, Arnold M. Eisen (on leave), Bernard R. Faure, Hester G. Gelber

Assistant Professors: Alice Bach, Rudy V. Busto, Howard Eilberg-Schwartz, Philip J. Ivanhoe (Philosophy and Religious Studies), Timothy P. Jackson

Professor (Teaching): Robert C. Gregg

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 Studies. (Religious Traditions consists of three subfields: East Asian Religions, Judaism, and Christianity.) Alternatively, the student may construct a self-designed concentration across these (or other) areas, again in consultation with the adviser.

The student is expected to take a minimum of 25 units in the area of concentration. Relevant courses listed in one area may, with the written consent of the undergraduate director, be counted in another. Approved courses offered by other departments may also be counted.

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 departmental total, as well as toward the 25-unit concentration total.

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 graded Satisfactory/No Credit. Grades of 'S' are counted towards the total required for the major (60) even if permission to pursue the honors program is not given.

By May 15 of the junior year, the student should have presented a statement of the proposed topic and the method of investigation to the undergraduate director. This statement should be no less than five double-spaced pages in length and in addition should contain a bibliography of works to be consulted together with an appended list of courses taken or to be taken that are germane to the topic. After approval of the undergraduate director, the proposal is submitted to the professoriate for approval or disapproval. Upon approval, the chair of the department appoints a tutor and a second reader. In the case of an interdisciplinary topic, a second reader from another department is assigned.

No special seminars or courses are required as a prerequisite for honors other than the individual work necessary for writing the thesis. In addition to the 2 units of credit taken in the last quarter of the junior year, students may elect to take as many as 10 but no less than 5 credit units of 198 on writing the thesis. These units must be in addition to the total number of units required for the successful completion of the major.

The tutor supervises the development of the essay, a complete first draft being submitted no later than the first day of the quarter preceding graduation. This draft is revised in the light of the tutor's criticisms. The tutor, with a second reader, assigns the final grade. Essays must receive a 'B' or better to receive honors.

The student is encouraged to make use of a foreign language relevant to his or her work.

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 in this bulletin, or in the guidelines available from the undergraduate director of either department.

GRADUATE PROGRAMS
MASTER OF ARTS

University regulations pertaining to the A.M. are listed in the "Degrees" section in this bulletin. The following requirements are in addition to the University's basic requirements.

The student completes at least 48 units of graduate work at Stanford beyond the A.B. degree, includ-
ing two required graduate seminars (304A and B). Residence may be completed by four quarters of full-time work or the equivalent.

The student's plan of courses is subject to approval by the graduate director. No field of specialization is expected, but students may focus work in particular areas. Advanced and graduate courses in other departments may be taken. No thesis is required; a thesis, if elected, may count for as many as 9 units.

Each student demonstrates reading knowledge of at least one foreign language.

DOCTOR OF PHILOSOPHY

University regulations regarding the Ph.D. are found in the "Degrees" section in this bulletin. The following requirements are in addition to the University's basic requirements.

Residence — Each student completes three years (nine quarters) of full-time study, or the equivalent, in graduate work beyond the A.B. degree, and a minimum of 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 departmental faculty recommends 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, one prescribed essay, and two other 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 will 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 in 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 — Introduction to the religious thought of Asia through analysis and comparison of selected issues in classical texts from India and E. Asia. Limited enrollment. DR:2(8*)
4 units, Aut (Bielefeldt)

14. Introduction to Buddhism — Introduction to the life and teachings of the canonical Buddha, an
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 1993-94

18. Zen Buddhism — Introduction to Zen Buddhist religious thought, focusing on selected issues in several representative texts. DR:2(*) or 8(3*)
4 units (Faure) not given 1993-94

20. Chinese Religious Thought and Practice — Introduction to the religious traditions of China, emphasizing Buddhism and Taoism. DR:2(*)
4 units, Win (Faure)

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(*)
4 units (Ivanhoe) not given 1993-94

114. Early Taoism: A Doctrine without Words — (Same as Asian Languages 114.) The history of Taoism through the Han Dynasty (220 A.D.); emphasis on HuangLao, the doctrines of the Yellow Emperor, and the sage Laozi. Different approaches to reconcile counter-intuitive precepts of early Taoism, e.g., ruling through non-action. Dao de jing and writings ascribed to the Yellow Emperor. Research paper on early Taoist thought or its applications required. Enrollment limited to 20. Recommended: 55 or Asian Languages 46.
4 units, Spr (Csikszentmihalyi)

116. Japanese Buddhism — History and teachings of Buddhism in Japan, emphasizing the early and medieval periods. DR:2(*)
5 units, not given 1993-94

117. Syncretism and Sectarianism in Chinese Buddhism — Focuses on 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 1993-94

118. Ritual in East Asian Buddhism — Focuses on various rituals and symbolic representations of the relationship between sacred and profane in E. Asian religious traditions.
4 units (Faure) not given 1993-94

119. Neo-Confucianism — (Same as Asian Languages 231, Philosophy 114.) 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 reinterpretation of Confucian thought in its later phase. The thought of Cheng Hao, Cheng Yi, Ju Xi, Wang Yangming, Dai Zhen, and Zhang Xuecheng. Prerequisite: 55 or consent of instructor.
4 units, Win (Ivanhoe)

5 units (Bielefeldt) not given 1993-94

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 1993-94

150. Systems of Buddhist Thought — Introduction to the Lotus school of Mahayana; its Indian sources, Chinese formulation, and Japanese developments.
5 units, Win (Bielefeldt)

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, Spr (Faure)

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 1993-94

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
65. Introduction to Christian Ethics — Four central moral concepts (love, freedom, sin, and salvation) as understood by four major Christian authors: Augustine, Kierkegaard, Simone Weil, and Martin Luther King, Jr. Critiques of Christian ethics by Nietzsche and Freud. DR.(8)3
5 units, Win (Jackson)

145. Protestantism — Development of Protestantism from Reformation to the present.
5 units (Harvey) not given 1993-94

146. Christian Fundamentalisms — Considers the diversity of Evangelical traditions in the U.S. Readings in the history, theology, and cultures of Christian Fundamentalism from diverse points of view.
4 units (Busto) not given 1993-94

234B. 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 modern era. Emphasis on the Middle Ages.
5 units (Gelber) not given 1993-94

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 (Gelber) not given 1993-94

274C. Kierkegaard — (Same as Philosophy 130.) Examines Soren Kierkegaard’s major works.
5 units, Win (Harvey)

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. DR:7(2) or 8(3)
5 units, Win (Bach)

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, liturgi...
cal, midrashic, legal, historical, and philosophical. DR:8(3)
4 units (Eisen) not given 1993-94

53. Jews and Judaism in America — Examination of the interaction between 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 (Eisen) not given 1993-94

5 units, Spr (Eilberg-Schwartz)

128. Women and Judaism — (Same as Feminist Studies 151.) 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 1993-94

161. Modern Jewish Thought
5 units, not given 1993-94

165. Religious Ritual — Classical and contemporary theories of religious ritual with case studies from a variety of traditions.
5 units (Eisen) not given 1993-94

166. Myth and Ritual in Judaism — Reconsideration of major practices and beliefs of ancient Judaism from perspectives of symbolic, cultural, and structural anthropology. Dietary restrictions, circumcision, sacrifice, menstrual laws, rules of impurity. DR:8(3)
5 units, Spr (Eilberg-Schwartz)

5 units (Eilberg-Schwartz) not given 1993-94

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 1993-94

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 1993-94

281. Encounters Between Modern Philosophy and Judaism
5 units (Eisen) not given 1993-94

ETHICS AND PHILOSOPHY OF RELIGION

42. Philosophy of Religion — (Same as Philosophy 42.) Classic and modern questions in philosophy of religion traced through Western and Eastern traditions: coherence of theism, relativism, verification and ethics of belief. Readings include traditional and modern texts. DR:8(3)
4 units, Aut (Gelber)

113. Zhuang Zi — (Same as Philosophy 113, Asian Languages 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 knowledge of Chinese is required. Separate readings for those who know Classical Chinese. Prerequisite: 55 or consent of instructor.
5 units, Spr (Ivanhoe)

150. Systems of Buddhist Thought — Introduction to the Lotus school of Mahayana; its Indian sources, Chinese formulation, and Japanese developments.
5 units, Win (Bielefeldt)

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 (Jackson) not given 1993-94

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, Spr (Jackson)

4 units, Win (Gelber)

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 1993-94

174. From Kant to Kierkegaard — Survey of main currents of theology and religion in Germany, em-
phasizing themes of the knowledge of God and the problem of alienation.

5 units, Win (Harvey)

174D. Friedrich Nietzsche—Exploration of his writings, emphasizing his views on religion. Prequisite: consent of instructor.
5 units, Spr (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 1993-94

5 units (Bach) not given 1993-94

5 units, Win (Jackson)

274A. Sigmund Freud
5 units (Yearley) not given 1993-94

274D. Nietzsche's Zarathustra
5 units, Spr (Harvey)

275. Love and Justice—The relation between various accounts of justice (Rawls, Walzer, Niebuhr) and conceptions of the self (Charles Taylor, Alasdair MacIntyre, and Wolfhart Pannenberg). Has a post-Enlightenment consensus emerged on these topics, or is the liberalism/communitarian distinction still significant? Do we need a theory of human nature for political philosophy?
5 units, Spr (Jackson)

5 units (Harvey) not given 1993-94

5 units (Harvey) not given 1993-94

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, Aut (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, e.g., classical Greek, Christian, Confucian, Buddhist, Taoist, and Freudian. Limited enrollment.
DR:2(*) or 8(3*)
5 units, Spr (Yearley)

5 units, Win (Eilberg-Schwartz)

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 1993-94

8. Religion in America—Interdisciplinary introduction to the diversity of religious communities in the U.S. Important religious events, figures, and movements in American religions. Topics: indigenous worldviews, popular religions, civil religion, religion and social conflict, and new religious expressions. DR:3 or 8†(3)
4 units, Spr (Busto)

112. Sexual Politics in the Ancient World—(Same as Feminist Studies 155.) 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, Aut (Bach)

Edith Wharton. Hollywood fantasies of the suburban wife and the office wife, proper girls and problem girls.

3 units, Aut (Bach)

143. Chicanos and Religion — The religious traditions that created and continue to influence the history, politics, and formation of Mexican-American communities. Topics: ancient Mesoamerica, Mexican Catholicism, Movimiento “indigenismo,” Evangelicos, Latino theology, Chicana innovations. 

4 units (Busto) not given 1993-94

148. Social Theory and Religion

5 units (Eisen) not given 1993-94

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. 

3 units (Harvey) not given 1993-94

154. Creation/Procreation: A Comparative Study — (Same as Anthropology 154, 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 literature examines 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, Aut (Delaney)

157. Readings in Greco-Roman Religion — Texts present philosophical and religious thought and point towards activities of discrete groups. 

5 units (Gregg) not given 1993-94

163. Religion and Ethnicity — Religion and issues of race, class, and gender in development of racially ethnic communities. Religion as promoting or resisting assimilation. Issues: revitalization, theologies of liberation, dissent and transformation within traditions. DR:3†

5 units, Aut (Busto)

165. Religious Ritual — Classical and contemporary theories of religious ritual with case studies from a variety of traditions.

5 units (Eisen) not given 1993-94

171. Medieval Religious Thinkers

5 units, not given 1993-94


5 units, Spr (Faure)

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 1993-94

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 1993-94

227. Seminar: Religion and Gender — (Same as Feminist Studies 227.) Topic is “Eating Texts,” and exploration of the interrelated literary tropes of beautiful women, banquets, and bizarre deaths. Structuralist and postmodern literary theories of characterization 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, Spr (Bach)

241. Asceticism in Pagan and Christian Antiquity

4-5 units (Gregg) not given 1993-94

245. Comparative Religious Ethics

5 units (Yearley) not given 1993-94


4 units, Spr (Busto)

261. Modernization/Secularization — Re-examination of the two fundamental concepts in light of recent historical, sociological, anthropological, and philosophical developments.

5 units (Eisen) not given 1993-94

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 litera-
ture concerning the psychological and sociological factors shaping the image of manhood.

5 units, Win (Eilberg-Schwartz)

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 1993-94

276. Topics in Race and Religion — Seminar on issues in the intersection of race and religion. Chicano/a religion from the Movimiento through the post-Aztlan era. Prerequisite: consent of instructor.

4 units, Win (Busto)

287. Religion — (Same as Anthropology 253.) Covers range of 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 by whom, what counts as religious phenomena and what accounts for the persistence of religion and the power of religious movements? What is the relation between religion, power, and gender? Prerequisite: consent of instructor.

5 units, Aut (Delaney)

UNDERGRADUATE DIRECTED READING

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; Aut (Gelber)

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, alternate years, given 1994-95


5 units (Faure) not given 1993-94

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 1993-94

319. East Asian Religions — Directed research.

(Bielefeldt, Faure, Ivanhoe, Yearley)

by arrangement

321. Graduate Seminar in Modern Judaism — Prerequisite: consent of instructor.

4 units (Eisen) not given 1993-94


(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

379. Religious Thought — Directed research.

(Bielefeldt, 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
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 a coterminal A.B./A.M. and an A.M. program in Russian and East European Studies.

The degree program in Russian and East European Studies is directed by a committee of faculty members who are affiliated with the center. The program is offered primarily for two types of students:

1. Advanced undergraduate students who need a coherent interdisciplinary program of study to assemble the skills and credentials necessary for admission to a Ph.D. program in the Russian and East European field.

2. Those students who wish to acquire a competence in Russian and East European Studies in preparation for careers in government, journalism, business, law, or teaching at other than the college or university level.

Each A.M. candidate is assigned an academic adviser who monitors his or her program of courses and course performance.

The basic prerequisite for admission to the program is completion of at least three years of study of the Russian language (or the equivalent). A minimum of four years of advanced Russian or the equivalent is to be completed before the awarding of the A.M. degree. With the consent of the master’s committee, an East European language may be substituted for Russian (at a similar level) where appropriate for the student’s program and objectives.

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 in 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. Appli-
cations may be obtained from the Graduate Admissions 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).

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. (See “Requirements” below for distribution of units.)

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

Students interested in the study of the languages, history, culture, and social organization of Russia and Eastern Europe can attend Stanford study centers in Berlin, Krakow, and Moscow. For information about these programs, students should contact the Overseas Studies office in Sweet Hall.

GRADUATE PROGRAMS

Masters of Arts

A limited number of students are admitted as candidates for a terminal master’s degree in Russian and East European Studies. Application materials may be obtained directly from the Graduate Admissions Section of the Registrar’s Office, Stanford University, Stanford, CA 94305-3052.

To qualify for admission to the program, applicants must have the equivalent of an A.B. or a B.S. degree. They must have completed three years of Russian language study (or the equivalent).

Applicants must also take the general test of the Graduate Record Examination and have the results sent to the Graduate Admissions Section of the Registrar’s office. Applicants whose native language is not English and who have not studied in an English-speaking institution for at least one and a 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 to begin in the Autumn Quarter, but requests for exceptions are considered.

Candidates for an A.M. degree must meet University requirements for an A.M. degree as described in the “Advanced Degrees” section of this bulletin. All requirements for the A.M. degree may normally be completed in three academic quarters as a full-time student.

REQUIREMENTS

For students in both the coterminal A.B./A.M. and the terminal A.M. programs, the 40 units required for the master’s degree must be distributed as follows:

1. A minimum of five graduate courses in the program field, distributed over at least three different departments. None of the five graduate courses can be directed reading. At least one course must require a research project resulting in a substantial paper. The remaining required units may include advanced undergraduate courses in various departments, but all must deal with the Russian/Soviet/post-Soviet and East European field. Of the 40-unit minimum, no courses may be below 100 and at least 50 per cent must be at the 200 level or higher. To count toward the 40-unit minimum, 100-level courses should have additional requirements for graduate students, to be assigned by the instructor.

2. No credit toward the master’s degree is given for the first two years of Russian or East European language instruction. Credit towards the degree is allowed at Stanford for third-year Russian language and above, up to 3 units per academic quarter, and up to a total of 9 units. (Other languages of Eastern Europe and the former Soviet Union may, with CREES approval, be substituted.)

3. All students must enroll in the Core Seminar in Russian and East European Studies (see below).

4. All students must obtain a minimum letter grade indicator (LGI) of ‘B’ in courses counting to-
ward fulfillment of requirements for the master’s degree.

5. All students should have taken introductory courses in modern Russian history, modern Russian literature, and Soviet/post-Soviet or East European politics. These courses, if taken at Stanford, may be applied to the units required for the A.M. only when doing so does not interfere with completion of language or graduate course requirements. Ordinarily, a student admitted to the program does course work on both Soviet/post-Soviet and East European topics. Students wishing to specialize in one or the other alone may do so subject to the prior approval of their programs by the master’s committee.

FINANCIAL AID

Subject to annual funding, the center may have a limited amount of financial aid to offer in the form of Foreign Language and Area Studies fellowships (FLAS) and College Work Study Graduate Student Assistantships (CWS). Recipients of FLAS fellowships must be American citizens or permanent residents. Applicants in A.M., J.D., or M.B.A. programs have priority over Ph.D. students. College Work Study awards are based on a combination of merit and financial need. Applicants to the A.M. program are encouraged to apply for FLAS or CWS when completing the application for admission.

For further information, contact the Center for Russian and East European Studies, 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

110/210. Ukrainian Reading Course — (Same as Slavic Languages 110/210.) 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 (Draganova) by arrangement

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 — Limited to students enrolled in the A.M. program in Russian/Soviet and East European Studies. Introduction to methodologies and the status of research within the interdisciplinary area studies program.

1 unit, Aut, Win, Spr (J. Kollmann) Th 12-1:30

275A. The Gorbachev-Yeltsin Years and After — Focuses on leadership policies and elite and mass responses mainly 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, analyzed in detail.

3 units, Aut (Dunlop) M 11-1

290. Peoples of the Former Soviet Union — Survey of the non-Russian nationalities of the former Soviet Union, emphasizing the Caucasus and Siberia.

5 units, Spr (Arutiunov)

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 (Earle)

126. Comparative Economic Institutions: The Economics of Transition

5 units, Win (Qian)
217. Money and Finance in Economic Development
  5 units, Aut (McKinnon) TTh 9-10:50

293. Reform and Transition in Socialist Economies
  5 units, Spr (Qian)

FEMINIST STUDIES
140A. A Seminar: Women in Transition to Democracy in Latin America and Eastern Europe —
  (Same as Latin American Studies 91.)
  5 units, Aut (Friedman) MW 1:15-3:05

HISTORY
19S. Introductory Seminar: “The West” in the Russian Consciousness, 1789-1855
  5 units, Spr (Staff) W 2:15-4:05

24A. Russian Civilization from 9th to 17th Centuries
  5 units (N. Kollmann) not given 1993-94

24B. Russian Civilization II, 18th to 20th Centuries
  5 units (Emmons) not given 1993-94

25S. Ivan the Terrible in Russian Historiography
  5 units, Aut (N. Kollmann) W 1:15-3:05

119. Aristocracies and Absolutism: Early Modern Eastern Europe, 1300-1800
  5 units, Spr (N. Kollmann) MTWTh 10

120C. Russia in Revolution, 1861-1930
  5 units, Win (Emmons) TTh 1:15-2:45

121. Russian Jewish History, 1772-1917
  5 units, Aut (Zipperstein) TTh 11-12:15

122B. Soviet Foreign Policy since 1917
  5 units, Aut (Haslam) MTWTh 9

123A. Soviet History and Politics 1917-1993 (“From Coup to Coup”) — (Same as Political Science 119A.)
  5 units, Spr (Dalhin) MTWTh 11

125. 20th-Century Eastern Europe
  5 units, Aut (Naimark) MTWTh 10

137. The Holocaust
  5 units, Spr (Rodrigue) MWTh 1:15

219/319A. Undergraduate/Graduate Colloquium: Major Problems in Soviet History and Politics — (Same as Political Science 226C.)
  5 units, Win (Dalhin) M 2:15-4:05

221S. Senior Research Seminar: Wartime and Postwar Poland
  5 units, Win (Naimark) W 2:15-4:05

223/323. Colloquium: Comparative Early Modern Nobilities: Russia, Poland, 19th and 20th Century
  5 units (N. Kollmann) not given 1993-94

224/324. Undergraduate/Graduate Colloquium: Stalinism in Eastern Europe
  5 units, Spr (Naimark) T 2:15-4:05

225S. Law and Society in Early Modern Russia
  5 units, Win (N. Kollman) T 1:15-3:05

261. Nuclear Weapons and International Relations — Theories and History — (Same as Political Science 246.)
  5 units, Spr (Holloway, Bernstein) Th 2:15-5

289A. The Ottoman Empire
  5 units (Rodrigue) not given 1993-94

300W. Graduate Directed Reading
  units by arrangement (Staff)

320A. Graduate Colloquium: Topics in Early Modern Russian History
  4-5 units, Aut (N. Kollmann) M 1:15-3:05

420B. Graduate Seminar: Topics in Modern Russian History
  4-5 units, Spr (Emmons) by arrangement

421A. Graduate Seminar: Topics in Russian History
  4-5 units (Emmons) not given 1993-94

433. Graduate Seminar: Modern Eastern Europe
  4-5 units, Spr (Naimark) Th 2:15-4:05

LINGUISTICS
626A, B.C. Beginning Turkish
  3 units, Aut, Win, Spr (Ayanoglu)

POLITICAL SCIENCE
  5 units, Win (Blacker, Holloway)

119A. Soviet History and Politics 1917-1993 (“From Coup to Coup”) — (Same as History 123A.)
  5 units, Spr (Dalhin) MTWTh 11

123M. Seminar: Post-Communist Politics
  5 units, Spr (McFaul)

136. Soviet Foreign Policy since 1917
  5 units (Dalhin) given 1994-95

138B. Seminar: Security and Diplomacy
  5 units, Spr (Lewis)

226C. Major Problems in Soviet History and Politics — (Same as History 319A.)
  5 units, Win (Dalhin) M 2:15-4:05

240. Seminar: Security in an Insecure World
  5 units, Aut (Blacker) M 2:15-4:05
244H. Seminar: The Collapse of the Soviet Union — Causes and Consequences
5 units, Spr (Holloway)

246. Colloquium: Nuclear Weapons and International Relations — Theories and History — (Same as History 261.)
5 units, Spr (Holloway, Bernstein)

SLAVIC LANGUAGES AND LITERATURES

GENERAL

130. Milan Kundera
2 units, Aut (Moeller-Sally) T 7-8:30 p.m.

145/245. Survey of Russian Literature in English Translation I: The Age of Experiment
4 units, Aut (Fleishman) MWF 10

146/246. Survey of Russian Literature in English Translation II: The Age of Realism
4 units, Win (Moeller-Sally) MWF 10

147/247. Survey of Russian Literature in English Translation after 1917: Invention of Tradition
4 units, Spr (Greenleaf) MWF 10

151. Fyodor Dostoevsky
4 units, Aut (Frank) TTh 2:15-4:05

155/255. Anton Chekhov
4 units, Spr (Moeller-Sally) TTh 10-11:30

UNDERGRADUATE

1A. First-Year Russian A
5 units, Aut (Schupbach, Staff)
MTWThF 9, 10, 11, or 1:15

2B. First-Year Russian B
5 units, Win (Schupbach, Staff)
MTWThF 9, 10, 11, or 1:15

3C. First-Year Russian C
5 units, Spr (Schupbach, Staff)
MTWThF 9, 10, or 1:15

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

8A,B,C. Beginning Serbo-Croatian
4 units, Aut, Win, Spr (Bojic) by arrangement

11A,B,C. Beginning Czech
4 units, Aut, Win, Spr (Vesinova) by arrangement

12A,B,C. Intermediate Czech
4 units, Aut, Win, Spr (Vesinova) by arrangement

50. Review of Russian Grammar
3 units, Aut (Schupbach) by arrangement

51,52,53. Second-Year Russian
3 units, Aut, Win, Spr (Greenhill, Moeller-Sally, Mueller-Vollmer) MWF 12 or 1:15

51A,52A,53A. Second-Year Russian: Conversation
2 units, Aut, Win, Spr (Eisen, Moeller-Sally) TTh 10 or 11

110/210. Ukrainian Reading Course — (Same as Russian and East European Studies 110/210.)
3 units, Aut (Draganova) by arrangement

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

ADVANCED UNDERGRADUATE AND GRADUATE

177/201. Advanced Russian
3 units, Aut (Greenhill) TTh 3:15-4:30

178/202. Advanced Russian
3 units, Win (Greenhill) TTh 3:15-4:30

179/203. Advanced Russian
3 units, Spr (Greenhill) TTh 3:15-4:30

181/204. Fifth-Year 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
4 units, Win (Arkhipov) by arrangement

187. Russian Poetry of the 18th and 19th Centuries
4 units, Aut (Fleishman) MWF 12

188. Russian Poetry of the 20th Century
4 units, Win (Freidin) by arrangement

190. Modernism and the Humanities — (Same as Humanities 197.)
5 units, Aut (Freidin) MW 1:15-3:05

195. Advanced Topics in Russian Grammar I: Phonetics and Phonology and Introduction to Morphology of Russian
3 units, Aut (Schupbach) by arrangement
196. Advanced Topics in Russian Grammar II: Morphology and Syntax
3 units, Win (Schupbach) by arrangement

199. Individual Work
1-5 units, any quarter (Staff) by arrangement

200. Proseminar in Russian Literature
4 units, Aut (Freidin) M 3:15-5:05

200A/200B. Introduction to Slavic Bibliography
1-2 units, Aut (Zalewski) W 3:15-4, W 4:05-5:15

207A. Advanced Polish — For graduate students.
4 units, Aut (Debski) by arrangement

211. Introduction to Old Church Slavic
3 units, Aut (Arkhipov) by arrangement

212. Old Russian and Old Church Slavic
4 units, Win (Arkhipov) by arrangement

213. History of the Russian Literary Language
4 units, Spr (Arkhipov) by arrangement

224. Reading in the Russian Novel
4 units, Spr (Moeller-Sally) by arrangement

227. Boris Pasternak and the Poetry of the Russian Avant Garde
4 units, Win (Fleishman) TTh 10-12

240. Foundations of Soviet Civilization
4 units, Win (Freidin) by arrangement

299. Individual Work
1-12 units, any quarter, by arrangement

300A. Graduate Seminar: Literature as Institutions
4 units, Win (Moeller-Sally) by arrangement

399A,B,C. Advanced Research Seminar in Russian Literature
2-4 units, Aut, Win, Spr (Staff) by arrangement

SLAVIC LANGUAGES AND LITERATURES

Emeriti: (Professors) Joseph Frank, Jack A. Posin, Lawrence L. Stahlberger, Joseph A. Van Campen; (Assistant Professor) Elisabeth Stenbock-Fermor
Chair: Lazar Fleishman
Professors: Lazar Fleishman, Gregory Freidin, Richard D. Schupbach
Assistant Professor: Stephen Moeller-Sally
Lecturers: Jasmina Bojic, Ludmila Draganova, Rima Greenhill, Patricia Mueller-Vollmer, Sima Radivilova, Wojciech Zalewski (Curator, Russian and East European Collection, Stanford Libraries)
Visiting Assistant Professors: Andrey Arkhipov, Robert Debski, Eva Vesinova
Teaching Fellow: Samuel Eijen

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

Candidates for an A.B. degree in Russian must have completed the first- and second-year courses in reading, composition, and conversation (or the equivalent).

1. Concentration in Russian Literature: candidates must complete a minimum of 35 units, selected with approval of their adviser and including courses numbered 111, 112, 113, 145, 146, 147, 187, 188.

2. Concentration in Russian Language: in addition to the basic first- and second-year sequence or its equivalent, candidates must complete a minimum of 35 units selected with approval of their adviser and including courses numbered 111, 112, 113, 114, 115, 116; and 177, 178, 179; and either 195, 196, or 211, 212, and 213. The remaining units are to be selected from: 167, 168, 187, 188, 195, 196, 211, 212, 213.

Majors in Russian must earn a letter grade indicator (LGI) of 'C' or better in order to receive credit toward the major.

In addition to the 35 units mentioned above, students majoring in literature or language who are not enrolled in the honors program in Humanities (see the "Humanities Special Programs" section in this bulletin) are to select with the help of their adviser a minimum of three general courses (9 units) in support of their major program.

HONORS PROGRAM

Majors with an LGI of 'B+' in Russian courses are eligible to participate in the department's honors program. Honors work may be done in Russian literature or in Russian language. Requirements are listed below.

RUSSIAN LITERATURE

1. Language prerequisite: three years of Russian, and a reading knowledge of French, German, or a second Slavic language, demonstrated by passing an examination.

2. Requirements in Russian literature: Slavic 145, 146, 147, 187, 188, 200 (the last taken during the senior year).

3. Minimum requirements in other literatures: Humanities 61, 62, 63, or three courses in one W. European literature selected in consultation with the student's faculty adviser.

4. Slavic 199, Individual Work: 5 units per quarter during Winter and Spring Quarters of the se-
niorship year. To receive honors, the candidate must receive an LGI of 'B' or better on a thesis written during this period.

5. Recommended: course sequence in Russian history.

RUSSIAN LANGUAGE

Required:
1. Four years of Russian, including Slavic 111-116, 167-168, and 177, 178, 179, 187, or 188.
2. At least two additional department courses to be chosen from: 191, 195, 196, 197, 211, 212, 213.
3. Slavic 199, Individual Work: 6 to 9 units during the senior year. To receive honors, the candidate must receive an LGI of "B" or better on a thesis or project conducted under the close supervision of a member of the professorial staff.

Recommended:
1. Courses in Russian literature: 145, 146, 147, 187, 188.
2. Courses in other departments: Communication 104; Computer Science 101, 106, or 108A,B,C; History 120; Linguistics 4, 5, 25, 35, 71B; Math. 3; Philosophy 57, 180.

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 insure 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 departmental adviser.

No credit toward the A.M. degree is allowed for first- or second-year courses in non-Slavic languages required for the Ph.D. degree.

Final Examination — Students not enrolled in the Ph.D. program may either submit an A.M. thesis or take a final examination. In the latter case, regardless of the area of specialization, the student must demonstrate in a written examination (1) command of the phonology, morphology, syntax, and lexicology of contemporary Standard Russian sufficient to teach beginning and intermediate courses at the college level; (2) an ability to read contemporary Standard Russian sufficient to assist students studying contemporary Russian poetry or literary prose; and (3) sufficient familiarity with Russian literature of either the 19th or 20th century to handle successfully survey courses dealing with a chosen period of specialization.

The examination should be passed at the end of the final quarter of required course work.

MASTER OF ARTS IN TEACHING

The degree of Master of Arts in Teaching is offered jointly by the department and the School of Education. It is intended for candidates with a teaching credential or relevant teaching experience who wish to further strengthen their academic preparation. Requirements for the degree are outlined in the "School of Education" section in this bulletin. The program includes 45 units, of which 25 must be in the teaching field and 12 in education.
specific language requirements are established in consultation with the department.

DOCTOR OF PHILOSOPHY

Students enrolled in the Ph.D. program in Slavic Languages and Literatures are expected to fulfill the following requirements:

1. Minor or Related Fields: during the course of study, students must develop substantial 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 W. European literature, to be 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 (e.g., 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 "Degrees" section in this bulletin. For specific departmental requirements and recommendations, the student should consult with the department chair. 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 will result 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 will 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 departmental 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 at 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 departmental 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 W. 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 upon 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 departmental 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 upon: for first-year students, a high quality of performance in course work (decided by departmental 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. For University residence requirements, see the "Advanced Degrees" section in this bulletin. 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 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 examination, 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 '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 examination in one of these languages must be passed by the end of the first year of study. The reading examination in the second language must be passed by the end of the second year of study. Both language examinations must be passed before the candidate takes the University oral examination, i.e., 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 in 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

These courses may be of interest to students in other literatures, in comparative literature, and in Russian area studies. They are primarily for undergraduates but can be taken for graduate credit by special arrangement with the department.

130. Milan Kundera — The author’s major works discussed in their literary, philosophical, and political contexts. Readings: The Joke, Laughable Loves, The Unbearable Lightness of Being, and others.
2 units, Aut (Mueller-Sally) T 7-8:30 p.m.

131. Introduction to the Russian Short Story: 19th Century — Pushkin, Gogol, Dostoevsky, Leskov, and others. Short reading assignments (20-30 pages) facilitate concentration on the individual author’s style. The short story as a genre. Offered in English translation for 1 unit, in Russian for 2 units.
not given 1993-94

135. The Other Europe — The sociocultural experience of contemporary Eastern Europe through 20th-century Polish, Czech, and Yugoslav writers: Andric, Havel, Kundera, Kis, Milosz, Pavic, and Schultz. Readings in English translation.
4 units, not given 1993-94

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 1993-94

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 1993-94

145/245. Survey of Russian Literature in English Translation I: The Age of Experiment — (Graduate students register for 245.) Part I of a three-quarter survey of the Russian prose tradition. Covers 1800-1840, emphasizing the formative period of Russian prose, the lesser known contributions of poets, and Romantic and popular writers. Recognized “classics,” Pushkin’s Eugene Onegin, The Belkin Tales, The Captain’s Daughter; Lermontov’s Hero of Our Time; Gogol’s Petersburg Tales and Dead Souls, are considered in the context of “local” literary and stylistic developments and of contemporary European trends. DR:7(2)
4 units, Aut (Fleishman) MWF 10

146/246. Survey of Russian Literature in English Translation II: The Age of Realism — (Graduate students register for 246.) A continuation of 145 but may be taken independently. Selected novels and short fiction by Turgenev, Dostoevsky, Tolstoy, and Chekhov. The dynamics of literary culture in the Age of Realism. DR:7(2)
4 units, Win (Moeller-Sally) MWF 10

147/247. Survey of Russian Literature in English Translation after 1917: Invention of Tradition — (Graduate students register for 247.) Required of all majors in Russian literature. A continuation of 145 and 146, but may be taken independently. 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, Solzhenitsyn, Zoshchenko, etc.). Attention to the way poets and novelists have constituted the post-revolutionary “historical experience” of the Russians. DR:7(2)
4 units, Spr (Greenleaf) MWF 10

151. Fyodor 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. Leo Tolstoy — (Graduate students register for 253.) 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 1993-94

4 units, not given 1993-94

155/255. Anton Chekhov — The author’s short fiction and plays examined within a variety of contexts. Topics: Chekhov’s creative evolution, the genre of the short story, and the changing literary process of late 19th-century Russia.
4 units, Spr (Moeller-Sally) TTh 10-11:30

UNDERGRADUATE AND GRADUATE LANGUAGE

By special arrangement with the department, courses numbered 100-159 can be taken for graduate
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 units, Aut (Schupbach, Staff)
   MTWThF 9, 10, 11, or 1:15

2B. First-Year Russian B—Three-quarter sequence. Continuation of 1. Optional unit for extra work on pronunciation and conversation.
   5 units, Win (Schupbach, Staff)
   MTWThF 9, 10, 11, or 1:15

3C. First-Year Russian C—Three-quarter sequence. Continuation of 2. Optional unit for extra work on pronunciation and reading.
   5 units, Spr (Schupbach, Staff)
   MTWThF 9, 10, or 1:15

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
   4 units, Aut (Bojic) by arrangement

8B. Beginning Serbo-Croatian
   4 units, Win (Bojic) by arrangement

8C. Beginning Serbo-Croatian
   4 units, Spr (Bojic) by arrangement

11A. Beginning Czech
   4 units, Aut (Vesinova) by arrangement

11B. Beginning Czech
   4 units, Win (Vesinova) by arrangement

11C. Beginning Czech
   4 units, Spr (Vesinova) by arrangement

12A. Intermediate Czech
   4 units, Aut (Vesinova) by arrangement

12B. Intermediate Czech
   4 units, Win (Vesinova) by arrangement

12C. Intermediate Czech
   4 units, Spr (Vesinova) by arrangement

50. Repair Russian—Accelerated, remedial Russian for students with sufficient background to place, with the help of this course, into 52 and 52A. Prerequisite: consent of instructor.
   3 units, Aut (Schupbach) by arrangement

   3 units, Aut (Greenhill, Moeller-Sally)
   MWF 12 or 1:15

   2 units, Win (Eisen, Moeller-Sally) TTh 10 or 11

52. Second-Year Russian—Continuation of 51 focusing on vocabulary building, syntax. Corequisite: 52A.
   3 units, Win (Mueller-Vollmer, Moeller-Sally)
   MWF 12 or 1:15

52A. Second-Year Russian: Conversation—Continuation of 51A. Corequisite: 52.
   2 units, Win (Eisen, Moeller-Sally)
   TTh 10 or 11

53. Second-Year Russian—Continuation of 52. Corequisite: 53A.
   3 units, Spr (Mueller-Vollmer, Moeller-Sally)
   MWF 12 or 1:15

53A. Second-Year Russian: Conversation—Continuation of 52A. Corequisite: 53.
   2 units, Spr (Eisen, Moeller-Sally) TTh 10 or 11

110/210. 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 (Draganova) by arrangement

111,112,113. Third-Year Russian—Emphasis on reading, vocabulary building, and textual analysis. Prerequisite: 51-53 or equivalent (with 114-116 only). Recommended: take 114-116 in conjunction with this series.
   3 units, Aut, Win, Spr (Schupbach, Greenleaf)
   MWF 1:15

   2 units, Aut, Win, Spr (Greenhill) TTh 1:15

119/204. Advanced Russian for Social Scientists—Develops reliable reading skills in technical language of this area. Underscores systematic dif-
ferences between this level and 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 1993-94

120/205. Advanced Russian for Students of the Physical Sciences, Mathematics, and Engineering—Develops reliable reading skills in technical language of this area, emphasizing mathematics and the physical sciences.

1 unit, not given 1993-94

ADVANCED UNDERGRADUATE AND GRADUATE LANGUAGE AND LITERATURE

167, 168. Fourth-Year Russian Seminars I-II—Perfects 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.

167. Fourth-Year Russian Seminars I—Close-up of Alexander Pushkin’s major poetic works.

4 units, not given 1993-94

168. Fourth-Year Russian Seminars II—Close reading of Tolstoy’s Anna Karenina, in literary, historical, and political context. Also, relevant contemporary texts in a variety of genres.

4 units, not given 1993-94

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, 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 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, Win (Arkhipov) by arrangement

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-realistic traditions. Representative poems by Lomonsov, Derzhavin, Zhukovskii, Pushkin, Baratynskii, Lermontov, Tiutchev, Nekrasov, Fet, Soloviev. Lectures/discussions in Russian.

4 units, Aut (Fleishman) 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 (i.e., Bal’mont, Blok, Khlebnikov, Maiakovskii, Tsvetaeva, Pasternak, Sel’vinskii, Kharmas, and others). Prerequisite: 187 or consent of instructor.

4 units, Win (Freidin) 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, not given 1993-94

190. Modernism and the Humanities—(Same as Humanities 197.)

5 units, Aut (Freidin) MW 1:15-3:05

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 1993-94

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 1993-94


3 units, Aut (Schupbach) by arrangement

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, Win (Schupbach) by arrangement

197. Advanced Topics in Russian Grammar III

3 units, not given 1993-94

198A. Yugoslav Cinematography — Dialogue Tutorial — Open to sophomores only with the instructor's consent. European cinematography, focusing on Yugoslav movies. Discussion of symbolism, the selection of topics, Yugoslav values, and hidden political messages. Participating Yugoslav movie directors. Topics: issues in production, distribution, and social problems: how do Yugoslav films reach the domestic and foreign public? What are the differences and similarities 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

200A. Introduction to Slavic Bibliography — Open to undergraduate and graduate students. Beginning level (200A, 1 unit) introduces students to library's bibliographic and book resources, and reference sources in English and Western languages. Advanced level (200B, 2 units) 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 advanced level. Both levels may be taken within one quarter or over two consecutive years.

200A. 1 unit, Aut (Zalewski) W 3:15-4
200B. 2 units, Aut (Zalewski) W 4:05-5:15

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 unit, Aut (Radivilova) by arrangement

206B. Colloquium on Russian Language Teaching Methodology — Continuation of 206A.

1 unit, Win (Mueller-Vollmer) by arrangement

206C. Colloquium on Russian Language Teaching Methodology — Continuation of 206B.

1 unit, Spr (Mueller-Vollmer) by arrangement

207A. Advanced Polish — (For graduate students.) 4 units, Aut (Debski) 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, 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 1993-94

211. Introduction to Old Church Slavic

3 units, Aut (Arkhipov) by arrangement

212. Old Russian and Old Church Slavic

4 units, Win (Arkhipov) by arrangement


3 units, not given 1993-94


4 units, not given 1993-94

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 1993-94

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 1993-94

223. 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 author-
ship, examined in the contemporary literary and socio-historical context. Emphasis on non-Party authors. Babel, Eikhenbaum, Mandelstam, Olesha, Tynianov, Zamiatin, and Zoshchenko.

4 units, not given 1993-94

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 1993-94

225A. Bulgakov—Close analysis of Mikhail Bulgakov’s major prose works.

3 units, not given 1993-94


3 units, not given 1993-94

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 poetry.

4 units, Win (Fleishman) TTh 10-12

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 (Fleishman) not given 1993-94

229. Russian Versification—History and theory of Russian versification from the 17th to the 20th century.

4 units, not given 1993-94

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 1993-94

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 1993-94

230C. 20th-Century Russian Literary Theory from Symbolism and Formalism to Semiotics—Survey of Russian theoretical works on literature. Academic 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 (Bachtin, 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 1993-94


4 units, Win (Freidin) by arrangement

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 1993-94

270A. Pushkin’s Eugene Onegin

2 units (Fleishman) not given 1993-94

271. Solzhenitsyn—Undergraduates register for 155.) 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 1993-94

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 1993-94

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, not given 1993-94
278. Tolstoy — Open to exempt undergraduates. Tolstoy’s creative evolution from his early and late short fiction (Childhood, The Sevastopol Tales, and The Kreutzer Sonata, etc.) and non-fiction, (Confession and Anna Karenina), together with the appropriate critical texts. Readings in Russian.
4 units, not given 1993-94

279. Dostoevsky — The writer’s shorter works in the context of European thought and literature.
4 units, not given 1993-94

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 1993-94

300A. Graduate Seminar: Russian Literature as Institutions — Investigation of the institutions of Russian literature in selected periods, focusing on theoretical and practical issues, including: 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, Win (Moeller-Sally) W2-4

300B. Graduate Seminar: Utopianism in Russian Literature
4 units

300C. Introduction to Archival Research in Russian Literature and History
3 units, not given 1993-94

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 1993-94

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 OBERIUNITY. Theater as seen through theoretical writings (Stanislavsky, V. Ivanov, Meyerhold, Tairov) and performances (Balaganchik, Petrushka, Pobeda nad solnsem, Klop).
4 units, not given 1993-94

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 (Tsvetacva, Khodasevich, Poplavsky, Bunin, Remizov, Nabokov).
4 units, not given 1993-94

300G. Mayakovsky, The Poet of Revolution — Close reading of the major works of the poet.
4 units, not given 1993-94

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, 1920-1923.
4 units, not given 1993-94

300I. The Tradition of the Classics in the Russian Poetry of the Early 20th Century
4 units, not given 1993-94

375. Dostoevsky and French Literature — Dostoevsky’s relations with French literature as a source of inspiration for his own work and as himself inspiring 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 1993-94

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

SOCIOLGY

Emeriti: (Professors) Alex Inkeles, Dudley Kirk, Seymour M. Lipset
Chair: Cecilia Ridgeway
Associate Professors: David B. Grusky, Susan Olzak
Assistant Professors: Jerald R. Herting (on leave Autumn, Spring), Leonard Hochberg, Szonja Szelenyi
Courtesy Professors: JoAnne Martin, Jeffrey Pfef-fer, Francisco O. Ramirez
Courtesy Associate Professors: Larry Diamond, Arnold Eisen, Clifford J. Nass
Consulting Professor: George Bohrnstedt
Consulting Associate Professors: Joan Hafner, Janna Johnston
Visiting Professors: Johannes Berger, Karen Hegt-vedt, Johan Olivier
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**

**AREAS OF CONCENTRATION**

Each area identifies a specialized arena of inquiry, a set of skills within sociology, and basic preparation for a variety of careers. A brief description of each area follows.

**Social Psychology and Interpersonal Processes**—This area of inquiry focuses on the social organization of individual identity, beliefs, and behavior; and upon social structures and processes which emerge in and define interpersonal interactions. Processes studied include social acceptance and competition for prestige and status, the generation of power differences, the development of intimacy bonds, the formation of expectation states which govern performance in task oriented groups, and social pressures to constrain deviance. Foundation courses emphasize the effect of social processes on individual behavior and the analysis of group processes. This area provides excellent training for any career that has 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 in this concentration. Careers related to this area include law, government service, and national and international business applications.

**COURSE OFFERINGS**

Most 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: 105, 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
   - Other Courses: 132, 134, 141-149, 150-153, 232, 240-249, 330, 341

4. **Political and Comparative/Historical Sociology**
   - Foundation Course: 110, 111, 130
   - Other Courses: 112-119, 133, 137, 210-219, 230, 311, 332
BACHELOR OF ARTS

The department offers two programs leading to the A.B. degree in Sociology: the general sociology major and the specialized sociology major. Both are designed around a core curriculum, the intent of which is to ensure adequate coverage of basic sociological knowledge, but also to provide enough flexibility for tailoring the degree program to fit individual needs and interests. The programs and the requirements for each are described below.

CORE CURRICULUM AND GENERAL SOCIOLOGY MAJOR

All recipients of the A.B. degree in Sociology must complete a minimum of 60 units of course work in the major. All courses taken to satisfy this 60-unit requirement must be taken for a 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.
2. 180A and 180B, Introduction to Sociological Research, or its equivalent.
3. An introductory course in statistics, preferably Sociology 181, or equivalent (e.g., Statistics 190).
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 above. 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 an additional 20 units of course work in the selected area of concentration.

HONORS PROGRAM

Each year several students participate in the departmental honors program, undertaking an intensive, individualized program of study. Each honors student works closely with one or more faculty members on an independent research project. Most projects are student initiated but can be associated with ongoing faculty research.

Admission requires an average LGI of 'B+' or better. Admission applications are due before the Winter Quarter of the student’s junior year. To apply for the program, students are required to submit a copy of their transcript, a term paper, a statement of intent, and a letter of recommendation written by a faculty member in the Department of Sociology. The honors director will review these materials and admit to the honors program no more than 10 new students in any one year.

It is anticipated that the applicant will have completed a 100-level course with honors in the Department of Sociology before applying for admission to the honors program. In order to earn honors designation in a course, a student (in consultation with the instructor) is expected to engage in independent research and write a high quality term paper. This term paper cannot be used as a substitute for work that is normally required for the course; rather, this has to be carried out in addition to such requirements. In the event that the course requirements already include a term paper, the instructor may increase the amount of research undertaken by the student or the length of the paper in order to fulfill the honors requirements.

A minimum LGI of 'A-' or better is required on the thesis for a student to be considered for honors, but does not guarantee an honors degree. If the grade is less than an 'A-,' credit for the thesis counts toward the major in sociology.

Honor students earn 15 units credit for work leading to completion of the required honors thesis. Work on the project normally begins during Spring Quarter of the junior year (by enrolling in Sociology 196 for 5 units) and the remaining units are spread equally over the next two quarters during the senior year. The honors thesis may be submitted in the form of a scientific paper (similar to the format required for submission to a journal in the field) or that required of a Stanford master’s thesis. Students interested in the honors program should talk with their academic adviser or the director of the honors program no later than the start of Spring Quarter of the junior year.

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 coterminus master’s program as described in the “Degrees” section of this bulletin.

To apply for admission to the coterminus program, students should submit with the coterminus 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 should be at or above the 100 level; and 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 coterminus students take one or more research methodology courses, e.g., Sociology 381. An LGI of ‘B-’ or better must be secured in each course satisfying the 45-unit requirement.

Most coterminus 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.

TEACHING CREDENTIALS

For information concerning the requirements for teaching credentials, consult the “School of Education” section of this bulletin or address inquiry to the Credential Secretary, School of Education.

GRADUATE PROGRAMS

Admission — Although it is desirable to have had undergraduate preparation in sociology, the department does consider for admission students without such preparation. Admissions forms may be obtained from the Graduate Admissions Section of the Registrar’s Office. Applicants must submit results on the General Test of the Graduate Record Examination. The GRE Subject Test in Sociology may also be taken but is not mandatory. Those wishing to apply for fellowships, scholarships, or assistantships should consult representatives of the financial aid office of their home institution to obtain application forms and information concerning application procedures.

MASTER OF ARTS

Ordinarily, the department does not admit students who are candidates solely for the A.M. in Sociology except for coterminous master’s students (see above). This degree is granted as a step toward the fulfillment of Ph.D. requirements. To receive it, the student must complete 45 units of approved work with a letter grade indicator (LGI) of ‘B-’ or better. All course work should be at a level 100 or above, 18 units should be above the 200 level, and at least 30 units must be taken within the department.

Graduates 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 departmental adviser for doctoral candidates of other departments and schools. Interested students should contact the department secretary for further information. Students may also apply for the coterminous master’s program as described in the “Degrees” section of this bulletin. Information may be obtained from the departmental secretary.

DOCTOR OF PHILOSOPHY

The department admits only those students who show potential for admission to Ph.D. candidacy. For the first three quarters in residence, all students have probationary status. At the end of this period, the entire faculty of the department reviews each student’s progress toward the goal of a professional career of teaching and research in the field. A student may be (1) removed from probationary status, (2) continued in probationary status for an additional period, or (3) terminated from the program. In the sixth quarter in residence, a further decision is made on Ph.D. candidacy. The decision to admit the student to candidacy implies that the student’s position in the department is secure, subject only to continued satisfactory progress toward completion of remaining departmental and University requirements.

A student admitted to Ph.D. candidacy must:
1. Complete a research apprenticeship, working for three quarters in a faculty research program and collaborating in associated publications.
2. Complete a teaching apprenticeship, working for three quarters as a teaching assistant under the supervision of a faculty member.
3. Take four required foundation courses for graduate students, one in each of four areas of specialization: Organization Studies (360), Social Psychology (320), Stratification (340), and Political and Comparative/Historical (310). These courses are broad but analytic and rigorous introductions 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 early in the second year.
4. Develop a thorough grounding in sociological theory and research methods. Students entering
with little background in statistics are required to take an elementary course during the first quarter after entering. Then, three methodology courses are required: Sociology 382, 383, and 384. In the second year, after completion of the foundation courses and methodology courses, students take a required one- or two-quarter course in Analysis and Design. This course focuses on analyzing theories, strategic choices of methods, and the relation of theory to data.

5. Satisfactory completion of the examinations in the foundation courses certifies the breadth of the student's knowledge, but there is still a need to demonstrate the ability to contribute to specialized knowledge at the cutting edge of a field. The student must write a publishable paper by the end of the first-quarter of the student's third year. This paper may be on any sociological topic, theoretical, empirical or methodological; its publishable quality is assessed by an exam committee drawn from departmental faculty.

6. Pass the University oral examination which ordinarily evaluates a dissertation prospectus, and, following this, complete a doctoral dissertation. For basic University requirements see the "Degrees" section of this bulletin.

**Ph.D. MINOR**

The department offers a minor in Sociology for doctoral students in the School of Education. Students must take at least 30 units of work in courses giving graduate credit. Work in theory and methods is encouraged. The specific program must be approved by a department adviser.

**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 numbered 1-199 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.

"X" suffix denotes a new "Experimental" course. With faculty approval, after being offered once or twice, it can be offered as a regular course.

"S" suffix denotes a "Special" course, given only once and usually taught by a visiting faculty.

**OPEN TO ALL STUDENTS**

**INTRODUCTORY**

1. **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)

**SOCIOLOGY 653**

Units, Aut (Dornbusch) MWF10
Win (Staff) MWF 9
Spr (Staff) MWF 10

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/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, Dornbusch, Dreikmeier, Holloway, Moses, Noddings, Ross) MTW 1:15 and by arrangement

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 10-12

111. Introduction to Historical Sociology — (Graduate students register for 211.) Analysis of the relationship between historical events and sociological structures. A variety of theoretical perspectives are brought to bear on a single theme; e.g., capitalism and the rise of the West. Readings from recent works by Michael Mann, Immanuel Wallerstein, Perry Anderson, Charles Tilly, etc.

3 or 5 units (Hochberg) given 1994-95

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 (Diamond) given 1994-95

113S. Social Movements and Collective Action: The Case of South Africa — Analysis of the rise and fall of social movements and spontaneous collective action, including analysis of the ethnic violence in South Africa, the women's movement, contemporary U.S. race riots, the U.S. Civil Rights movement, student movements of the 1960s, the Greens Party in Europe, and the analysis of political social movements in S. Africa and elsewhere.

5 units, Win (Olivier) 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 sociogeographic structures to stages of revolutionary processes; and the formation of new political regimes and societies. Attempts to weave together empirical issues and theoretical perspectives.

3 or 5 units, Spr (Hochberg) TTh 9:30-10:45

118S. Social Structure and Social Change in Europe: The Case of Germany — German society since 1950 in a comparative perspective. Topics: population, households and families, the social market economy, the labor market, social stratification, the German welfare state. Emphasis is on developmental trends German society shares with the advanced societies—especially of Western Europe (e.g., decline in population, increasing instability of marriage, changes of class structures, abatement of class conflicts, expansion of the welfare state). The central problems faced by Germany and Western Europe and prospects for the future.

5 units, Aut (Berger, Johannes) MWF 9

119. Introduction to Regional Sociology — How spatial analysis contributes to our understanding of social processes and structures. Readings from the major theoretical approaches: the Annales school, world-systems analysis, sociogeography, spacetime, geopolitics, etc., juxtaposed in order to assess how time and space are conceptualized. Emphasis on how regional sociology facilitates the selection of theoretically-relevant case studies (i.e., local histories or ethnographies), and enhances comparative techniques.

5 units (Hochberg) given 1994-95

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? Examples focus on the relationship between information and information-processing technologies since 1850 and the self, mass society, and the information economy.

DR:9(5)

4 units, Spr (Nass) TTh 10-11:50

SOCIAL PSYCHOLOGY AND INTERPERSONAL PROCESSES

105. Status, Friendship, and Social Pressure: An Experiential Approach — (Formerly Sociology 5.) 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
Groups — How different group processes, e.g., so-

and theoretical ideas. Enrollment limited to 35.

129. Control, Affect, and Structure in Intimate

ing these experiences based on empirical research

studies. Lectures/reading provide tools for analyz-

of simulation games, structured exercises, and case

group and organizational phenomena through use

individual performance? How do organizations expand

and constrain individuals? Provides experience with

group member? How does "team spirit" affect indi-

makes groups productive? What is an effective

128. Groups, Teams, and Organizations — What

resents.

124X. Sociology of Emotions — Surveys basic

tory theory and research in the sociology of emotions,

focusing on understanding human emotional ex-

pression and experience in sociological terms. The

importance of emotions such as love, anger, fear,

happiness, pride, shame, grief, joy, and awe for

face-to-face social interaction and social structures,

particularly within major social institutions (family,

education, organizations, politics, and religion). The

social construction of emotions in relation to social

 stratification, including ethnicity, class, and gender.

Emphasis is on relating personal experience and

observations to the theories and perspectives pre-

sented.

5 units, Aut (Staff) TTh 1:15-2:30

128. Groups, Teams, and Organizations — What

makes groups productive? What is an effective
group member? How does "team spirit" affect indi-

vidual performance? How do organizations expand

and constrain individuals? Provides experience with

group and organizational phenomena through use

of simulation games, structured exercises, and case

studies. Lectures/reading provide tools for analyz-

ing these experiences based on empirical research

and theoretical ideas. Enrollment limited to 35.

5 units, Win (B. Cohen) T 2:15-5:05

129. Control, Affect, and Structure in Intimate

Groups — How different group processes, e.g., so-

cial control, interpersonal affect, and status pro-

cesses, affect behavior in intimate groups. Empha-

sis on the role of pre-given cultural institutional

structures and on the development of new structures

as an outcome of group processes. Limited enroll-

ment. Prerequisites: 105, 108, or 120, or consent of

instructor.

5 units (Berger) given 1994-95

155. Children and Society — An integrated view

of childhood, including international comparisons,
historical images of childhood, and ethnic differ-

ences. Emphasizes theoretical issues, empirical stud-

ies, and policy implications. Guest lecturers. Topics

related to children examined in depth: nutrition,
labor force participation and child care, abuse and

neglect, divorce, and communities. Aim is to sensi-
tize students to the issues and problems of contem-

porary childhood. DR:9(5)

5 units, Win (Dornbusch) Th 7-9 p.m.

157. Sociology of Mental Health — (Graduate stu-

dents register for 257; same as Human Biology

108.) Interdisciplinary introduction to the concept

of mental disorder and its social/historical context,
types of mental disorders and their epidemiology,
factors that shape psychiatrist diagnosis, various

models of the causes and treatment of mental disor-

ders, current trends and issues in the organization

and delivery of mental health services, current trends

in evaluating treatment programs, and ethical issues

in mental health practices. Opportunities for

community service internships for additional credit

available.

5 units, Spr (Cronkite) TTh 10:30-12

STRATIFICATION AND INEQUALITY

132. Gender and Education — (Same as Educa-

tion 170, Feminist Studies 130.) Gender as a criti-

cal variable in educational institutions and labor

markets. Interdisciplinary approach to the distribu-
tion of power in schools, the determinants of occu-

pational choice, the relative payoff of schooling

for women and men, the causes of differential

behavior and treatment between the sexes in schools

and in the work force, and the legal redress of in-

equalities. Primary disciplines are economics and

sociology; historical, psychological, and legal

materials also examined. Focus is on the U.S. with

some work on other countries.

4 units (E. Cohen, Strober)

alternate years, given 1994-95

134. Education and the Status of Women: A

Comparative Perspective — (Same as Education

197, Feminist Studies 139A.) Theories and perspec-
tives from the social sciences relevant to an under-

standing of the role of education in changing, modi-

fying, or reproducing structures of gender differen-
tiation and hierarchy. Cross-national research on

the status of women and its uses to evaluate knowl-
137. Urban Growth and Change — Cities and towns change in size, density, composition, and internal organization. Causes and consequences of these changes. The processes of change in a city as a whole and in subareas of a city, emphasizing the U.S.

5 units (Staff) given 1994-95

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:9f(5)

5 units, Spr (Szelenyi) MW 9-10:30

141. Poverty and Public Policy in America — Why poverty persists in the U.S. and other modern industrialized societies. The role of public policies in preventing and mitigating poverty. Lectures, class discussions, and individual projects explore facts, myths, and theories.

3-5 units, given 1994-95

142. Sociology of Gender — (Same as Feminist Studies 134.) Examines 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.

3-5 units, Win (Ridgeway) TTh 9:30-10:45

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, Spr (Szelenyi) MW 1:15-2:30

144. Social Mobility — Functions and consequences of mobility between social classes; the role of education, social contacts, cultural capital, and "luck" in allocating individuals to class positions; social mobility of minorities and women; implications of social mobility for class structure and formation.

5 units (Grusky) given 1994-95

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:9f(5)

5 units, Aut (Olzak) TTh 10-11:15

147S. 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 11-12:15

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 9:15-10:30

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 (Herting) given 1994-95

151S. 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 11-12:15

153. Population, the Environment, and the Third World — (Same as Economics 133, Food Research 136, Human Biology 136; graduate students register for Food Research 236.) Population problems in
developing countries; population growth in relation to the environment, resources, urbanization, and development; determinants of levels and trends in fertility, mortality, and migration; population projections and demographic methods. Environmental problems in the Third World. Population policies.
5 units, Spr (Arthur) MW 1:15-3:05

FORMAL ORGANIZATIONS

5 units, Aut (Hannan) MWF 10
section by arrangement

163. Organizational Decision Making—(Same as Business 371.) 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 1994-95

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. Attention to 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). Focus is mostly 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

169. Gender and Organizations—Using a sociological perspective, extends "conventional" organizational analysis and interprets previous research by introducing the issue of gender. Two approaches: "women in organizations" and "organizations as gendered." Topics: labor markets, corporate women, social division of labor and organizational division of labor, women's organizations, and sex and organizations.
5 units, Win (Staff) MWF 1:15

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 (Hochberg) TTh 9:30-10:45

171S. Sociological Perspectives on Contemporary Societies—The "Diagnosis of our Time" (Karl Mannheim) as an essential task of sociological theory; central problems and current developments of contemporary western 20th-century contributions to conservative, liberal, and radical social theory. Emphasis on the work of Theodor W. Adorno, Daniel Bell, Peter Berger, Ralf Dahrendorf, Jurgen Habermas, Niklas Luhmann, Karl Mannheim, and Herbert Marcuse.
5 units, Spr (Berger, Johannes)
MWF 12:15-1:05

RESEARCH METHODS

180A. Introduction to Sociological Research—Required of all sociology majors. Provides the consumer of social research with standards to evaluate the findings of sociological studies, and to present a critical analysis of basic notions and theories used in sociological analysis. Associated lab, see 180B.
3 units, Aut (B. Cohen) MWF 11

180B. Introduction to Sociological Research: Laboratory—Required of all sociology majors. Lab exercises consider problems of collecting observations, constructing theory, testing hypotheses and generalizing research results. Corequisite: 180A.
4 units, Aut (B. Cohen) by arrangement

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. Students who receive credit for Statistics 190
cannot be given credit for Sociology 60.
5 units, given 1994-95

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 spe-
cific 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. Intro-
duces sociology as an academic discipline, career
opportunities in the field, and current faculty re-
search interests.
2 units, Aut (Scott) W 12

195. Honors Seminar — Required of all students
planning an honors thesis. Write and present por-
tions 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 devel-
opment of a thesis and to enable the student to
compete for awards from the Fund for Undergradu-
ate Research.
2 units (Staff) by arrangement

196. Senior Thesis — Work intensively on an hon-ors 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

131. Sociology of Culture — Introduction to the
major themes and questions in the sociology of
culture. Culture is defined in terms of particular
objects and practices (art, literature, theater, mass
media, and music). Challenges the premise these
objects and practices directly reflect the nature of
the society in which they are produced and utilized,
and suggests alternative models for the relation-
ship between culture and society. Students partici-
pate in and analyze a variety of cultural products.
5 units, Win (Staff) TTh 1:15-2:30

210. Politics and Society — For graduate students; see 110.
5 units, Aut (Meyer) TTh 10-12

211. Introduction to Historical Sociology — For
graduate students; see 111.
3 or 5 units (Hochberg) given 1994-95

212. Social Foundations of Democracy — For
graduate students; see 112.
5 units (Diamond) given 1994-95

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 ef-
fects on the evolution, dominance, and modern
forms of states and regimes. Prerequisite: previous
work in comparative or political sociology.
5 units (Meyer) given 1994-95

214S. Social and Moral Foundations of Modern
Society — The contribution of classical and contem-
porary sociology to the analysis of the structure and
culture of modern society. Authors: Bell, Durkheim,
Habermas, Luhmann, Marx, Parsons, Weber. Top-
ics: tradition and modernity, the rise of the West,
functional differentiation, social stratification, so-
cial and cultural rationalization, individualism, sepa-
ration of value spheres, equity and efficiency.
5 units, Aut (Berger, Johannes) MW 11-12:15

217. Seminar: Spatial Systems and Social Pro-
cesses — (Same as Anthropology 267.) The differ-
entiation of social processes through spatial sys-
tems in agrarian and commercial societies, the contin-
gencies of human interaction in space and time, and
some problems of comparative social science his-
tory. E. Asian and Western European cases are
juxtaposed and brought to bear on peasant market-
ing, urbanization, agrarian uprisings, ethnic mobili-
zation, and revolution. Theories include classics
from human geography, and contemporary ap-
proaches, e.g., system analysis, and the Annales
School. Student’s 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 collect-
ing and analyzing information on collective events,
protests, conflicts, and social movements organiza-
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 (Hochberg) given 1994-95

228. Social Institutions and Economic Performance — Seminar on important sociological and economic arguments to substantiate the contention of a negative impact of welfare state institutions on the economy. To assess the validity of these contentions, different types of welfare states are distinguished. Focus on the impact of welfare state institutions on the functioning of the economy. The leading theoretical approaches for the study of the relationship between politics and the economy. Empirical findings.
5 units, Win (Berger, Johannes) M 2:15-5:05
5 units, Spr (Meyer) TTh 10-11:50

229. Status, Expectations, and Rewards — The 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: 120 (or 220) and 121, or consent of instructor.
5 units, Spr (Berger) TTh 2:15-4:05

230. Education and Society — For graduate students; see 130.
5 units, Spr (Meyer) TTh 10-11:50

232. 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, Aut (Ridgeway) given 1994-95

233. Communications, Technology, and Society — For graduate students; see 133.
4 units, Win (Nass) TTh 10-11:30

SOCIAL PSYCHOLOGY AND INTERPERSONAL PROCESSES

220. Interpersonal Relations: Lectures and Seminars — For graduate students; see 120.
5 units, Aut (Hegtvedt) TTh 9-10:15

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 interpersonal 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.

225. Social Psychology and Social Structure — For graduate students; see 121.
5 units, given 1994-95

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: 105 (or 5), 120, 121, or consent of instructor.
5 units (Berger, Staff) given 1994-95

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: 105 (or 5), 120, 122, or consent of instructor.
5 units, Spr (Berger) TTh 2:15-4:05

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 10:30-12
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, Aut (E. Cohen) MW 3:15-5:05

240. Introduction to Social Stratification — For graduate students; see 140.
5 units, Spr (Szelenyi) MW 9-10:30

241. Seminar: Social Stratification — Major research issues in social stratification and inequality. Topics: concepts and theoretical approaches, historical perspectives on stratification, intergenerational transmission of socioeconomic resources and rewards, careers, ascriptive bases of stratification, cross-national perspectives on stratification and mobility, the distribution of income and wealth, and subjective aspects of stratification. Identifies major research issues, approaches, and conclusions.
5 units, given 1994-95

243. Gender Stratification — For graduate students; see 143.
5 units, Spr (Szelenyi) MW 1:15-2:30

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, Aut (Olzak) Th 2:15-5:05

249. The Urban Underclass — For graduate students; see 149.
5 units, Spr (Olzak) TTh 9:15-10:30

260. Formal Organizations — For graduate students; see 160.
5 units, Aut (Hannan) MWF 10

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 considered 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 (Kzamer)
Spr (Webb)

264. Organizations and Public Policy — For graduate students; see 166.
5 units, Win (Scott) MWF 9

265. Cross-National Perspectives in Organizations — (Same as Political Science 207M, Business 475.) 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)

266. Seminar: Organization and the Employment Relationships — (Same as Business 674.) Current theory and empirical research from social science disciplines on the nature of the employment relationship. Topics vary each year, but include selection and screening mechanisms, career structures and other aspects of incentive systems, implicit and explicit contracts, authority and control systems, equity, and the role of institutions (including unions and the state) in shaping the employment practices of organization. Prerequisite: consent of instructor.
4 units, Win (Baron)

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) W 2:15-5:05

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)

312. Workshop: Ethnic Collective Action — Issues of research design, data gathering, measure-
ment, and analysis of evidence on the occurrence of race and ethnic collective action. Prerequisite: consent of instructor.

3-5 units, Spr (Olzak) Th 3:15-5:05

332. Sociology of Development and Education—(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, Spr (Ramirez) TTh 2:15-4:05 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 (Ridgeway) M 2:15-5:05

SOCIOLOGY 661

341. 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, Spr (Tuma) W 3-5

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, Aut (Scott) M 2:15-5:05

361. Seminar: Social Psychology of Organizations—(Same as Business 671.) Selected curriculum issues in social psychology that are 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 analyzing data on longterm change in populations and communities of organizations. Prerequisites: 360, consent of the instructor.

5 units, Aut, Win, Spr (Hannan) by arrangement

369A,B,C. Topics in Organizations—Restricted to doctoral students. Research presentations and theoretical discussions addressing issues in current organizational research.

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

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 (e.g., Homans, Merton, Parsons, et al). Also, some el-
Primary methods required to intelligently read and analyze theory.

5 units, Aut (Zelditch) MW 12:15-2:05

371. Cumulative Research Strategies — Seminar on methodological issues involved in the development of theoretically based research programs. Topics: initiating a research program, advantages and limitations of standardized procedures and indicators, criteria for comparability of studies, valid and invalid generalizing, ad hoc and heuristic explanation, the place of replication. Students participate actively in the analysis and discussion. Prerequisite: 370A, 370B, or consent of instructor.

5 units, Win (B. Cohen) W 2:15-5:05

RESEARCH METHODS

380A. Introduction to Sociological Research — (Same as 180A but restricted to Ph.D. candidates in Sociology or Sociology of Education.) For associated lab, see 380B.

3 units, Aut (B. Cohen) MWF 11

380B. Introduction to Sociological Research — Lab, same as 180B but restricted to Ph.D. candidates in Sociology or Sociology of Education. Students must enroll concurrently in 380A.

4 units, Aut (B. Cohen) by arrangement

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, given 1984-95

381B. Sociological Methodology IB: Social Scientific Computing — Introduction to the computer as a research tool and to common datasets in the social sciences. Emphasis is on preparing necessary skills for advanced courses in the Sociology methodology sequence.

2 units, Staff TTh 12:15-1:30

382. Sociological Methodology II: The General Linear Model — The general linear model for discrete and continuous variables. Introduction to principles of estimation, model selection, specification error, and assessment of fit. An evaluation is given at first class meeting to determine whether students have the appropriate background. Prerequisites: 381A and 381B, or equivalent.

4-6 units, Win (Grusky) MWF 11-1

383. Sociological Methodology III: Advanced Models for Discrete Outcomes — Required for Ph.D. in Sociology. Rationale for and interpretation of static and dynamic models for the analysis of discrete variables. An evaluation is given at first class meeting to determine whether students have the appropriate background. Prerequisites: 381B and 382, or equivalent.

4-6 units, Spr (Tuma) MWF 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) TTh 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 1994-95

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 (Tuma) given 1994-95

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 1994-95

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
The center is an interdepartmental organization coordinating teaching and research in space science and astrophysics. Its members are drawn from the Departments of Applied Earth Sciences and Geology 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: technical aspects of space projects such as guidance and control, planetary sciences, 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. For administrative purposes, the center comprises a number of smaller units with specialized research activities.

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.

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 a listing of courses in astronomy and astrophysics, see the “Astronomy Course Program” section in this bulletin. The following is a list of courses on space science. Descriptions of these courses may be found under the “Aeronautics and Astronautics,” “Electrical Engineering,” and “Engineering” sections in this bulletin.

### AERONAUTICS AND ASTRONAUTICS

129. Life in Space
212. Introductory Hypervelocity Aerophysics
227. Atmospheric and Space Physics
279A. Space Mechanics
280. Rocket Propulsion Fundamentals

### ELECTRICAL ENGINEERING

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
SPANISH AND PORTUGUESE

Emeriti: (Professors) Fernando Alegria, Aurelio M. Espinosa, Jr., Bernard Gicovate, Juan B. Rael, Isabel Magaña Schevill; (Assistant Professor) Grace Knopp
Chair: Michael P. Predmore
Director, Undergraduate Language Program: María-Paz Haro
Professors: Mary Louise Pratt (Winter, Spring), Michael P. Predmore, Jorge Ruffinelli, Guadalupe Valdés, Sylvia Wynter (Winter)
Associate Professor: Wilfrido H. Corral (Autumn, Spring), Yvonne Yarbro-Bejarano (Winter, Spring)
Assistant Professors: Francisco Caetano Lopes, Jr., Adrienne L. Martin (Spring)
Associate Professor (Teaching): María-Paz Haro
Courtesy Professor: Hans U. Gumbrecht (French and Italian, and Comparative Literature)
Senior Lecturer: Karin Van den Dool
Lecturers: Irene Corso, Juergen Hahn, Alice Miano, María Sandoval
Visiting Professors: Keith Ellis (Winter, Spring), Alban Forcione (Winter), Alejandro Morales (Autumn)
Visiting Lecturer: Nelson F. de Carvalho

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 concentrations. Each has different objectives and requirements. Students should consider, in consultation with a faculty adviser, which major concentration corresponds most closely to their own personal and professional objectives.

Literature Emphasis — This concentration 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, 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 concentration allows a broader major than is possible in the other areas of specialization. The student can combine the study of Spanish, Portuguese, or Latin American literature with such areas as anthropology, economics, history, or political science. Students must complete a minimum of 40 units in the department from courses numbered 100 or higher, and 10 units in related areas with adviser approval.

Requirements: Spanish 140, Introduction to Methods of Literary Analysis; 170, Undergraduate Colloquium; 201, 202, Advanced Grammar and Composition; three courses in Peninsular Literature; three courses in Latin American literature.

Chicano Studies Emphasis — This concentration allows specialization 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, 202, Advanced Grammar and Composition; three courses in Chicano literature; four courses in Latin American and/or Peninsular literature.

Language Emphasis — This concentration 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.
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 concentrations. 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.

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 area 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 Professor Lopes. 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.

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.

PROFICIENCY NOTATION

Seniors are encouraged to qualify by examination for the departmental Language Proficiency Notation on their transcript which certifies foreign language competence. For further information, contact Prof. Haro.

COTERMINAL PROGRAM

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 the Graduate Admissions Section of 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); 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 areas 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 in 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 concentration of study from the following: (1) Spanish Literature of the Golden Age, (2) Modern Spanish Literature, (4) Luso-Brazilian Literature, (5) Spanish American Literature to Independence, (6) Spanish American Literature of the 19th and 20th Centuries, (7) Chicano Literature. In addition, candidates select two secondary areas of study outside the major concentration from the following: (1) Spanish Medieval Literature, (2) Spanish Literature of the Golden Age, (3) Modern Spanish Literature, (4) Portuguese Literature, (5) Luso-Brazilian Literature, (6) Spanish American Literature of the Colonial Period, (7) Spanish American Literature from Independence, (8) Chicano Literature, (9) Literary Theory.

At least four courses must be taken in the major concentration of study. At least two courses must be taken in each secondary area. Students whose major field is in Spanish American, Luso-Brazilian, or Chicano Literature must choose one secondary 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 Comparative Literature, Feminist Studies, the Graduate Program in Humanities, History, or Modern Thought and Literature. It is also possible to complete a minor in another department with approval of the adviser. Normally, not more than 25 units are taken outside the department.

After the first year of study, the student is evaluated by the faculty to determine whether continuation to the Ph.D. is recommended and whether there are particular areas where improvement is needed. For this evaluation, students submit a term paper of approximately 20 pages by the first week of Autumn Quarter of the second year.

If approval of the qualifying paper is granted, the student should file a formal application for candidacy no later than the end of the second year, as prescribed by the University. Course requirements are usually completed by the third year of study. A written comprehensive examination on the major concentration and secondary areas is then taken. The examination is based on a comprehensive 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 also 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
fter passing the comprehensive examination. The oral examination covers plans for the dissertation based on a prospectus approved by the adviser (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 in this bulletin.

COURSES

1. First- and Second-Year Spanish (1-99)
   a. Culture and Bilingual (130-139)
   b. Literature (140-198)
   c. Chicano Literature (180-189)
   d. Individual Work (199)
2. Intermediate Courses (100-199)
   a. Language and Culture (100-119)
   b. Literature (120-139)
   c. Chicano Literature (180-189)
   d. Individual Work (199)
3. Courses for Advanced Undergraduates and Graduates (200-299)
   a. Advanced Language, Linguistics, and Theory (200-210)
   b. Peninsular Literature (211-239)
   c. Medieval and Golden Age Literatures (211-219)
   d. Modern and Contemporary Literatures (220-229)
   e. Genre Survey Courses (230-235)
   f. Individual Authors (236-239)
   g. Latin American Literature (240-279)
   h. Periods (240-247)
   i. National and Regional Literatures (248-254)
   j. Genres and Literary Movements (255-271)
   k. Individual Authors (272-279)
   l. Chicano Literature (280-289)
4. Graduate Seminars (300-399)
   a. Linguistics, Methodology, and Literary Theory (300-313)
   b. Peninsular Literature (314-339)
   c. Latin American Literature (340-379)
   d. Chicano Literature (380-389)
   e. Special Topics (390-398)
   f. Individual Work (399)
   g. Dissertation Research (802)
5. Portuguese Program (1-399)
   a. Language and Culture (1-199)
   b. Portuguese Literature (211-239)
   c. Brazilian Literature (240-279)
   d. Individual Authors (280-289)
   e. Special Topics (290-298)
   f. Individual Work (299)
   g. Graduate Seminars (300-398)
   h. Individual Work (399)
   i. 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 have 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 unit AP credit. Students who passed the AP exams with a 3 should take the placement test and will receive units of AP credit if placed in Spanish 12 or above. For courses 11B, 12B, and 13B, see the special section for bilingual students. Auditors are not permitted in language courses.

INTRODUCTORY

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) — 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
10/110. Elementary Conversation — (Graduate students register for 110.) 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.

4-5 units, Aut, Win, Spr (Staff) MTWThF

12. Second-Year Spanish (2nd Quarter) — Continuation of 11. Prerequisite: 11 or placement test.

4-5 units, Aut, Win, Spr (Staff) MTWThF

13. Second-Year Spanish (3rd Quarter) — Application of grammatical concepts to composition, conversation, and oral presentation. Advanced readings. Prerequisite: 12 or placement test.

5 units, Aut, Spr (Staff) MTWTh

15/115. Intermediate Conversation — (Graduate students register for 115.) 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

110. Elementary Conversation for Graduate Students — See 10.

115. Intermediate Conversation for Graduate Students — See 15.

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 — (Same as Chicano Studies 11B, 12B, 13B.) 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.

5 units, Aut, Win, Spr (Sandoval) MTWTh

162B. Chicano Literature: Creative Writing for Bilingual Students — Basic creative writing. Students are encouraged to draw from their bicultural, bilingual experience. Knowledge of Spanish and familiarity with barrio dialects essential. Not open to graduate students or freshmen.

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) 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) plus language lab

1S, 2S, 3S. First-Year Individualized Spanish — Primarily for seniors who need to complete more or less than 5 units a quarter, or 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/101S, 2S/102S, 3S/103S must complete 10/110, or pass a first-year oral proficiency examination. Enrollment limited. Consent of instructor required.

3-15 units, Win (Hahn)

5. Intensive Beginning Spanish — Daily work in language lab required. Proficiency-oriented instruction in comprehension, speaking, reading, and writing; also exposure to Hispanic cultures. Not equivalent to full year of Spanish study during the regular academic year. Enrollment limited to 15. No auditors.

9 units, Sum (Staff) MTWThF

11A. Accelerated Second-Year Spanish Part 1 — Proficiency-oriented accelerated course 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, Aut (Staff) MTWThF

11B. 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, Win (Staff) MTWThF

50. Reading Spanish — Intensive course designed to fulfill the University requirement of a reading knowledge of Spanish. Students must earn an LG of at least ‘B+.’

3 units, Spr (Staff)

99. Individual Work — For special projects. Cannot be taken as a substitute for any of the regular scheduled language courses.

1-5 units (Staff) by arrangement
121M, 122M, 123M. Spanish for Medical Personnel—(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—Prepares for the proficiency exam which must be passed in order to obtain the official transcript notation certifying foreign language proficiency. Prerequisite: 13 or equivalent. 4 units, Win (Staff)

126L. Spanish for Lawyers—Provides a solid basis for communication in law-related interactions and develops the ability to read professional texts in Spanish. 3 units

CULTURAL PERSPECTIVES

For students who do not anticipate a literature major but want to continue beyond the second year.

Readings and topics for discussion and composition begin with a focus on Spain and expand to include socio-cultural and historical material from Latin America, and the Mexican-Chicano, Puerto- rriqueno, and Cubano heritages. Aim is to 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. 130B, 131B, 132B. Cultural Perspectives—(Same as Chicano Studies 130B, 131B, 132B.) 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. 3-5 units, Win (Haro)

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 (Coral)

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, Galciaso, Cervantes, Góngora, Lope de Vega, Calderón. DR:7(2) 3-5 units, Aut (Haro)

151. Spanish Literature II—Representative works of Spanish literature from the 1830s to the 1930s: Larra, Espronceda, Bécquer, Galdós, Unamuno, Valle-Inclán, Machado, and Lorca. Emphasis 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 (Kenna)

160-161. Spanish American Literature—Basic 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 (Coral)

161. Spanish American Literature II—Continuation of 160, from independence to the present. Readings: El matadero, María, Santa, Los de abajo, Cien años de soledad, El aleph, and Gringo viejo. DR:7(2) 3-5 units, Spr (Coral)

170. Undergraduate Colloquium: Fiction and Political Imagination: Latin American Novels in Translation—Over the last 25 years, Latin American novelists have produced some of the most interesting and profound reflections on the workings of power in the social world. The problem of imagining the state, intersections of the 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, Spr (Pratt)

183. Chicana Writers and Feminist Theory — (Same as English 163C.) Works by contemporary Mexican-American women writing (mostly) in English in a variety of genres (autobiography, novel, short story, poetry, and film). Discussions combine readings of primary texts with consideration of the theoretical issues raised. Secondary works that theorize race, class, gender, power, resistance, and sexuality are applied as theoretical concepts to primary texts. The applicability of Anglo-European theory to texts written by Chicanas and the status of Chicana texts in Chicano Studies and Women's Studies programs. Recommended: reading knowledge of Spanish.
3 units, Spr (Romero)

186. Modern Chicano/a Fiction — (Same as Chicano Studies 198, Comparative Literature 196, English 163D.) Readings of novels and short fiction by novelists such as Rudolfo Anaya, Tomás Rivera, José Antonio Villareal, and texts of more recently recognized authors, i.e., Ana Castillo, Denise Chávez, Sandra Cisneros, Roberta Fernández, and Arturo Islas. Discussions on the evolution of Chicano/a literature; aspects of the Chicano/a historical and literary experience; the importance of such themes as the search for identity, problems of language use and choice, invisibility, silence, and blindness. The question of gender as it relates to issues of ethnicity and class. Students add to this list their own observations and discoveries. (Area:H)
4-5 units, Aut (Espinosa)

190A. Peter's Seminar: Don Quijote — 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. Enrollment limited to 10 sophomores. Application procedure required. In English; readings in either Spanish or English.
3-5 units, Spr (Martin)

190B. Peter's Seminar: Cuba Now! — For the past 30 years, Cuba has been the only Latin American socialist regime, and it still operates under communist rule despite the disappearance of most other Marxist states. The changes in Cuban society (family structure, emigration of intellectuals, popular culture and superstition, political and economic international support, and the withdrawal of the former U.S.S.R.) through recent works of literature and film. Enrollment limited to 10 sophomores. 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 in the course of this development.
3-5 units (Valdes) not given 1993-94

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 (Valdes) not given 1993-94

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, Spr (Valdes)

206. Spanish Use in Chicano Communities — (Same as Chicano Studies 206.) 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.[DR:3]
3-5 units, Aut (Valdes)

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 autonomity, historical periods and genres, literature nomenclature and the concept of America.
3-5 units, Spr (Ruffinelli)
PENINSULAR LITERATURE

211. Studies in Medieval Literature — Spanish literature between 1000 and 1500. Focus is on the major works and history of the period. Readings: Poema de Mio Cid, El libro de Buen Amor, and La Celestina.
3-5 units

212. La Celestina
3-5 units

214. The Spanish Golden Age
3-5 units

215. Women and Transgression in the Spanish Renaissance — (Same as Feminist Studies 173.) Examines the depiction of marginal/exceptional women in Renaissance Spanish literature, centering on those who transgress accepted gender roles. Readings on recurring transgressive types who sabotage the division of socially-assigned functions of the gendered self into "masculine" and "feminine", the symbology of the exceptional woman and the reasons for her tremendous magnetism in Spanish literature.
3-5 units, Spr (Martin)

216. Don Quijote I — Don Quijote in relation to the principal literary traditions and cultural forces of the European Renaissance.
3-5 units (Martin)

217. Don Quijote II — Continuation of 216.
3-5 units (Martin)

218. Cervantes and His Age — An understanding of Cervantes' artistic creation through close reading of the text of Don Quijote and a consideration of forces in Spain's cultural life of the 16th century which influenced its author. (In English, texts in Spanish or English.)
3-5 units, Win (Forcione)

222. Literature and Society in 19th-Century Spain — Representative literary figures of 19th-century Spain: Bécquer, Espronceda, Galdós, Larra, and Zorrilla. 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, Win (Predmore)

3-5 units, Spr (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 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)

229. The Dramatic Expression of the Golden Age — Survey of the major forms of Spanish drama of the Golden Age, including plays by Calderón, Lope de Vega, and Tirso de Molina. Emphasis is on the development of the theater in relation to the rise of the absolutist state, the Counter Reformation, and the impact of the Inquisition on Spanish society. (In English, texts in Spanish)
3-5 units, Win (Forcione)

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 socio 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, romancero, Garcilaso, Fray Luís, San Juan, Lope de Vega, Góngora, Quevedo. Coordinates with 233.
3-5 units (Martin)

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)

236. Cervantes: Other Major Works — Cervantes and the concept of literary modernity. Analysis of Cervantes' major works exclusive of Don Quijote with respect to literary currents of the Renaissance.
Between popular and "formal" literature and art, oral poetry-narrative, and to the interaction of the Caribbean. Introduction to the popular cultures of the Caribbean Basin within the context of an overview of its multiple cultural and linguistic worlds. Readings in Spanish, Portuguese, and in English translations.

3-5 units, Win (Wynter)

252. The Cuban Revolution - The literature of the Cuban Revolution from its main perspectives: one historical, and the other synchronic and analytical. The first views the literature as a new stage in Spanish-American historical reality. The second studies specific works produced in Cuba since 1959 for the literary means by which they develop topics related to the impact of the Revolution.

3-5 units, Spr (Ellis)

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 Rulfo.

3-5 units

254. Modern Mexican Narrative: Azuela to Pacheco - Examination of representative novels reflecting the emergence of a post-revolutionary society in Mexico. Readings: Azuela, Castellanos, Fuentes, Pacheco, Poniatowska, Revueltas, Rulfo.

3-5 units

256. Spanish American Verse since Modernismo - Examination of the essential characteristics of the poetic art through the works of C. Alegría, Borges, Cardenal, Guíllén, Huidobro, Morejón, Neruda, and Vallejo.

3-5 units, Win (Ellis)

257. Methodology of Reading Poetry: Poesía de Amor - Latin American love poetry seems akin to the lyric but often appears in various other forms. Surveys the diversity of love poetry through the centuries and across national boundaries to determine the varied structural and cultural origins of this tradition. Readings: Neruda, Sor Juana, Vallejo, Vilarino.

3-5 units (Ruffinelli)

258. The Short Novel as Genre in Latin America - The short novel as a marginal genre. The genre's important forgotten influence and contribution to literary historiography. Texts are studied for their own values and as harbingers of changes in subsequent works in other genres. Works by Bombal, Donoso, Fuentes, García Márquez, Onetti, Pacheco, Poniatowska, and Sábato.

3-5 units (Corral)

259. Contemporary Latin American Short Story - A question of canons. Selected stories by Borges, Cortázar, Monterroso, and Quiroga, examined within the theory of what is a minor literature.

3-5 units (Corral)


3-5 units (Corral)

The Origins of the New Latin American Novel — Several important works of the 1920s form the foundation of the contemporary novel and provide a powerful image of Latin America: the "novel of the Land" (*Don Segundo Sombra, Doña Barbara, La Vordgine*), and the "novel of the City" (*Los siete locos, Ifigenia*). Close readings survey the historical panorama of the 20th century.

3-5 units (Ruffinelli)

The Latin American Novel of the Sixties: Cortázar, Vargas Llosa, García Márquez — 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 (Ruffinelli)


3-5 units, Aut (Ruffinelli)

The Latin American Novel of the '80s

3-5 units (Ruffinelli)

Spanish American Essay — Socio-historical accounting of the genre from the period of nation building to the present. Problematizes the canonicity that has been created for the genre and its characteristics by focusing on the works of J. L. González, Fernández Retamar, Mariátegui, Monterroso, and Paz. Identity, culture, and generic displacement toward cultural studies.

3-5 units (Corral)

A New Literary Genre: Testimony — Latin American literature and politics viewed in light of a new narrative genre in works of Cabezas, Poniatowska, Walsh, and others.

3-5 units (Ruffinelli)


3-5 units (Alegria)

Jorge Luis Borges, Thinker, Poet, and Narrator — The role of Borges' narrative and thought in the Hispanic avant-garde and his influence on contemporary writers.

3-5 units

García Márquez in International Cinema — Can Magical Realism be expressed in film as well as in literature? Does the transposition from one medium to another detract from or add to the issues presented by the author? What challenges are overcome in the transition from novel to script? Original works and screenplays by the Columbian writer are compared to the Latin American and European films based on them.

3-5 units, Spr (Ruffinelli)

Introduction to Chicano Literature — Selected works by major Chicano writers of the 20th century, including poetry, fiction, and drama. Questions of genre and textual interpretation, emphasizing the socio-historical cultural context of Chicano literature.

3-5 units

Introduction to Chicano Life and Culture — (Same as Anthropology 110, Chicano Studies 110, English 124C, Political Science 92.) Interdisciplinary focus on the history and culture of Mexican Americans from the settling of the Spanish borderlands to the present. Historical perspectives are balanced with anthropological and literary views of the cultural diversity of Mexicans in the U.S. DR: 3 units, Aut (Fraga, Saldivar)

Chicano Poetry — Readings of lyrical and social Chicano/a poetry. Analyzes representative poetic works in order to discover how personal and social experiences are manifested through poetry.

Readings: Alurista, Baca, Castillo, Corpi, Herrera, Santiago, Soto.

3-5 units

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: Anaya, Castillo, Islas, Méndez, Rivera.

3-5 units

Chicana Writers — Examines works of Chicana writers from various theoretical, critical approaches (feminist, semiotic, structural, anthropological, etc.) Authors: Cisneros, Corpi, De Cervantes, Portillo-Trambley, Vigil, Villanueva, and Viramontes.

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)

289. Chicano Cultural Studies — Presents theoretical and practical materials, emphasizing primary literary performances, including works by Chicano/a painters, performance artists, comic book writers, and literary writers. Texts from the early 19th century to the present from a cross-disciplinary perspective. Comparative context with other American cultures. Furthers an understanding of cultural studies and Chicano culture, and emphasizes the ways that modern U.S. society has become increasingly “Latinized.” DR:3†
5 units (Saldivar)

SPECIAL TOPICS

291. “Race,” Discourse, and the Origin of the Americas: A New World View of 1492 — (Same as African and Afro-American Studies 291.) 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, and analyzes juridico-theological, historical, and literary texts from the perspective of the Americas; attempts to decipher the politics of representation in the orthodox interpretation of Columbus’ discovery and to deconstruct the strategies whereby a symbolic construct of “race” (in a Natural Law variant) would take primary place in the New World instead of the “gender” construct of previous human societies. (In English)
5 units (Wynter) not given 1993-94

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, Martin)

293. Spanish Cinema: From Surrealism to the Postmodern — Spanish cinema beginning with the Franco dictatorship, through the transition to contemporary democratic Spain. Viewing and analysis of the works of internationally-known directors, (Aragon, Bardem, Bunuel, Guiterrez, Saura) and the daring 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)

294. Latin American Cinema: Myths, Realities, and Style — From “La Cucaracha” to “La deuda interna,” Latin American cinema has come of age. The new cinematography which has gained international recognition and brought uniquely Latin American contributions to the art of film.
3-5 units (Ruffinelli)

295. Cinema, Literature, and Politics in Latin America — The relationship between the cinematic arts and politics examined through internationally acclaimed films and videos from Argentina, Cuba, Mexico, Peru, and Venezuela. Depiction of issues such as slavery, dictatorship, and liberation movements.
3-5 units, Aut (Ruffinelli)

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.

301. Methods of Teaching Spanish — (Same as Education 292.) Analysis and discussion of second language theory on teaching and learning, classroom practices, and preparation of Spanish instructional materials.
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, Win (Pratt)

309. The Modern Tradition: Criticism and Colonialism — (Same as Modern Thought and Literature 309.) Examines 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 sub
jects, 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, Win (Pratt)

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 concept of socially determined meaning, discursive practices in the French tradition, British empirical analyses, American sociolinguistics. (In English)
4-5 units (Pratt)

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 examined by Auerbach, Lukács, Bakhtin, Hutcheon, and Špilka/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, Spr (Corral)

318. Don Quijote
3-5 units (Martín)

3-5 units (Martín)

320. Garcilaso de la Vega and St. John of the Cross — The achievements of Garcilaso as the voice of the Renaissance in Spain and of the transposition of the new forms to the expression of mystical rapture in San Juan de la Cruz.
3-5 units

321. Peninsular Theater — Introduction and overview of different theater movements, from the comedia nueva proposed by Lope de Vega in the 16th century, through Calderonian Baroque wife-murder plays, the first exemplar of the Don Juan myth and its 19th-century Romantic reworking, to the theater of the absurd. Emphasis on the structural elements of the plays and their socio-historical context.
3-5 units

325. The Code of Honor/Limpieza de Sangre: Golden Age Theater — The dialectic relation between the literary motif of the code of honor and the social code of Limpieza de Sangre. Focuses mainly on drama; references to the role of honor and the social code in other genres.
3-5 units (Wynter)

3-5 units (Martín)

332. 19th-Century Spanish Novel — Examines the Naturalist/Realist novel of the second half of the 19th century against the historical and social background; works by Galdós (Tormenta, La de Bringas, and Mina), Pardo Bazán (Los pasos de Ulloa), Pereda (La leva), and Clarín (La Regenta).
3-5 units

3-5 units (Predmore)

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)

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 Góngora’s Infortunios de Alonso Ramírez, Rodríguez Freile’s El carpintero, and Carrión de la Vendra’s El Lazarillo de ciegos caminantes. Critical literature that proposes other works as models or novels is analyzed.
3-5 units, Spr (Corral)

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)
349. Literature and Popular Culture in the Hispanic Caribbean — Overview of ideological apparatuses controlling contemporary culture in the Caribbean. Exploration of modernity, cultural studies debates on nature of Spanish American popular culture, the historical locus (Lowenthal) and “public sphere” (Habermas), as exemplified by major writers such as Casey, Ferré, Lugo Filippi, Cabrera Infante, Sánchez, Sarduy, and Vega.

3-5 units (Corral)

350. Rubén Darío and the Poetics of Modernismo — The modernista period and the revolutionary poetic forms of Darío respond to traditional and foreign sources. Darío’s influence on the Generation of ’98 and innovative Latin American writers foreshadows the avant garde movements.

3-5 units

351. Modernista Fiction and Non-Fiction Prose — The modernista novel La Gloria de don Ramiro by Larreta, Rodó’s Ariel, and the prose and essays of Rubén Darío, José Martí, and Gutiérrez Nájera are studied in terms of the development of an aesthetic and a continental conscience and show the influence of prose in proper perspective.

3-5 units (Corral)

352. Gender, Race, and Nation in 19th-Century Latin America — Readings in major writers of the 19th century, emphasizing their relation to projects of nation-building and decolonization.

5 units (Pratt)


5 units (Pratt) not given 1993-94

354. 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; relations to discourses of nationality, race, and history; literature of project and survival; women’s responses to military authoritarianism and state terror. Works by Alegría, Barros, Belli, Brunet, Castellanos, Ferré, Garro, Lispector, Menchu, Mercado, Murillo, Peri-Rossi, Poniatowska, Traba, Valenzuela, in conjunction with readings in history and social analysis. Prerequisite: read and understand Spanish, but not necessarily speak it.

5 units, Spr (Pratt)

355. City and Country in Latin American Literature: Onetti and Rulfo — Discussion of the themes of City and Country through characters, motives, and the problematic of representation during the 1950s as shown in the works of Onetti and Rulfo. Focuses on the oppositional paradigm of city and country for later generations.

3-5 units, Aut (Ruffinelli)

356. Language and Post-Modern Conditions in Narrative — Works by Borges, M. Fernández, F. Hernández, Monterroso, and Piñera studied in terms of concepts of language and writing, which historically and formally do not belong to movements summarized as avant garde or post-modern. Dependent post-modern literary representation in Spanish America is examined in background readings.

3-5 units (Corral)

357. 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)

358. 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)

359. Intersections of “Race,” Sexuality, and Nation — (Same as Comparative Literature 350, English 306D.) Traces the trajectory of Chicano/a poetry from its earliest appearance as part of the Hispanic-American oral tradition, through its publication in the Spanish language newspapers of the Southwest, to its modern evolution as an important 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, Win (Espinosa)

360. Chicano/a Poetry — Textual analysis and critique of the Chicano short story with discussions on the realities and the values presented by the Chicano/a personal and community experience.

3-5 units (Corral)

361. Border Culture, Border Writings — Analyzes the ideas of border culture, writing, text, reader, and space, and examines whether these
concepts are applicable to the Mexican-American novel. Texts by Anaya, Arias, Castillo, Cisneros, del Fuego, Hicks, McHale, Méndez, Morales, Rechy, and Rivera.

3-5 units, Aut (Morales)

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 analyzed in the light of theoretical works (Bakhtin, Bergson, Collé, Foucault, Levin) to establish a poetics of Hispanic humor.

3-5 units (Martin)

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)

396. Huidobro, Vallejo, and Borges — Readings from the complete works of Huidobro, Vallejo, and Borges form the basis for determining how these poets used language and technical devices to invent their respective worlds. Discusses their acceptance of and dissent from the vanguardist movements of their formative years and their contributions to the tradition of Spanish American lyric poetry.

3-5 units, Win (Ellis)

397. Neruda, Guillén, and Cardenal — Poetic texts of Neruda, Guillén, and Cardenal, studied so as to allow an understanding of their whole work. Emphasis is on the social and ethical aspects of literature in the Spanish-American tradition (Bello, Mariátegui, Portuondo) and on the concern for expressive features that began to be prominent within that tradition with the Modernists, as well as contemporary elaborations of these perspectives.

3-5 units, Spr (Ellis)

399. Individual Work — Exclusively for graduate students in Spanish engaged in special work.

1-12 units, any quarter (Staff) by arrangement

PORTUGESE 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

10/110. Elementary Conversation — (Graduate students register for 110.) 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

15/115. Intermediate Conversation — (Graduate students register for 115.) 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 unit, 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, WinSpr (Staff) by arrangement

100. Advanced Portuguese Conversation — Conversation practice recommended as a supplement to the second-year sequence. No study of grammar per
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).

3 units, Spr (Staff) MWF

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

110. Elementary Conversation for Graduate Students — See 10.

115. Intermediate Conversation for Graduate Students — See 15.

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 language. 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


3-5 units, Aut (Carvalho)

191. Lusophone African Literature in Translation: Angola — Introduction to African culture and oral literature as developed in the Portuguese-speaking countries. Examines the discourse of a transcultural society and the concepts of angolanidade, colonial vs. national literature, anticolonial resistance, urban/rural, post-independence, and the reconsideration of the traditional indigenous culture as shown in myth, humor, philosophy, and criticism.

3-5 units, Win (Carvalho)


3-5 units, Spr (Carvalho)

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 (Lopes)

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 sociohistorical perspective.

3-5 units (Lopes)

250. Luso-Brazilian Literature: Decolonization and Recolonization — Utilizing a comparative approach toward the sensitive issues of “sources” and “influences” in Portuguese and Brazilian litera-
270. Postmodernity: A Brazilian View — Major issues of postmodernism (feminism, redefinition of subjectivity, absence of political polarization, etc.) as developed in a "Third World" country, e.g., Brazil. Analysis of theoretical themes and problems based upon post-structuralist writers like Barthes, Derida, Foucault, Kristeva, etc.
3-5 units (Lopes)

271. Postmodern Brazilian Poetry — Survey of recent important Brazilian poets, exploring issues of gender, class, and race. Examination of postmodern problems in a "Third World" country through key works by Francisco Alvim, Ana Cristina César, Silviano Santiago, etc.
3-5 units (Lopes)

272. Postmodern Brazilian Short Story — Study of the major Brazilian writers of the genre, highlighting problems of gender, class, and race in the postmodern context of a "Third World" country. Analysis of works by Clarice Lispector, Silviano Santiago, Dalton Trevisan, and others.
3-5 units, Win (Lopes)

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; and the exploitation of women by male directors.
3-5 units, Aut (Lopes)

294. Luso-Brazilian Women in a Postmodern Context — The position of women in the culture of Brazil and Portugal through issues of social class and ethnicity. Female creativity, the relationship of female artists to the male tradition, woman's exploitation of women, and the attitude of the middle-class toward popular feminism and social change. (In English)
3-5 units (Lopes)

295. Trans-Atlantic Feminisms: A Dialogue between "Center" and "Periphery" or How Tasty were my French Sisters — (Same as Feminist Studies 295A.) Interdisciplinary textual readings on French feminism(s) and theory illuminate the intersections between gender, race, and class, emphasizing postcolonial contexts, and including Luso-Brazilian and Chicana writers and filmmakers. DR:†
3-5 units, Spr (Lopes)

299. Individual Work — Open to graduates or undergraduates majoring in Spanish. May be repeated for credit.
1-12 units (Staff) by arrangement

399. Individual Work — Exclusively for graduate students in Portuguese engaged in special work.
1-12 units, by arrangement

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: Applied Earth Sciences (Switzer), Economics (Anderson), Education (Olkin, Rogosa, Suppes), Electrical Engineering (Cover), Health Research and Policy (Brown, Efron, Johnstone, Moses, Olshen), Mathematics (Dembo), Operations Re-
search (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, 806 15th St., N.W., Washington, D.C. 20005.

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.

GRADUATE PROGRAMS
MASTER OF SCIENCE

The department requires that the student take 42 units of work from offerings in the Department of Statistics or from authorized courses in other departments. If advanced statistics courses are included in the program, the total number of units may be reduced. A thesis is not required. Ordinarily, four or five quarters are needed to complete all requirements.

Each student normally fulfills the following requirements for the M.S. degree:

1. Statistics 116, 200, 217, 218. Courses previously taken may be waived, in which case they must be replaced by other approved courses.
2. Math. 103 or 113. Students should be proficient in computer programming at the level of Computer Science 106A, and this course or an equivalent is required for all students who lack sufficient computing experience. Substitution of other courses in mathematics and computer science may be made with consent of the adviser.
3. Three additional courses from offerings in the Department of Statistics. These are normally taken from the group of courses 201, 202, 203, 204, 205, 206, 207, 211, 229.
4. Additional units to complete the requirements chosen from offerings in the Department of Statistics or from authorized courses in other departments. At least half of the units taken for the M.S. degree must be from offerings in the Department of Statistics.

There is sufficient flexibility to accommodate students with interests in applications to business, computing, economics, operations research, engineering, health, and social sciences.

Students with a strong mathematical background who may wish to go on to a Ph.D. in Statistics should consider applying directly to the Ph.D. program. A 2.75 letter grade indicator (LGI) is required for all statistics courses which are taken for an M.S. degree. All statistics courses required for the M.S. degree (116, 200, 217, 218, and three additional courses) must be taken for letter grades.

DOCTOR OF PHILOSOPHY

The department looks for motivated students who want to prepare for research careers in statistics or probability, either applied or theoretical. Advanced undergraduate or master's level work in mathematics and statistics provides a good background for the doctoral program. Quantitatively oriented students with degrees in other scientific fields are also considered for admission. The program normally takes four years.

Program Summary — Statistics 300A,B,C, 305, 306A,B, and 310A,B,C (first-year core program); pass two or three of the qualifying examination (beginning of second year); breadth requirement (second or third year); University oral examination (end of third year or beginning of fourth year); dissertation (fourth year).

First-Year Core Courses — Statistics 300 systematically surveys the ideas of estimation and of hypothesis testing for parametric and nonparametric models involving small and large samples. 305 is concerned with linear regression and the analysis of variance. 306 surveys a large number of modeling techniques, related to but going beyond the linear models of 305. 310 is a measure-theoretic probability theory, beginning with the basic concepts of analysis.

Qualifying Examinations — These are intended to test the student's level of knowledge when the first-year program, common to all students, has been completed. There are separate examinations in the three core subjects of statistical methods, mathematical statistics, and probability theory, and all are given at the beginning of the Autumn Quarter of the student's second year. Students may take two or three of these examinations and are expected to show acceptable performance in two examinations.

Breadth Requirement — In order to appreciate scientific problems, students are required to take 9 units of course work at a graduate or advanced
undergraduate level in some other department. These units must be in courses higher than 200. Students with a graduate degree in a scientific area that is not essentially mathematics or statistics are exempted from this requirement.

University Oral Examination — The University oral examination is taken on the recommendation of the student's research adviser after the thesis problem has been well defined and some research progress has been made. Usually, this happens early in the student's fourth year. The oral examination consists of a 40 minute presentation on the thesis topic, followed by two question periods. The first relates directly to the student's presentation and the second is intended to explore the student's familiarity with broader statistical topics related to the thesis research.

Financial Support — Students accepted to the Ph.D. program are offered financial support. All tuition expenses are paid and there is a fixed monthly stipend determined to be sufficient to pay living expenses. Financial support is continued for four years, departmental resources permitting, for students in good standing. The resources for student financial support derive from funds made available for student teaching assistantships and research assistantships. Students receive both a teaching and research assignment each quarter which, together, do not exceed 20 hours. Students are strongly encouraged to apply for outside scholarships, fellowships, and other forms of financial support.

Ph.D. MINOR

The Department of Statistics will devise individual Ph.D. minor programs, but the department urges all graduate students in other fields who wish to have a 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, 70. 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 70 is designed for students interested in biological and medical applications of statistics.

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 (DiCiccio) MWF 2:15

60. Introduction to Statistical Methods I — (Graduate students register for 160.) A nonmathematical study of statistical methods. Emphasis is on statistical techniques. Organization of data, averages, variability, and association. Statistical inference, test of hypotheses, estimation, and confidence intervals. Computer statistical packages are used. Students cannot receive credit for both Statistics 60 and Psychology 60. DR: 4(6)

5 units, Aut (Adhikari) MTWThF 1:15
Win, Spr (Staff) 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 (Olkin) 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 (Romano) MTWF 11
Sum (Staff) MTWThF 9

116. Theory of Probability — Probability spaces as models for phenomena with statistical regularity. Discrete spaces (binomial, hypergeometric, Poisson). Continuous spaces (normal, exponential) and
densities. Random variables, expectation, independence, conditional probability. Introduction to the Laws of Large Numbers and Central Limit Theorem. Prerequisite: Math. 43 and some familiarity with infinite series, or equivalent. DR:4(6)

- 5 units, Aut (Holmes) MTWThF 10
- Spr (Wyner) MTWThF 10
- Sum (Staff) MTWThF 2:15

140. Chance and Strategy — See 40. For graduate students.
3 units, Aut (DiCiccio) MWF 2:15

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 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)
- Spr (Staff)


- 4 units, Win (Glynn)

160. Introduction to Statistical Methods I — See 60. For graduate students.
5 units, Aut (Adhikari) MTWThF 1:15
- Win, Spr (Staff) MTWThF 1:15
- Sum (Staff) MTWThF 11

161. Introduction to Statistical Methods II — See 61. For graduate students.
5 units, Win (Olkin) 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 (Martin) MTWF 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, non-parametric 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 (Martin) MWF 3:15


- 3 units, Spr (Martin) 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, non-linear 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, Spr (Lai) MWF 1:15

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 1993-94

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 (DiCiccio) MWF 10
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, Aut (Owen) MWF 11

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

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, Win (Olkin) MWF 11-12:30


3 units, Aut (Wyner) MWF 2:15

Win (Adhikari) 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 (Wyner) MWF 2:15

229. **Selected Topics** — Topics vary each year. Prerequisite: 200 or equivalent.

3 units, by arrangement

251. **Stochastic Models in Operations Research** — (Enroll in Operations Research 252.) Formulation and analysis of models in operations research involving stochastic processes. Topics: Markovian queues, queues with embedded Markov chains, general single server queue, queueing networks, diffusion approximations, and Markov decision chains. Software packages are used. Prerequisites: 217 and Operations Research 251, or equivalent.

3 units, Spr (Hillier)

257. **Simulation** — (Enroll in Operations Research 253.) Generation of uniform and nonuniform random numbers, discrete-event simulations, simulation languages, design of simulations, statistical analysis of the output of simulations, applications to modeling stochastic systems in computer science, engineering, and operations research. Prerequisites: working knowledge of FORTRAN or PASCAL or C; 217 or equivalent.

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.) Linear programming emphasizing standard model formulation, fundamental theorems, variations of the simplex method, and parametric programming. AMPL/MINOS software is used. Corequisite: Math. 103.

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, Johnstone, Olshen) Th 1:15-3:05

260B. 1-5 units, Win (Brown, Efron, Johnstone, Olshen) Th 1:15-3:05

260C. 1-5 units, Spr (Brown, Efron, 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; minimum estimation; shrinkage estimators. Large sample estimation theory: asymptotic efficiency, maximum likelihood estimation, delta method, asymptotic distribution of quantiles and trimmed means, differentiability of statistical functionals robustness and influence. Hypothesis testing and confidence intervals: Neyman-Pearson theory; uniformly most powerful tests and uniformly most accurate confidence intervals for distributions with monotone likelihood ra-
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 (Johnstone) MWF 10

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.

3 units, Win (Donoho) MWF 10

306B. 3 units, Spr (Donoho) MWF 10


3 units, Aut (Dembo) MWF 11

310B. 3 units, Win (Adhikari) MWF 11

310C. 3 units, Spr (Lai) MWF 11


3 units, Win (Dembo)


3 units, Spr (Lai) MWF 11


3 units, Aut (Adhikari) by arrangement

Win (Dembo) by arrangement

Spr (Donoho) by arrangement


3 units, Aut (Owen) by arrangement

Win, Spr (DiCiccio) by arrangement


3 units, not given 1993-94

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, Aut (Siegmund) MWF 2:15


3 units, Spr (Friedman) MWF 1:15

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 1993-94

332. Asymptotic Methods in Statistics — Concepts of efficiency, the asymptotic efficiency of maximum likelihood estimators, best asymptotically normal (BAN) estimators, asymptotic behavior of likelihood ratio tests, optimal designs, empirical Bayes methods.

3 units, not given 1993-94

333. Robust Estimation — Procedures which continue to be effective when the usual parametric assumptions are violated. The estimation of location for symmetric distributions: M, L, and R estimators, asymptotics, the influence curve. Robustness in hypothesis testing. Survey of recent literature. Prerequisites: 236A, B, C.

3 units, not given 1993-94


3 units, Aut (Lai) MF 9:30-10:45

340. Experimental Design — For graduate students in science, engineering, and statistics. Emphasis on how and why to do experiments and analyzing and presenting the results. Topics: control groups, anova, blocking and balance, factorial experiments, fractional factorials, screening designs, response surfaces, binary outcomes, Taguchi methods, computer experiments. Prerequisite: 116. Recommended: experience with experimentation or data analysis.

3 units, Win (Owen) TTh 11-12:15


3 units, Spr (Johnstone) TTh 10-11:15

352. Spatial Statistics — Summary statistics, probability models, smoothing and interpolation, classification, sampling design, applications to remote sensing and environmental monitoring.

3 units, Win (Switzer) MWF 2:15


3 units, Aut (Martin) MWF 3:15

358. Queueing Theory — (Enroll in Operations Research 358.) Advanced nonmeasure theoretic course on the foundation of queueing theory. Topics: Markovian queues, embedded Markov chains, general single server queue and random walk theory, limit theorems for average values and extreme values of waiting times, queuing networks, multiple channel queues in heavy traffic, and diffusion approximations. Prerequisite: 359.

3 units, Spr (Inglehart) MWF 2:15-3:30


3 units, Win (Glynn)

374. Large Deviations — (Same as Math. 234.) 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. Applications in statistics, information theory and statistical mechanics. Prerequisite: 310 or Math. 230A.

3 units, not given 1993-94

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 1993-94


3 units, Spr (Grey) TTh 11-12:15


3 units, not given 1993-94

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 (Owen) by arrangement
Spr (Friedman) 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, TW6:30-8 p.m., and Th 6-8p.m.
93. 9 units, Spr (Staff) TWTh 3:15-5, TW 6:30-8 p.m., and Th 6-8p.m.

PROGRAM IN SYMBOLIC SYSTEMS

Director: Thomas Wasow (Linguistics and Philosophy)
Program Committee: Fred Dretske, James Greeno, Nils Nilsson, David Rumelhart, Brian Smith, Thomas Wasow
Program Faculty: Joan Bresnan (Linguistics), Herbert H. Clark (Psychology), Fred Dretske (Philosophy, on leave), John Etchemendy (Philosophy), Solomon Feferman (Mathematics and Philosophy), John Gabrieli (Psychology), Peter Godfrey-Smith (Philosophy), James Greeno (Education), David Heeger (Psychology), Martin Kay (Linguistics), Jean-Claude Latombe (Computer Science, on leave Winter, Spring), John Perry (Philosophy), Stanley Peters (Linguistics), Eric Roberts (Computer Science), David Rumelhart (Psychology), Ivan Sag (Linguistics), 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, on leave Winter)
Consulting Faculty: Philip Cohen, Joseph Y. Halpern (Computer Science), Per-Kristian Halvorsen (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), 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:

"PROGRAM IN SYMBOLIC SYSTEMS"
2. Computation and Artificial Intelligence:
   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: Math. 103, 109, 120, 162; Statistics 110, 116; Computer Science 260; Philosophy 160B. Other courses may be substituted for the suggested ones with the approval of the coordinator.
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**

80. Mind, Matter, and Meaning — (Enroll in Philosophy 80.) DR:8(3)
   5 units, Win (Bratman) MWF 11

105. Introduction to Cognitive Psychology — (Enroll in Psychology 106.) DR:9(4)
   4 units, Win (B. Tversky) TTh 1:15-2:30

106B. Programming Abstractions — (Enroll in Computer Science 106B.) DR:6(8)
   5 units, Aut (Staff) MWF 11
   Win, Spr (Staff) MWF 1:15

106X. Programming Methodology and Abstractions (Accelerated) — (Enroll in Computer Science 106X.) DR:6(8)
   5 units, Aut (Staff) MWF 3:15
   Spr (Staff) MWF 1:15

109A.B. Introduction to Computer Science — (Enroll in Computer Science 109A,B.)
   109A. — DR:6(8)
   4 units, Aut (Staff) MWF 10
   Win (Staff) MWF 2:15

109B. 4 units, Win (Staff) MWF 10
   Spr (Staff) MWF 2:15

120. Introduction to Syntax — (Enroll in Linguistics 120.)
   4 units, Aut (Sells)

130. Introduction to Semantics and Pragmatics — (Enroll in Linguistics 130.)
   4 units, Win (Peters)

154. Introduction to Automata and Complexity Theory — (Enroll in Computer Science 154.)
   4 units, Win (Pratt) MWF 3:15-4:30
   Spr (Motwani) MWF 3:15

160A. First Order Logic — (Enroll in Philosophy 160A.) DR:4(6)
   4 units, Win (Etchemendy) MWF 2:15

160B. Computability and Logic — (Enroll in Philosophy 160B.)
   4 units, Spr (Mints) MWF 9
181. Philosophy of Language — (Enroll in Philosophy 181.)
4 units, Win (Taylor) MWF 2:15

186. Philosophy of Mind — (Enroll in Philosophy 186.)
4 units, Spr (Taylor) MWF 2:15

201. Senior Seminar — Core seminar for program majors. Integrates themes from core course work with contemporary cross-disciplinary research in learning, computation, and formal systems. Led by program faculty who represent central sub-areas of the program.
3 units, Win, Spr (Staff)

220A. Introduction to Syntactic Theory — (Enroll in Linguistics 220A.)
4 units, Aut (Sells)

221. Introduction to Artificial Intelligence — (Enroll in Computer Science 221.)
3 units, Aut (Latombe) MW 12:50-2:05
Win (Nilsson) TTh 9:30-10:45
Spr (Shoham) TTh 1:15

230A. Semantics and Pragmatics — (Enroll in Linguistics 230A.)
4 units, Win (Peters)

254. Automata, Languages, and Computability — (Enroll in Computer Science 254.)
4 units, Aut (Staff) MWF 10

RELATED COURSES
Listed below are all of the Symbolic Systems Program courses and a sample of other courses that may be of special interest to SSP majors. The list is not exhaustive. Students should consult course listings in the related departments.

10. Symbolic Systems 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 intelligence, 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, linguistic, philosophical, and psychological research discussed and compared. Relevance of the material to instruction and learning. DR:9(4)
4 units, Aut (Greeno)

60. Introduction to the History and Philosophy of Science — (Enroll in Philosophy 60, 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, Spr (Godfrey-Smith)

100. Computers, Ethics, and Social Responsibility — (Enroll in Computer Science 201; 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, social, political, and legal considerations. Analysis of scenarios in a number of specific problem areas: privacy, reliability, and risks of complex systems, and the responsibility of professionals for the applications and consequences of their work. Small group discussion emphasizing developing analytical skills. Prerequisite: Computer Science 106B or 106X.
3-4 units, Spr (Winograd)

119. Cognitive Development — (Enroll in Psychology 120.) Topics and issues on cognitive development, development changes in memory, conceptual organization, logical reasoning, and communication skills. Prerequisite: Psychology 1. DR:9(4)
3 units, Aut (Markman)

121. Intermediate Syntax — (Enroll in Linguistics 121.) Introduction to modern syntactic theory and its relation to sentence processing. Selected grammatical problems from the perspective of post-transformational syntactic theory. Emphasis on English grammar, with exposure to the syntax of other languages.
4 units, Spr (Green)

139A,B. Introduction to Computational Linguistics — (Enroll in Linguistics 139A,B.) 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, Win (Kay)

141. Human Neuropsychology — (Enroll in Psychology 141.) Topics in 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 im-
plication in understanding normal function. Prereq-
usite: Psychology 1 or equivalent.
3 units, Spr (Gabrieli)

144. Foundations of Vision Science — (Enroll in Psychology 221.) Topics in basic visual science
including the physiology of human vision, basic human visual performance, and computational
algorithms that characterize physiology and performance. Prerequisites: Psychology 102 or equiva-
lent, and calculus.
3 units, Spr (Rumelhart, Skokowski) T3:15-5:05

190. Senior Honors Tutorial
1-5 units, any quarter (Staff) by arrangement

191. Senior Honors Seminar
2 units, Spr (Staff) by arrangement

192. Facets of Complexity Dialogue Tutorial —
Sophomores only. What do we mean when we say
that something is complex? Why do we think that
a computer is more complex than a bicycle? Is there
a way to measure the complexity of an object, or of
a computer program? If there is, what can be done
with that measurement? Tutorial explores complex
systems, their structure and behavior, and different
notions of complexity that have been developed.
How complexity relates to adaptation and the ways
it can be quantified.
2 units, Spr (Huberman) by arrangement

194. Study of Consciousness in Cognitive Sci-
ence — (Same as Philosophy 194F.) Why study con-
sciousness and how? Survey of various issues re-
lated to consciousness in philosophy, psychology,
and cognitive neuroscience: the function of con-
sciousness and the epiphemahlenalism debate, qualia,
attention and subliminal perception, commissur-
permy, and dissociative disorders. Evolutionary ap-
proaches and computational models. Readings:
Dennett, Dretske, Gazzaniga, Jaynes, Marcel, Nagel,
Schacter, Velmans, and others.
3 units, Spr (Guzeldere) T3:15-5:05

196. Independent Study — Independent work un-
der the supervision of a faculty member.
1-15 units, any quarter (Staff)

200. Foundations of Cognitive Science — (Enroll in Psychology 200.) Survey of the basic topics of
cognitive science and cognitive psychology: percep-
tion, attention, memory, action, language, rea-
soning judgment, problem solving, cognitive archi-
tectures, and computational modes.
3 units, Spr (Rumelhart)

206. Behavioral Neuroscience — (Enroll in Psy-
chology 206.) The biological substrates of behavior
emphasizing topics currently being investigated by
resident and visiting neuroscientists at Stanford.
Possible topics: neuroanatomical and neurophysi-
o logical aspects of vision, audition, motor control
and learning and memory, and hormonal and neuro-
chemical aspects of stress and motivation.
3 units (Wandell, Wine)
alternate years, given 1994-95
223. Semantic Foundations of Knowledge Representation — (Enroll in Computer Science 324.) 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: understanding of logic and basic model theory.

3 units, Spr (Geffner)

224. Information Technology in Teaching — (Enroll in Education 224.) 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 use; 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.

3 units, Win, Spr (Walker)

233. Semantics Seminar: Lexical Semantics — Enroll in Linguistics 233.)

4 units, Win (Staff)

240. Language Acquisition I — (Enroll in Linguistics 240, Psychology 240.) Survey of present knowledge of processes of language acquisition from a linguistic point of view. Recent and past literature.

4 units, Aut (Clark)

241. Language Acquisition II — (Enroll in Linguistics 241, Psychology 241.) Focuses on theories of meaning acquisition, lexical structure, and lexical factors in the acquisition of syntax.

4 units, Win (Clark)

244. Evolutionary Perspectives on Cognitive Science — (Enroll in Philosophy 244.) Examination of the relevance of key evolutionary concepts for cognitive science. Focus is on the concept of adaptation. Recent work on complexity and evolution. Basic understanding of philosophy of mind assumed.

3 units, Spr (Godfrey-Smith) Th 3:15-5:05

247. Seminar on Human Sentence Processing — (Enroll in Linguistics 247.) Discussion of recent literature on how people parse and produce sentences. Emphasis on the relationship between sentence processing models and issues on contemporary syntactic theory.

4 units, Win (Wasow)

247A.B. Human Computer Interaction — (Enroll in Computer Science 247A.B.) Issues of human-computer interaction, including: interface styles, work design, communication structure and organizational factors. Students in small groups develop 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. Enrollment limited. Consent of instructor required. Prerequisite for 247A: Computer Science 109B. Prerequisite for 247B: Computer Science 247A.

247A. 5 units, Win (Winograd)

247B. 5 units, Spr (Winograd)

256A. Reasoning about Knowledge — (Enroll in Computer Science 356A.) 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 the areas above. Issues: common knowledge, knowledge based programs, applying knowledge to analyzing distributed systems, attainable states of knowledge, and modeling resource-bounded reasoning. Prerequisites: mathematical maturity and an acquaintance with propositional logic.

1-3 units, Win (Halpern)
alternate years, not given 1994-95

256B. Reasoning About Uncertainty — (Enroll in Computer Science 356B.) Uncertainty is a fundamental feature of daily life, and must be confronted when designing computer systems. Examines formalizing reasoning about uncertainty in approaches based on logics involving probability. Topics: logics of probability, combining knowledge and probability, probability and adversaries, the Dempster-Shafer approach, going from statistical information to degrees of belief. Prerequisites: mathematical maturity and an acquaintance with propositional logic. Recommended: Computer Science 356A.

1-3 units (Halpern)
alternate years, given 1994-95

258. Introduction to Programming Language — (Enroll in Computer Science 258.) 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 language with higher-type functions and recursion. Treatment of side-effects. Prerequisites: Computer Science 154 and 157, or Philosophy 160A.

3 units, Win (Mitchell)


3 units, Win (Rumelhart)

261. Psychology of Program Solving and Reasoning — (Enroll in Psychology 261, 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 since 1970 including views of cognition as a situated activity.

3 units, Spr (Greeno)

267. Visual and Image Processing Laboratory — (Enroll in Psychology 267.) Through lectures and hands on experience with a computer, explores image-processing, human and computer vision, and computer graphics. Topics: image presentation and image coding, sampling and filtering, motion analysis, binocular stereopsis, color, texture analysis, and synthesis.

3 units, Spr (Heeger)


3 units, Aut (Clanton)


3 units, Win (Smith)

alternate years, not given 1994-95

295B. Philosophy of Cognitive Science — (Enroll in Philosophy 395B.) A foundation analysis of modern cognitive science, emphasizing the role of computation. Topics: traditional symbol manipulation (Fodor, Haugeland, Newell, Pylyshyn, Simon); full-scale critiques, the role of connectionism (Cussins, Fodor, Smolensky); and anti-representationalism (Brooks, Chapman, Dretske, Rosenbliein). Prerequisite: 295A.

3 units (Smith)

alternate years, given 1994-95

298. Philosophy of Logic — (Enroll in Philosophy 298.) Focuses on logical theories of computation, based on labeled transition systems, emphasizing operational semantics, dynamic logic and process algebra, and various new connections between them. Investigation of general issues of “dynamic logic” as they arise in linguistics and AI, including nonstandard reasoning and its proof theory.

3 units, Spr (VanBenthem)
ies core and design the remaining units with an academic adviser who is a member of the Academic Council.

In all cases, a total 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 should be taken before 115 and 130.

Each of the following is required:

- 110. Introduction to Urban Studies
- 115. Utopia and Reality in Modern Urban Planning
- 130. Seminar: Urban Policy

Select at least one course from each of the following categories:

### 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
- 151. Urban Growth and Change
- 152. Poverty and Public Policy
- 155. The Urban Underclass

### Urban Anthropology:

- 160. Urban Culture
- 161. Language and Culture of Urban Youth
- 162. Urban Youth and Their Institutions: Research and Practice
- 164. The Multicultural City in Europe

### Urban Design and Architecture:

- 170. Introduction to Urban Design
- 173. Architecture: Process and Practice
- 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

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.

## URBAN PLANNING OPTION

The 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 provides a key element to this option. In addition, students are required to study the methods of land use planning and techniques 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 departmental listings for course information.

### PREREQUISITE COURSES

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
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<tbody>
<tr>
<td>Math 41. Calculus</td>
</tr>
<tr>
<td>Economics 1. Elementary Economics</td>
</tr>
<tr>
<td>Economics 51. Economic Analysis I</td>
</tr>
<tr>
<td>Economics 180. Mathematics for Economists</td>
</tr>
</tbody>
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### REQUIRED COURSES TO COMPLETE THE MAJOR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
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<tbody>
<tr>
<td>Geological and Environmental Sciences 131. Environmental Earth Sciences II</td>
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<tr>
<td>Geological and Environmental Sciences 132. Environmental Earth Sciences III</td>
</tr>
<tr>
<td>Computer Science 105A. Introduction to Computers</td>
</tr>
<tr>
<td>Statistics 190. Statistics for Social Scientists</td>
</tr>
<tr>
<td>Applied Microeconomics — select one of the following: Economics 148, 150, 154, 155</td>
</tr>
</tbody>
</table>

### 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).

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
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<tbody>
<tr>
<td>Civil Engineering 172. Air Quality Management</td>
</tr>
<tr>
<td>Sociology 160. Formal Organizations</td>
</tr>
<tr>
<td>Sociology 163. Organizational Decision-Making</td>
</tr>
<tr>
<td>Sociology 165. Organizational Leadership</td>
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</tbody>
</table>

## 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. The 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 departmental listings for course information.

**PREREQUISITE COURSES**

*Course No. and Subject*
- Art 40. Basic Drawing
- Art 60. Basic Design

**REQUIRED COURSES TO COMPLETE THE MAJOR**

*Course No. and Subject*
- Art 140. Drawing
- Art 160K or 160L. Design I — Intermediate Design
- Mechanical Engineering 101. Visual Thinking

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, from any offered by the program on Urban Studies, from 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*
- Civil Engineering 176. Small Scale Energy Systems
- Civil Engineering 177. Building Energy Laboratory
- Civil Engineering 180B. Elementary Structural Analysis
- Engineering 10. Applied Mechanics: Statics
- Engineering 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. Therefore, 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 (e.g., 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. Note also that 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 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 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.

5 units, 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 facts but not to agree on what they mean. Florentine documents of the Renaissance, ranging from census records to court records, letters, and diaries. Students develop their own interpretations of what Florentines were like. Emphasis on social structure and everyday people.

5 units (Brown) not given 1993-94

110. Introduction to Urban Studies — Interdisciplinary introduction to the study of cities and urban civilization. The history of urbanization through Lewis Mumford's *The City in History* and various interdisciplinary methodologists comprising the unified field of urban studies (sociology, economics, politics, architecture, urban design, and urban public policy formation).

4 units, Aut (Stout) MW 1:15

115. Seminar: Utopia and Reality in Modern Urban Planning — (Enroll in Art 280.) Primarily for upper-level undergraduate Urban Studies majors. 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

120. Urban Economics — (Same as Economics 148.) The economy of cities. Why cities form, the types of agglomeration, how cities grow. Location and land use, urban transportation, housing and local taxation of the provision of public services. Mix of theory and policy with some focus on poverty and discrimination, environmental and developmental issues. Prerequisite: Economics 51.

5 units, Spr (Bostic, Gans)

130. Seminar: Urban Policy — (Enroll in Political Science 104.) Issues of public finance, housing, education, transportation, and crime in major metropolitan areas in the U.S. Classes meet regularly first half of quarter. In the second half, students are placed in an internship in local government and contribute to a policy report being written by a local government agency.

5 units, Aut (Fraga) Th 2:15-4

131. Urban Politics and Policy — (Enroll in Political Science 186.) Introduces the major actors, institutions, processes, 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 related to federalism, representation, voting, race, poverty, housing, and finances. Prerequisite for Urban Studies majors: 110.

5 units (Fraga) given 1994-95

132. Seminar: Urban Politics and Policy — (Enroll in Political Science 291F.) Graduate and undergraduate seminar examines the major theoretical approaches used in the analysis of urban politics and policy. Assesses fundamental conclusions about American politics reached by urban scholars as to how subsequent interpretations continue to set the context for scholarly debate and understanding about American political development generally.

5 units (Fraga) given 1994-95

133. The Politics of Development — Examines the reality of community development: the tug and pull that cities experience, the interests of developers, and the roles played by various publics. The politics of development deals with values, votes, revenues, conflicts, deals, mistrusts, negotiations, and compromise. Why are developers, environmentalists, and cities antagonists? What effect does this have on cities and the Bay Area in general? Prerequisite for Urban Studies majors: 110.

4 units (Everett, Sipel) given 1994-95

134. Preparation for Internship Learning — (Enroll in Public Policy 179.) Provides students with 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, 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)
135. Policy Making and Problem Solving at the Local and Regional Level — (Enroll in Public Policy 182.) Public policy issues, processes and organizations at the local and regional level. Focus: public context of community problem-solving and local policy formulation, implementation, and analysis. Case study investigation of public issues in the local community (e.g., homelessness, toxic waste disposal, child care, land use planning). Opportunity to learn from local policy makers and community leaders.

4 units (Stanton) not given 1993-94

136. Politics and Public Policy — (Enroll in Political Science 101P, Public Policy 101.) The domestic policy-making process, emphasizing how elected officials, bureaucrats, and interest groups shape governmental policies in various areas including tax, environmental, and social-welfare policy, given their goals and available tactics. How public policies are formulated and implemented. Results of this process using equity and efficiency criteria. Prerequisite: Political 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 of 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 (Fraga) given 1994-95

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, Win (Sipel) W 7-9:30

139. American Education and Public Policy — (Enroll in Education 105.) 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

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 (Sawislak) given 1994-95

145. Introduction to Race and Ethnicity in the American Experience — (Enroll in American Studies 164, History 164.) 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 majority populations. Focuses on developments during the past two centuries. DR:3

5 units, Spr (Camarillo, Fredrickson) MTWThF 11

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 (Seaver) not given 1993-94

149. Undergraduate Colloquium: Poverty and Homelessness — (Enroll in History 251A.) Students participate in an administrative 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 professor before enrolling.

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

150. The Process and Practice of Community Service — (Enroll in American Studies 120.) Seminar combines theoretical and hands-on approaches. Weekly readings, research, speakers, and discussions generate the ability to identify accurately community needs, examine issues surrounding public service, and provide opportunities to initiate and participate in public service projects. Participants spend additional one to two hours a week in community service.

4 units, Aut (J. Cohen)
151. Urban Growth and Change — (Enroll in Sociology 137.) Cities and towns change in size, density, composition, and internal organization. Causes and consequences of these changes. The processes of change in a city as a whole and in subareas of a city, emphasizing the U.S.
5 units (Staff) given 1994-95

152. Poverty and Public Policy in America — (Enroll in Sociology 141.) Why poverty persists in the U.S. and other modern industrialized societies. The role of public policies in preventing and mitigating poverty. Lectures, class discussions, and individual projects explore facts, myths, and theories.
3-5 units (Staff) given 1994-95

153. Organizations and Public Policy — (Enroll in Public Policy 102, 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) MWF 9 section by arrangement

5 units (Staff) given 1994-95

155. The Urban Underclass — (Enroll in Sociology 149.) Analysis of 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. Issues: the analysis of ethnic/racial conflict, residential segregation, and changes in the family structure of the urban poor.
5 units, Spr (Olzak) TTh 9:15-10:30

160. Urban Culture — (Enroll in Anthropology 59.) Socio-cultural perspectives of urban culture. How social theories, literature, and film help create categories of meaning of cities in cross-cultural contexts. Symbolic anthropology, social history, and cultural studies from theoretical frameworks of analysis.
5 units, Win (Ebron)

161. Language and Culture of Urban Youth — (Same as Anthropology 4, Linguistics 154.) 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 — 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.
5 units (Heath, McLaughlin) given 1994-95

163. Seminar: Spatial Systems and Social Processes — (Enroll in Sociology 217, Anthropology 267.) The differentiation of social processes through spatial systems in agrarian and commercial societies. Contingencies of human interaction in space and time. Some of the central problems of social science history. E. Asian and Western European cases are juxtaposed and brought to bear on such topics as peasant marketing, urbanization, ethnic mobilization, and revolution. Classic theories from human geography, and contemporary approaches such as regional systems analysis, world system analysis, and the Annales School. Student research may utilize a geographic information system for analyzing and displaying quantitative data via computer generated maps.
3, 5, or 8 units, Spr (Hochberg)
TTh 1:15-3:05

164. The Multicultural City in Europe — (Same as 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
165. Inter- and Intra-Ethnic Variation in Urban Vernacular English — (Enroll in Linguistics 153.) Literature on ethnic vernaculars in urban settings, concentrating on modern sociolinguistic studies of black and white vernaculars in New York City, Philadelphia, Detroit, Washington, D.C., Los Angeles, Atlanta, and London. Recent research findings that urban black and white vernaculars are diverging are compared with new research in the local (E. Palo Alto) community. Students innovate local research on their own. Implications for linguistics, the social sciences, and urban policy. DR:3 or 9(4 or 5)

4 units, not given 1993-94

170. Introduction to Urban Design — Urban design in theory and contemporary practice. Overview of critical issues in city design, development, and preservation. Central city revitalization, neighborhood conservation, and regional growth models are examined through comparative case studies from N. America and abroad. Focuses on urban design process through case study projects in San Francisco and the Bay region. Enrollment limited to 21. Preference given to Urban Studies majors and students majoring in art or applied earth sciences.

5 units, Win (Gasti) T 10-12 and 7-9 p.m. plus two required Sat. workshops in San Francisco

173. Architecture: Process and Practice — (Enroll in Civil Engineering 223.) Open to juniors, seniors, and graduate students. Overall view of the process and practice of architecture. Taught by five practicing architects and one contractor, and coordinated and supported by the Center for Integrated Facility Engineering (CIFE). Each stage of the architectural life cycle is presented by one of the outside faculty including design awareness (spaces, forms, organization), site planning and layout, programming of requirements, design, administration and project management, construction management (cost, schedule). Technology used by architects. Design of a homeless shelter (by student teams) illustrates the course. Enrollment limited to 25.

4 units (Teicholz, Staff)

174. Architectural Design Process — 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 statement and as a conceptual massing model along with simplified site and building related graphics. Result: demystification of the initial phase of the design process, providing a better understanding of the professional's role within it. Enrollment limited to 16.

4 units, Spr (Neuman) MW 4-6 plus one required architectural office visit

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, shop signs, graffiti), the "soundscape" (technological noise, natural sounds), and public social spaces (streets, plazas, malls, playgrounds). Limited enrollment.

3-4 units, Spr (McGinn) MW 2:15-3:45

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


4 units, Win (Ortolano) MW 3:15-4:30

182. Environmental Policy Design and Implementation — (Enroll in Civil Engineering 266.) Analysis of direct regulation, market incentives, the courts, and negotiation as bases for environmental quality management programs. Case examples involving hazardous substance management, environmental impact assessment, and air and water quality management demonstrate how environmen-
tal management programs combine various “social choice” mechanisms. Cases are used to examine the process of environmental policy formulation in the U.S. and to illustrate theories of policy implementation. Limited enrollment. Prerequisite: Civil Engineering 171.

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

183. Land Use Control — Rigorous 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

186. Management of Geological Hazards — (Enroll in Geological and Environmental Sciences 8.) The application of earth science to the identification and management of geological hazards within the modern regulatory framework. Emphasis is on developing geological techniques to recognize natural geologic hazards and select mitigation measures to manage risk. Topics: geologic problems associated with earthquakes, landslides, floods, stream and erosion, land subsidence, underground water, environmental abuses, and planning and engineering design alternatives. Necessary geological fundamentals are introduced. Prerequisite: Geological and Environmental Sciences 1 or consent of instructor. DR:6(8)
3 units, not given 1993-94

190. Urban Design and Planning Seminar — Seminar on the contemporary practice of urban design, urban 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 (Staff) given 1994-95

191. Public Service Practicum in Urban Studies — Open to Urban Studies majors. Students organize a volunteer public service internship. Examples: work at a homeless shelter, participation on a panel to mediate community conflict, or work as a counselor at a battered woman’s shelter. After the volunteer work, students prepare a 3-5 page statement on the nature of the practicum and its relevance to the major in Urban Studies. Recommended: 133.
1-2 units (Ortolano) by arrangement

2-4 units (Ortolano) by arrangement

193. Special Projects
2-5 units (Staff) by arrangement

197. Directed Reading
2-5 units (Staff) by arrangement

199. Honors Thesis
1-10 units (Staff) by arrangement

SPECIAL PROGRAMS

PROGRAM FOR INDIVIDUALLY DESIGNED MAJORS

This program is intended for currently registered undergraduates interested in pursuing an area of scholarly inquiry which falls outside the purview of an established academic department or program of the University. It permits 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. Any student in good academic standing is free to participate. 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 (or changes in previously approved...
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 which in its opinion lack scholarly merit or which are not clearly interdisciplinary. Occasionally, the committee must reject a proposal which, 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 which 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.

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 5 units of these 60 units may be taken in individual study or directed reading.
4. The proposed major must constitute a coherent academic program which 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.

These specific requirements are in addition to the general guidelines discussed under "The Major" in the "Degrees" section of this bulletin. Since each proposal is considered individually, the student and the faculty advisory group may request exception to the specific requirements. Such a request must be included in the statement which justifies the major.

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 center's "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 physical education 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.

Issues and conflicts surrounding urban growth, sample local growth control measures, and controversies regarding statewide growth control activities and legislation.

SOPHOMORE DIALOGUES AND SEMINARS

Participating Faculty:

Business, Graduate School of: Gerald Meier
Chemistry: Richard Zare
Communication: Byron Reeves
Drama: Carl Weber
Education: Ron Glass
English: Donald Bacon, Martin Evans, Rich Holton, Joss Lutz Marsh
History: Stewart Burns, Nancy Kollman
Human Biology: Shirley Feldman, Robert Siegel
Linguistics: Elizabeth Traugott
Medicine, School of: Christos Constantinou, Jeffery Croke, Henry Jones III
Political Science: Steven Krasner, Mark Tunick
Psychology: Anne Fernald, Russ Fernald
Science, Technology, and Society: Robert McGinn
Slavic Languages and Literature: Jasmina Bojic
Spanish and Portuguese: Adrienne Martin, Jorge Ruffinelli, SylviaWynter
Symbolic Systems: Bernardo Huberman
Urban Studies: Radford Hall

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 departmental credit and most count towards an eventual major in the field. No credit is granted 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 of limited space, students may enroll in a maximum of one of these courses per quarter.

All Dialogues Tutorials and some Peters Seminars require a brief application. Check the Time Schedule or with the Dialogues and Seminars office (123 Sweet Hall, telephone 415-723-4504) to find if an application is required. Due dates for applications for the 1993-1994 courses are: Autumn Quarter, 10 a.m. September 29; Winter Quarter, 5 p.m. December 17; Spring Quarter, 5 p.m. March 18.

COURSES

PETE'S SEMINARS

54. Speech in Action — (Enroll in Linguistics 54.) Open to sophomores only. Societies construct themselves in part through such interactive practices as promising, pledging, commanding, hypothesizing. These practices, known as “speech acts,” define speaker-addressee relations, and legitimize certain contractual, political, pedagogical, and rhetorical activities. Topics: forms of “politeness” as exemplified by English and by Japanese “honorification;” evidence for changes from interactive, negotiated practices of pledging to individualist practices of promising (the development of “modern consciousness”), the role of speech acts in legitimizing discourse genres, spoken and written; and the speech acts of rap, including ritual insults.

4-5 units, Aut (Traugott)

78. Uniquely Human: Rethinking “Race,” Rethinking “Culture” — (Enroll in African and Afro-American Studies 78.) Exploration of the major thesis of Philip Lieberman's Uniquely Human: The Evolution of Speech, Thought and Human Behaviour in order to "rethink" and reconceptualize the major constructs of “race” and “culture” against the grain of how they are normatively perceived. Topics: the discontinuity between the behaviors of purely organic species and our own, including moral sense and cognitive abilities. "Culture" as "language as part of living systems." Symbolic similarity and kinship, and the enabling of race as symbolic dissimilarity and non-kinship. Hypotheses: human culture as evolutionary mechanism. "Race" as central directive sign in the post-18th-century West. Race as a fact of language rather than of biology.

5 units, Spr (Wynter)

88. Dilemmas in Current Medical Practice — (Enroll in Medicine 88.) Exploration of the broad
social, political, scientific, and economic forces that influence the daily practice of physicians. The origins of the current crises in medicine and attempts to solve it. Spiraling health care costs, increasing segments of the population with impaired access to health care, controlling costs through managed care and HMO plans, medical education, alternative health care, preventative medicine, the doctor-patient relationship, and the social responsibility of physicians.

3 units, Win (Croke, Jones)

96B. Contemporary Issues in Human Experimentation—(Enroll in Human Biology 96B.) Practical 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. Specific ethical/legal issues involving human subjects in terms of confidentiality, recruitment, and conflict of interest. Legislation addressing the issue of inadequate numbers of women and minorities in research projects. Emphasis 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, Aut (Constantinou)

96C. Adolescent Sexuality—(Enroll in Human Biology 96C.) The emergence of sexuality in the context of developmental tasks of adolescence and the changing social conditions. Topics: theoretical perspectives; methodological approaches and limitations to the study of sexuality; adolescent’s sexual behavior and beliefs; biological aspects and the role of hormones at puberty; social influences, particularly the influence of parents and peers; social (or gendered) constructions of sexuality and their relationship to sex-roles during adolescence; gay and lesbian adolescence; AIDS and sexually transmissible diseases; and teenage pregnancy and abortion.

3 units, Spr (Feldman)

99. State, Market, and Development—(Enroll in Economics 99.) The development problems of Asia, Latin America, and Africa, development thinking by economists, and the policy relationships between the public and private sector. Focuses on analytical techniques used by developmental economists.

5 units, Win (Meier)

99B. Evolution of Sovereignty—(Enroll in Political Science 99B.) Series of presentations by the instructor and students. 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 cooperation in the coordination of macro-economic policy, and the wisdom of open vs. closed trade policies.

3 units, Win (Krasner)

100L. Laser Methods in Chemistry—(Enroll in Chemistry 100L) 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.

3 units (Zare) by arrangement

111. Social Responses to Communication Technologies—(Enroll in Communication 111.) The study of human responses to new communication media. Changes include new multimedia technologies, high definition television, virtual reality, new personal communication, and computing devices. Topics: the social and psychological effect of the new technologies; changes in private and public life; psychological responses to new media including attention, memory, emotional response, and decision-making. Social responses, including influences on interpersonal relationships, formal organizations, and the creation of telecommunities. Prerequisites: Communication 1; sophomores only.

3 units, Spr (Reeves)

119. Environmental Ethics—(Enroll in Science, Technology, and Society 119.) The analysis of important ethical issues raised by the ways humans have altered their environment in contemporary Western societies. Natural environmental phenomena explored: cross-border pollution, hazardous waste disposal, population growth, climate change, endangered species, and wilderness preservation. Built-environment phenomena explored: proliferation of high-rise buildings; traffic congestion, material signs, “soundscape,” ongoing transformation of public space. Arguments on various sides of the issues raised, how the ethical issues raised relate to environmental policies, and consideration of fundamental changes in ethical thinking in order to come to grips with the problems under study.

3-4 units, Aut (McGinn)

180A. Performance and Society: How Societies Use Performance in Defining their Identity—(Enroll in Drama 180A.) Sophomores only. The ways performance has been created by, and responded to, societal developments throughout history. Prerequisite: one course on history or the arts.

3-4 units, Win (Weber) T 3:15-6:05

181C. Studies of Animal Behavior—(Enroll in Psychology 181C.) Evolution of behavior, providing models for understanding features of human activities. Origins of study of animal behavior and development up to present by analyzing and discussing original research papers. Use and misuse of
parallels between animal and human behavior. Purpose is study and observation of animals in lab.

2 units, Aut (R. Fernald) W 3-5:30

181D. How Infants See the World—(Enroll in Psychology 181D.) How does the newborn infant make sense of the world? How can researchers discover what goes on in an infant's mind? Discusses original research on infant development. Students design and run an experiment at the Center for Infant Studies. Prerequisite: Psychology 1.

2 units, Aut (A. Fernald) T 2-4

190A. Don Quijote—(Enroll in Spanish and Portuguese 190A.) 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. Application procedure required.

3-5 units, Spr (Martin)

190B. Cuba Now!—(Enroll in Spanish and Portuguese 190B.) For the past 30 years, Cuba has been the only Latin American socialist regime, and it still operates under communist rule despite the disappearance of most other Marxist states. The changes in Cuban society (family structure, emigration of intellectuals, popular culture and superstition, political and economic international support, and the withdrawal of the former U.S.S.R.) through recent works of literature and film.

3-5 units, Aut (Ruffinelli)

198M. Dickens in the Round—(Enroll in English 198M.) Multiple perspectives on the multi-faceted genius who was the "father" of the Victorian novel and one of the grandparents of modern cinema. Entry to the full range of critical perspectives on the novel. Study: Nicholas Nickleby (Dickens, London, and urban narrative; pantomime and melodrama; the graphic tradition); Dombay and Son (the imaginative transformation of new technology, i.e., the railroad; Dickens and women, feminist perspectives); Great Expectations (biographical criticism and the autobiographical matrix; psychoanalytic perspectives); Little Dorrit (materialist and economic approaches; social criticism.)

3 units, Spr (Marsh)

198N. The Reciprocal Vision: Their America, Our Europe—(Enroll in English 198N.) European perceptions of the U.S. and Americans' perceptions of Europe, and their historical context. The extent to which European perceptions of the U.S. and Americans' perceptions of Europe have been shaped by the changing political and cultural relationships between the two societies and the respective social, economic, and political conditions within each society. Aspects of American culture that have been of most enduring interest to Europeans, and vice-versa. Readings: Dickens, Emerson, James, Kafka, Lewis, More, deToqueville, Twain.

4-5 units, Spr (Evans)

DIALOGUE TUTORIALS

10. Urban Growth Control Analysis—(Enroll in Urban Studies 10.) Critical readings, study and analysis of philosophy, techniques, and conflicts of urban growth control and growth control measures in California. Foundations of nonviolence and pacifism. Premise: the efficacy of nonviolent campaigns depends on persuasion by moral appeal and depends on the evident moral quality of the coercive measures employed. By combining the results of the philosophic and historical inquiries, conceptions of moral education and citizenship enable a more just democratic society.

2 units, Aut (Hall)

96D. Through the Eyes of Scientists—(Enroll in Human Biology 96D.) The nature and practice of science by reading personal reflections of the scientific discovery process. The sociology and history of science.

2 units, Spr (Siegel)

98. Promises and Moral Obligation—(Enroll in Political Science 98.) Addresses abstract issues of moral philosophy by focusing on a familiar, concrete, and accessible topic, "promising." Intention is to make ethical and political theory exciting to sophomores by showing its connections to everyday life.

2 units, Spr (Tunick)

99S. Nonviolent Struggles for Justice as Moral Education—(Enroll in Education 99S.) Sophomores only. Analysis of historic nonviolent struggles for justice in the U.S. as forms of public moral education. The nature of moral education and the philosophic foundations of nonviolence and pacifism. Premise: the efficacy of nonviolent campaigns depends on persuasion by moral appeal and depends on the evident moral quality of the coercive measures employed. By combining the results of the philosophic and historical inquiries, conceptions of moral education and citizenship enable a more just democratic society.

2 units, Spr (Glass) MW 3:15-5:05

100C. Gender Relations in Early Modern Russia—(Enroll in History 100C.) Survey of primary sources and secondary works on gender relations on various aspects of life in 16th- and 17th-century Russia, emphasizing the world of politics and the elite and possibly related issues in the law, spirituality, social values, and moral teachings. Muscovite conceptions of honor, politics at the tsar's court and in elite families. The reign of the first de facto female ruler in Muscovy, Sofiia Alekseevna, Peter the Great's elder sister. Primary sources include
saint's lives, foreign travellers' accounts, law codes, and pictorial sources.

2 units, Win (Kollman) T 1:15

100D. The Life and Thought of Martin Luther
King, Jr. — (Enroll in History 100D.) The relationship of King's evolving religious and political thinking with his leadership of the black freedom movement, focusing on the last five years of his life (1963-1968). Main theme: exploring how King's spirituality shaped his moral, intellectual, and political leadership.

2 units, Win (Burns) T 3-5

192. Facets of Complexity — (Enroll in Symbolic Systems 192.) Ways in which the complexity of an object can be measured. Complex systems, their structure and behavior and different notions of complexity developed over the years. Clarifying how complexity relates to adaptation and the many ways it can be quantified.

2 units, Spr (Huberman)

198A. Yugoslav Cinematography — (Enroll in Slavic Languages and Literature 198.) Understanding European cinematography, with a focus on Yugoslav film. Discussion of symbolism, topic selection, 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, and if the Yugoslav film still exists.

2 units, Aut (Bojic)

198B. Advanced Personal Narrative — (Enroll in English 198B.) Intensive writing workshop on personal narrative. Practice of techniques for finding meaningful subject matter from personal experience and for recreating that experience for readers. The porous boundaries between memory and imagination in autobiographical writing. Narrative models include modern writers George Orwell and Maya Angelou. Prerequisite: completion of the University Writing Requirement.

2 units, Spr (Holeton)

198C. Five Masterpieces of Modern American

2 units, Aut (Bacon)

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**CENTER FOR TEACHING AND LEARNING (CTL)**

**Director:** Michele Marincovich

The services of the Center for Teaching and Learning are divided into two broad categories: those for undergraduate and graduate students in the areas of study skills, reading rate improvement, and tutoring, and those for teaching assistants and faculty in the areas of teaching evaluation and improvement.

**SERVICES TO UNDERGRADUATES AND GRADUATES**

CTL is a resource for all students who want to improve their learning effectiveness. Through programs, individual counseling, and course work, CTL assists students in improving their ability to read with speed and comprehension, study efficiently, and learn material more thoroughly. Free tutoring is also available to undergraduates in most subjects, including writing. To arrange for a tutor, students should come to CTL and fill in a request form. The name of a trained tutor is generally ready 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, (415) 723-1326, and is open Monday through Friday from 8:30-12 and 1-5.

**SERVICES TO FACULTY AND TEACHING ASSISTANTS**

CTL provides the Stanford community with services and resources on effective teaching. Its aims are several: to identify and involve successful teachers who are willing to share their talents with others, to provide those who are seeking to improve their teaching with the means to do so, to acquaint the Stanford community with important innovations and new technologies for teaching, to prepare inexperienced teachers for their responsibilities, and to expand awareness of the role of teaching at research universities and increase its rewards.

Goals are realized through a variety of continuing programs: videotaping and consultation; small group evaluation; workshops and lectures; a handbook on teaching and a library of teaching materials; an annual orientation; and by working with individuals, groups, and departments on their specific needs. If you are currently teaching or will teach in the future, you are encouraged to drop by the CTL offices on the first floor of Sweet Hall and acquaint yourself with our activities. Further de-
tails are in CTL’s teaching handbook and in the CTL brochure, both available by calling (415) 723-1326.

COURSES

Unless otherwise noted, courses are offered on a Satisfactory/No Credit basis only and courses may not be repeated for credit.

10A. Learning by Design — Textbooks, lectures, section meetings, workshops, and tutoring sessions are seldom designed to match our strengths as learners. Understanding this puts us in a position to begin assuming responsibility for the design of our learning and for developing specific strategies for handling unfamiliar concepts.

1 unit, Aut, Win, Spr, Sum (Matthies)

10B. Self-Coaching and the Art of Working Reflectively — Improvement in any activity, from reading and writing to music and athletics, results from an increase in the ability to coach oneself. Self-coaching depends on self-motivation, self-observation, the ability to ask certain types of questions, and a willingness to experiment. Topic: time management.

1 unit, Aut, Win, Spr, Sum (Matthies)

30. Question-Driven Learning and Intellectual Constructs — Once we understand the basic categories of questions and their interrelationships, asking questions about what is abstract or unfamiliar becomes no more difficult than asking questions about everyday things. How to clarify intellectual constructs such as theories, models, definitions, interpretations, classifications, and systematic evaluations.

2 units, Aut, Win, Spr (Matthies)

40A. Reading Faster — Coping with the problem of information overload requires much more than speed reading. Overviewing, skimming, and browsing are necessary too. To decide what is worth reading, we also must learn to make quick, reliable judgments about importance and credibility.

1 unit, Aut, Win, Spr, Sum (Matthies)

40B. Reading Smarter — Expert readers shift gears smoothly and quickly, as they move out of one type of reading (browsing) and into another (aesthetic, interpretation-intensive, memory-intensive, systematically critical). How we read a text must be matched to our immediate goals and to the nature of the material.

1 unit, Aut, Win, Spr, Sum (Matthies)

50. Think On Your Feet — In discussions we 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. Unless we have a solid grip on the basic structural features of argumentation, and unless we understand the psychological and social forces that inhibit reasoned collaboration, our contributions to a group are inappropriate and ineffective. Introduction to the related topics of critical reading and the writing of argumentation.

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 (Matthies, 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. In addition to reading a textbook, students sharpen skills with the aid of 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 — Includes readings, discussion of videotapes, 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, Spr (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 writing tutor 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
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.

There are two principal formats in which the collaboration is established. Faculty members may list ongoing research projects in which undergraduates can become involved. Undergraduates may design their own individual projects and pursue them under the sponsorship of an individual faculty member. The URO staff directs students to departments with established research programs, advertises opportunities submitted by individual faculty, and helps to develop resources.

Faculty who have participated in this program have found enthusiastic and energetic assistants, made better progress in research, and freed up time for more specialized work. Students have appreciated the direct contact with faculty, immersion in a topic of mutual interest, and the unique learning opportunity that research provides.

LISTING RESEARCH

Faculty members with ongoing research programs are encouraged to identify a piece of their project appropriate to undergraduate competencies and to list it through URO. (Purely menial or mechanical projects are not appropriate.) The researcher should state clearly 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 the average, students have received 3 units of credit per quarter in exchange for a commitment of 10 hours per week).

RESOURCE FILES

Students can obtain free access to two databases 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 1993-94 are Friday, April 1 for projects in social sciences, natural sciences and engineering and Friday, April 22 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 for 1993-94 are October 29, February 4, and April 22.

Major grants differ from small grants in the scope of the project proposed rather than the level of reimbursement requested. Major and small grants are restricted to supplies and expenses associated with research. Major grants are awarded once a year, during Spring Quarter, to as many as 60 students whose projects reflect the highest level of creativity and independence and the greatest promise for exciting results. Major grants for students on financial aid may sometimes include 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, 1993. 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 underrepresented 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 10, 1994.

Irvine Assistantship Awards provide funding for an introduction to the research environment by assisting a faculty member with his or her own research. Irvine Research Awards offer term-time earnings replacement so that students can do independent research. Funding for this program ends in December, 1993.

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 part 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.

STANFORD IN WASHINGTON

Director: Elie Abel

Economics of Regulation—(Enroll in Economics 159.) Changing policies toward microeconomic interventions by the federal government. Topics: recent efforts to reform regulatory policies and institutions and to deregulate various sectors; the legal, political, and economic theories that prevailed prior to the reform movement; and the effects of the reforms. Exploration of hypotheses regarding these issues in the context of a variety of regulatory institutions and issues.

5 units, Aut, Spr (Owen) M 4-6, 7:30-8:30 p.m.

NAFTA and Beyond—The dynamics and ramifications of continental integration as NAFTA and the side agreements on labor and the environment are in the final stage of congressional review. Topics: the movement of peoples and national immigration policies; the development of trans-border regions; and the role of federalism in all three countries as a seedbed for experimentation below the federal level.

5 units, Aut (Wirth) T 4-6:30, 7:30-8:30 p.m.

Educational Policy and the Political System—The changing roles of the federal government in the reform of public schools in a system of governance that has traditionally been highly decentralized at the state and local levels. Topics: issues of social diversity, school finance and issues of economic equity, public regulation and market solutions, systematic reform vs. "restructuring," and education and economic productivity.

5 units, Spr (Hansot, Tyack)

Environmental Advocacy and the Nonprofit Sector—The environmental nonprofit sector and its role as advocate. The structure of nonprofit environmental organizations, particularly those operating at the national and international level, including their respective governance structures, funding, program priorities, interaction with Congress and federal agencies, and their effectiveness.

5 units, Win (Augsburger)

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
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 1993-94 include: African and African American Studies, Anthropology, Art, Biology, Economics, German Studies, History, Human Biology, Linguistics, Music, Philosophy, Physics, Psychology, and Public Policy.

Dean: Paul A. Brest
Associate Deans: Susan S. Bell, Ellen Borgersen, Frank Brucato, Sally M. Dickson


Associate Professors: Janet Cooper Alexander, Barbara H. Fried, Joseph A. Grundfest (on leave Autumn), Janet E. Halley (on leave Spring), Bill Ong Hing, Linda Mabry, Kim A. Taylor (on leave Spring), Deborah M. Weiss, James Q. Whitman (on leave Autumn, Spring)

Professor (Teaching): William C. Lazier
Senior Lecturer: Ellen Borgersen


Acting Professors: Barbara Caulfield, Jorge A. Vargas, Paul Zarefsky

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 7, 1993. Spring term classes begin on January 18, 1994, and the term ends on May 27, 1994.

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, Spr semester (Rosenhan)
Th 1:15-3:45

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 works of art in time of war, occupation, and civil strife; international traffic in stolen and smuggled cultural treasures; censorship, criticism, selection, and artistic freedom; copyright, moral right, and the proceeds right; art forgery, fakes, and consumer protection in the visual arts; legal relations between artists, dealers, museums, collectors, and auction houses; art forgery, and consumer protection in the visual arts; legal relations between artists, dealers, museums, collectors, and auction houses; tax and estate problems of artists and collectors; legal services for artists; artnapping and insurance; legal problems of art museums, etc.

3 term units, Spr semester (Merryman, 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 (Arrow, Ayres, 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 examining 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 1993-94

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. Also, 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)

345. Psychology and the 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. Prerequisites: law student or graduate standing in psychology or postdoctoral fellow, and consent of instructor.

2 term units or 4 quarter units, Aut (Rosenhan) T 12:45-3, Th 1:45-3, plus section by arrangement

380. Gender, Law, and Public Policy — The way legal norms and social policies affect and are affected by gender. Topics: employment, reproductive rights, sexual violence, and the family. Long paper or series of short written assignments required.

3 term units, Spr semester T 4:15-6:45

381. Health Law and Policy — (Same as Health Policy and Research 210.) Class starts September 7. 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 such as the definition of death and the “right-to-die.” Non-law students admitted by the consent of instructor.

5 units, Aut semester (Greely) MT 11:05-12:35

464. Advanced Issues in Health Law and Policy — (Same as Health Policy and Research 211.) Non-law students admitted with the consent of the instructor. 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 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.

(Greely) not given 1993-94

587. The History and Politics of Sexual Orientation — The role of sexual orientation in individual and social life. Materials from the social sciences, history, literature, and philosophy to systematically examine the theoretical and practical issues posed by the phenomena of different sexualities across cultures and historical periods. Issues: the role of homosexuality in classical Greek culture and philosophy; the relationships between sexual orientation and gender (and between queer theory and feminism); the contemporary controversy between social constructivists and essentialists as to whether sexual orientation is a natural condition or a complex social artifact; the place of sexual orientation in defining individual identity and social roles; the legal, political, and ethical foundations of claims to lesbian and gay male experience and theory.

4-5 units, Win (Kaplan) T 4:15-6:45

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 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)
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 "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 the Graduate Admissions Section of the 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 bulletin School of Medicine. For application materials write: Chair, Committee on Admission, Stanford University School of Medicine, Stanford, California 94305-5301.

COMBINED ADMISSIONS MODE (CAM) IN BIOLOGICAL AND BIOMEDICAL SCIENCES

Director: 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), Robert Fuller (Assistant Professor of Biochemistry), Patricia Jones (Professor of Biology, Director of Program in Immunology), Stuart Leff (Assistant Professor of Pharmacology and Neurosciences Program), David McKay (Professor of Cell Biology), Mark Musen (Assistant Professor of Medicine, Medical Information Sciences 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 14 programs listed above. It has been designed to facilitate 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. Limited non-lab course work continues.

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 1993 application deadlines.

Entry to the CAM program is likely to be highly competitive as only about 10-15 students are admitted each year. CAM represents a unique opportunity to choose from and to experience the diver
sity 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 particular 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: Robert L. Baldwin
Associate Professors: Douglas L. Brutlag, Suzanne R. Pfeffer
Assistant Professors: Patrick O. Brown, Robert S. Fuller, Daniel Herschlag, Mark A. Krasnow

Biochemistry is a department within the School of Medicine. Departmental 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 upon original research, students are required to complete six advanced courses in biochemistry and related areas, and at least three of these courses must be taken in the Department of Biochemistry. Selection of these courses is tailored to fit the background and interests of each student. A second requirement involves the submission of three research proposals which are presented by the student to a small advisory committee of departmental faculty members, who are also responsible for monitoring the progress of student curricular and research programs. All Ph.D. students are expected to participate actively in the departmental seminar program and journal club, and students are encouraged to attend, as well as 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 "Degrees" section in this bulletin. The department does not offer undergraduate degrees.
The Departments of Cell Biology and Biochemistry have a joint admissions program. 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 (Fuller, 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)

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 1993-94

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, can be handled in large numbers, and because their genomes are relatively small. Topics: morphogenesis of virus particles, asymmetric cell division in Caulobacter, spore formation in Bacillus, heterocyst differentiation in Anabaena, cell-cell communication in Vibrio and Saccharomyces, and multicellular development in Myxococcus and Dictyostelium. Lectures, discussions, readings in current literature.

2 units (Kaiser, Shapiro) not given 1993-94

212. Cellular and Molecular Biology of Yeast — The application of sophisticated methods of molecular and genetic analysis for studying the unicellular eukaryote Saccharomyces cerevisiae (baker'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, bio
genesis 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, Spr (Botstein, Davis, Fuller)

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 1993-94

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 1993-94

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.) The flow of information from genome to structure, from structure to biochemical function, and from function to phenotype. Reviews and evaluates current computer methods used in molecular biology. Topics: DNA and protein sequence databases, protein structure databases, sequence alignment, database search, multiple sequence alignment and phylogenies, pattern finding and pattern matching, structure prediction, physical mapping of DNA and genomes. Theoretical and practical component. Future directions in algorithm improvement. Enrollment limited to 40. Prerequisite: 201 or consent of instructor.

3 units (Spudich, Fuller) not given 1993-94

225. Molecular Motors 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. 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 1993-94

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)

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
GRADUATE PROGRAM

DOCTOR OF PHILOSOPHY

A few well-qualified applicants are admitted to the program each year. Applicants should have completed an undergraduate major in the biological sciences; applicants with undergraduate majors in physics, chemistry, or mathematics may be admitted if they complete background training in biology during the first two years of study. During the first year, each student is required to constitute a three-person 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.
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 examination that covers materials relevant to cancer biology and to the special research interests of the individual student. The second is an oral presentation to the Advising Committee of dissertation research or proposed dissertation research. The advising committee shall be 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, Aut, Win, Spr (Staff) alternate years, not given 1994-95

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 into 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 and 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., 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. 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 (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)

233. Antigen Presentation: Critique and Commentary — (Same as Immunology 211, Microbiology and Immunology 233.) For experienced graduate students. Current research in antigen presentation to T lymphocytes focusing on genetics and function of the major histocompatibility complex. Critical review of journal articles, the synthesis of knowledge in related fields, and on the directions for future research. Student preparation of written critiques and reviews and their oral presentation. Enrollment limited to 9. Prerequisite: basic knowledge of immunology.

3 units (Parham) not given 1993-94

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-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)

237. Introduction to Biotechnology — (Same as Biology 237, Chemical Engineering 237, Chemistry 237.) Faculty from the Departments of Biological Sciences, Cell Biology, Chemical Engineering, and 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 biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences and engineering.

3 units (Boxer, Goochee, Kornberg, Yanofsky) alternate years, given 1994-95

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)
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 advanced undergraduates with important current developmental biology. Small groups of students and faculty discuss current papers in depth, augmenting lectures. Team taught by department faculty. Undergraduate prerequisite: consent of instructor. Recommended: familiarity with basic techniques and experimental rationales of molecular biology, biochemistry, and genetics.

5 units, Spr (Baker, Clayton, Fuller, Hogness, Kaiser, Kim, Kingsley, Nusse, Scott, Shapiro, Spudich, Weissman) MWF 10:50

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 and readings in current literature.

2 units (Kaiser, Shapiro) given 1994-95

215. Frontiers in Developmental Biology — Seminar series presents the latest advances in understanding the genetic control of development. Distinguished scientists present research at a seminar every other week and review future directions for research. Background material is presented by reviewing relevant scientific papers. 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 (Nusse, Shapiro)

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, 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) given every 3rd year

299. Molecular and Genetic Medicine — For students about to undertake clerkships. Designed to stimulate ideas about novel applications of basic research in molecular, cellular, and developmental biology to clinical medicine. Topics demonstrate the combined power of observation, experimentation, and advances in technology brought to bear on fundamental problems of biomedical science. Many genes controlling development have crucial roles in disease; the connections between recently discovered classes of regulatory genes and genetically inherited diseases is emphasized. Topics: cell type determination, cell-cell communication, cell migration, master regulatory genes in embryology, and genetic control of sex determination. Lectures stress the problem-solving aspects of research that have been applied to a disease or disease process, and what is known and what remains to be learned. Students participate in mini-symposia on: gene therapy, teratology, and regeneration and healing. Prerequisites: Biochemistry 200, 202, and Genetics 201.

2 units, Win (Scott, Crabtree) M 3:15-5:05
399. Research — Must register by section numbers.  
I-18 units, any quarter (Staff) by arrangement

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 Department of Genetics offers programs of  
graduate study and broadly based research training  
in cytogenetics, human genetics, immunogenetics,  
modern genetics, and genetic approaches to the  
study of cellular and developmental biology. Students  
are generally enrolled in a program leading to the  
Ph.D. degree, 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 preliminary exam may request to  
receive the M.S. degree.

The training program is designed as preparation  
for a career in biomedical research and teaching.  
It provides students with the conceptual and  
experimental tools required by modern geneticists  
to approach biomedical problems of fundamental  
or clinical importance. Former trainees currently  
hold positions at leading universities and research  
institutions around the world as well as in private  
industry.

The program provides formal course work and  
informal seminars and lectures. Primary emphasis  
is on lab research, in close association with one  
or more faculty, so as to prepare students for  
careers as independent scientists. Principal areas for  
research training are concentrated in molecular  
genetics of humans as well as standard experimental  
organisms, notably bacteria, yeast, and fruit flies.  
There are strong research programs in genome stud- 
ies, including linkage and physical mapping in  
human and genomic DNA sequencing in yeast.  
Additional research areas include molecular and  
developmental genetics in bacteria and fruit flies,  
immunogenetics, medical genetics, and population  
genetics. There are opportunities in the area of tech- 
nology and technology development, including cell  
detection and sorting, automation of gene mapping  
and DNA sequencing, and application of computer  
technology to problems in genetics. Interdisciplin- 
ary programs can be arranged with the faculty of  
other departments in the Medical Center in clinical  
genetics, pharmacogenetics, prenatal diagnosis,  
development, and immunology.

Ordinarily, students select areas of research spe- 
cialization after they have explored the various  
scientific opportunities available in the department  
by rotation through the labs of some of the faculty.  
Study for the Ph.D. involves four to five years of  
graduate work, most of which is spent on the stu- 
dents’ dissertation research. A qualifying exami- 
nation is given the second year of study and a for- 
mal thesis proposal is submitted by the student during  
the tenth quarter. Student progress is followed by  
a faculty preceptor and an Advisory Committee.

A grant from the U.S. National Institute of Health  
provides major support for the graduate training  
program in the department. Students who are U.S.  
citizens or permanent residents are eligible to re- 
cieve support from this source. Other student sup- 
port can be provided by departmental funds and  
research grants awarded to individual faculty. In- 
formation about individual fellowship support can  
be obtained from the Fellowship Office, National  
Research Council, 2101 Constitution Avenue N.W.,  
Washington, D.C. 20418, and prospective students  
are encouraged to apply for such support.

For basic University requirements for the Ph.D.  
degree, see the “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, Bio- 
chemistry, Cell Biology, Developmental Biology,  
and Microbiology and Immunology.

201. Human Genetics — Theoretical and experi- 
mental basis for modern genetics emphasizing ex- 
amples from humans. Lectures/reading in all as- 
pects of genetics, including molecular, chromo- 
somal, cellular, developmental, population, and  
medical genetics, emphasizing the latter. Prerequi- 
sites: knowledge of biochemistry and basic gener- 
tics.

4 units, Spr (Cox, Francke) T 10, WTh 9

203. Advanced Genetics — Explores the genetic  
toolbox. Examples of analytic methods and modern  
synthetic genetic manipulation are studied in depth,  
including original papers. Emphasis is on use of  
genetic tools in dissecting complex biological path- 
ways, developmental processes, and regulatory sys- 
tems. Graduate students in any one of the biologi- 
sical sciences are welcome, but those with minimal  
experience in genetics should prepare themselves  
by working through problems in Suzuki, et al, or Hat- 
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 (Calos) alternate years, given 1994-95

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, Spr (Cohen) by arrangement

210. Advanced Human Genetics — For students in the Genetics Ph.D. program and 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 (Staff) by arrangement

260. Supervised Study — Prerequisite: consent of instructor.

any quarter (Staff) by arrangement

270. Genetics Seminar — 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

HEALTH RESEARCH AND POLICY

Lecturers: Kenneth D. Bloem, Irene S. Corso, Margaret Eaton, Sally L. Glaser, David Hopkins, Pamela Horn-Ross, Susan T. Sacks, 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 (Computer Science and Medicine), 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 listed in the current Stanford University bulletin, School of Medicine.

Course work and instruction in the Department of Health Research and Policy conforms to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this bulletin.

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; e.g., 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.
Medical students who intend to pursue careers involving administration may wish to consider course work in the Graduate School of Business.

Applications are considered from persons in the following categories:

1. Medical students interested in problems of health care delivery and policy who seek additional training in the applied social sciences.
2. Graduate students in other academic disciplines, such as business, communication, economics, education, engineering, political science, and sociology who want additional expertise in the application of social science research methods to issues in health care.

Students already admitted to a degree program who wish to be admitted to the M.S. in HSR program must submit a Graduate Program Authorization Petition, available from the Division of Health Services Research office.

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 approved statistics courses 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 2 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 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 Modular #1, rm. 70, Stanford, California 94305-5093.

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-squared 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 Education 493B, Statistics 211.) 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.
3 units, Win (Olkin) MWF 11-12:30

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, Spr (Price) M 7-9 p.m.

210. Health Law and Policy — (Same as Law 381.) Non-law students admitted with the consent of instructor. Class starts September 7. 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, Aut semester (Greely) M 1-3:10, T 1-2

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. Issues of interest through student-guided presentations. Enrollment limited to 18. Prerequisite: 210, 391 or equivalent.

5 units (Greely) not given 1993-94

223. Methods in Clinical and Epidemiological Research: An Applied Approach — (Same as Medicine 223.) Introduces students and postdoctoral fellows to the methods employed in clinical and epidemiological research with human subjects. Topics: the history of epidemiology, observational and experimental study designs, measure of risk, descriptive and analytic statistics, and practical examples of how to conduct epidemiologic studies.

2 units (Winkleby, Fortmann)

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 units, Aut (Kelsey) MW 1:30-3

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: 225 or consent of instructor.

3 units, Win (Nelson) MW 1:30-3

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

229. Epidemiology of Common Chronic Diseases — Reviews epidemiologic aspects of malignant, cardiovascular, reproductive, neurological, and musculoskeletal diseases. Topics: major risk factors such as lifestyle, occupational and environmental exposures, infectious agents, and genetic factors; and methodologic issues specific to each research area.

3 units, Spr (John) TTh 1:15-2:45

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 (Kelsey) W 11:30-1

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 undergraduates (juniors, seniors) 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 the instructor.

5 units, Aut (Spetz) TTh 1:15-3:05

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 (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 the instructor.

2-4 units, Spr (Basch) Th 1:15-3:05

272. International Health Special Studies — Allows students to undertake advanced individual work, either at the University or in the field overseas, on selected health problems of international
scope. Emphasis is on topics covered in 270. Prerequisite: consent of the 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, Win (Bloem, Hopkins) Th 3:15-6

283. Core Seminar — Presentation of research in progress and tutorials in the field of health services research.

1 unit, Aut, Win, Spr (Garber, Hlatky, Owens) W 1:30-3

284. Research Seminar — Invited guests present current research. Credit available to HSR masters candidates only.

1 unit, Aut, Win, Spr (Hlatky) alternate M 4:30-5:30

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 (Enthoven) given 1994-95

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 (Enthoven) MF 8-10

392. Cost-Benefit Analysis in Health Care — (Same as Business 332.) 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 insights into the art of practical application. Prerequisite: graduate student.

4 units (Enthoven) given 1994-95

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

IMMUNOLOGY PROGRAM

Director: Patricia P. Jones (Professor of Biological Sciences)

Committee on Immunology: Yueh-hsiu Chien (Associate Professor of Microbiology and Immunology), Gerald Crabtree (Professor of Pathology), Phyllis Gardner (Associate Professor of Medicine/Clinical Pharmacology), Alan Krensky (Associate Professor of Pediatrics), Gary Nolan (Assistant Professor of Molecular Pharmacology), Jane Parnes (Associate Professor of Medicine/Immunology and Rheumatology), Samuel Strober (Professor of Medicine/Immunology and Rheumatology), Irving Weissman (Professor of Pathology and of Developmental Biology)

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 and Cardiovascular Medicine: Phyllis Gardner (Associate Professor), Kenneth Melmon (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-Ihsiu 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)

Neurology and Neurological Sciences: Lawrence Steinman (Professor)

Pathology: Eugene C. Butcher (Associate Professor), Michael Cleary (Associate Professor), Gerald R. Crabtree (Professor), Edgar G. Engleman (Professor), F. Carl Grumet (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. 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 Pre-doctoral 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 Pre-doctoral 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 Pre-doctoral 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 "Degrees" section in 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 Semi-
nar Series (usually 5-6 p.m. Wednesdays). Students will 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 conforms 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 (Lieber, Staff) MWF 10
202. 3 units, Spr (Staff) MWF 11

211. Antigen Presentation: Critique and Commentary — (Same as Cell Biology 233, Microbiology and Immunology 233.) For experienced graduate students. Current research in antigen presentation to T lymphocytes, focusing on genetics and function of the major histocompatibility complex. Critical review of journal articles, the synthesis of knowledge in related fields, and on the directions for future research. Student preparation of written critiques and reviews and their oral presentation. Enrollment limited to 9. Prerequisite: basic knowledge of immunology.

3 units (Parham) not given 1993-94

220. 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 undergraduate students. 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.

4 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
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) Terrence F. Blaschke (Professor of Medicine), Alan M. Garber (Associate Professor of Medicine), Mark A. Musen (Assistant Professor of Medicine and by courtesy, Computer Science), Richard L. Popp, (Professor of Medicine), Gio Wiederhold (Professor of Computer Science, and Medicine)

Participating Faculty by Department:
Anesthesia: David M. Gaba (Associate Professor)
Biochemistry: Douglas L. Brutlag (Associate Professor)
Business, School of: Alain C. Enthoven (Professor)
Computer Science: Thomas O. Binford (Professor), Edward A. Feigenbaum (Professor), Richard E. Fikes (Professor), Michael L. Genesereth (Associate Professor), Marc Levoy (Assistant Professor), Mark A. Musen (Assistant Professor), Edward H. Shortliffe (Professor), Gio Wiederhold (Professor)
Economics: Victor R. Fuchs (Professor)
Education, School of: Lee S. Shulman (Professor), Richard E. Snow (Professor)
Electrical Engineering: Albert Macovski (Professor), Gio Wiederhold (Professor)
Engineering-Economic Systems: Samuel Holtzman (Consulting Assistant 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 (Associate Professor), Alan M. Garber (Associate Professor), Leslie Lenert (Assistant Professor), Lee B. Lusted (Consulting Professor, emeritus), Mark A. Musen (Assistant Professor), Douglas K. Owens (Consulting Professor), Richard L. Popp (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: Adam Seiver (Clinical Instructor)

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 in 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 upon 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 (e.g., 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 (11 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 11 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 Health Research and Policy (HRP) 200 (Health and Society). A second course may be selected from among MIS 256, MIS 432, 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 "Degrees" section in 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:
Committee:

requirements imposed by the MIS Interdisciplinary
ation in this bulletin. The following are additional
for the doctorate (residence, dissertation, exami-
toral program. The University's basic requirements
informatics should apply for admission to the doc-
careers as independent researchers in medical
research projects.

enabled ability to work effectively in collaborative
research activity by providing them with a height-

1. Completion of the core curriculum.
2. A minimum of 9 additional units composed of
courses in Medical Information Sciences num-
bered 228 or higher, courses in Computer Sci-
ence numbered 137 or higher, courses in Engi-
neering Economic Systems or Statistics num-
bered 200 or higher, courses in Operations
Research numbered 150 or higher, Psychology
256 or 267, or relevant courses in other depart-
ments approved by the student's academic ad-

3. Electives: additional courses to bring total to 54
or more units.

MASTER OF SCIENCE
(SPECIAL PROGRAM)

This special program is designed as post-doc-
toral training for individuals with established re-
search credentials who may wish to acquaint them-
sewly with the field of medical information
sciences, emphasizing formal course work. Can-
didates are required to complete the core cur-
rriculum and to supplement course work with ap-
proved electives to obtain a total of 42 units. A re-
search project is encouraged but not required. Can-
didates 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 height-
ened 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 doc-
toral program. The University's basic requirements
for the doctorate (residence, dissertation, exami-
ination, etc.) are discussed in the "Degrees" sec-
tion in 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 ad-
dition, doctoral candidates are expected to com-
plete two additional courses totaling at least 6
additional units of advanced course work (see
categories under item '2' of the master's pro-
gram requirements). The master's requirements,
including the oral examination, should be com-
pleted by the end of the second year in the pro-
gram (six quarters of study, excluding summers).

Doctoral students are generally advanced to Ph.D.
candidacy after completing the oral examina-
tion. 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 out-
lined from the master's programs above, and must
pass a comprehensive exam covering introduc-
tory 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 require-
ments and apply for admission to candidacy for
the Ph.D. by the end of six quarters of study (ex-
cluding summers).

3. By the end of nine quarters (excluding summers),
each student must orally present a thesis pro-
sal to a dissertation committee that generally
includes at least one member of the Graduate
Study Committee of the MIS program. The com-
mittee 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 stu-
dent 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 dis-
sertation proposal and defense, each student must
secure the agreement of a member of the pro-
gram 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 comple-
tion of the dissertation. The oral defense of the
dissertation proposal satisfies the University oral
examination requirement.

7. The student is expected to demonstrate an abil-
ity to present scholarly material orally and pre-
sents his or her research in a lecture at a formal
seminar.

8. The student is expected to demonstrate an abil-
ity 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 disserta-
tion adviser, a second member of the program
faculty, and a third member chosen from any-
where within the University. The principal ad-
viser 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 the 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

205. Introduction to Clinical Environments — Open only to students in an MIS or Health Services Research degree program. For students not enrolled in the M.D. program or who 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, Shortliffe) 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 — (Same as Computer Science 272.) 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 compared with current investigation in the areas of knowledge representation, user interfaces, knowledge acquisition, and control of inference. Enrollment limited to 20. Prerequisite: Computer Science 221 or 228A, or equivalent.
   2 units (Musen, Shortliffe) alternate years, not given 1994-95
230. Seminar on Knowledge Acquisition for Expert Systems—(Same as Computer Science 525.) 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) W 3:30-5

231. Computer Applications in Molecular Biology—(Same as Biochemistry 218.) The flow of information from genome to structure, from structure to biochemical function, and from function to phenotype. Reviews and evaluates current computer methods used in molecular biology. Topics: DNA and protein sequence databases, protein structure databases, sequence alignment, database search, multiple sequence alignment and phylogenies, pattern finding and pattern matching, structure prediction, physical mapping of DNA and genomes. Theoretical and practical component. Future directions in algorithm improvement. Enrollment limited to 40. Prerequisite: Biochemistry 201 or consent of instructor.
3 units (Bratlag) not given 1993-94

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

256. Economics of Health and Medical Care—(Same as Economics 156/256, Health Research and Policy 256.) Open to graduate students 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, Aut (Spetz)

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—(Same as 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 anti-aliasing 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 248A or 348A, or equivalent.
3 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: 106B or X, 221, and a knowledge of basic statistical measures as in Psychology 60.
3 units, Aut (Buntine, Cheeseman) TTh 2:45-4

432. Cost-Benefit Analysis in Health Care—(Same as Business 432.) 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 and 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, Spr (Enthoven, Garber)

MICROBIOLOGY AND IMMUNOLOGY

Emeriti: (Professors) Sidney Raffel, Robert J. Roantree, Leon T. Rosenberg, Carlton E. Schwerdt, John P. Steward, Bruce A. D. Stocker (Active); (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), Hugh O. McDevitt, James I. Mullins, John Niederhuber (jointly with Surgery/Oncology), Peter Parham (jointly with Cell Biology), Charles Prober (jointly with Pediatrics)
Associate Professors: John C. Boothroyd (jointly with Infectious Diseases and Geographic Medicine), Yueh-hsiu Chien, Abdul Matin, Edward S. Mocarski, Gary K. Schoolnik (jointly with
Infectious Diseases and Geographic Medicine),
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)
Courtesy Associate Professor: Peter O’Harley

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/pathogen 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 some experience in biochemistry and molecular biology, chemistry, and genetics. Deadline for receipt of applications with all supporting materials is December 15.

Applicants must file a report of scores on the general tests and the subject test (normally in biology, molecular biology, or chemistry) of the Graduate Record Examination (GRE). It is strongly recommended that the GRE be taken in 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. Applicants are encouraged to apply 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. Upon entering the department, students meet with their designated supervisor 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 required lab rotations (each usually one quarter). During 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; e.g., 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. (Appropriate backgrounds for these various
areas are required and must be discussed with individual faculty member.)

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. Each week 3-5 problems are to be corrected and discussed. Corequisite: 200.

1 unit, Spr (Goodnow, McDevitt, Weissman) by arrangement

**202. Medical Microbiology** — Limited to medical students and graduate students; others must have consent of the instructor. Lectures on the fundamentals of pathogenic microbiology, including bacteria and animal viruses. Also, some aspects of immunology, lab diagnosis, and preventive measures.

6 units, Aut (Falkow, Tompkins, Mullins, Greenberg, Schoolnik, Arvin, Prober, Relman) TTh 1:15-3:05 F 9-10:50

**203. Biological Stress Response** — Biological stress response to heat, radiation, osmotic changes, nutrient death, etc. has common features that are 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 (Matin, Hahn) alternate years, not given 1994-95


3 units, Spr (Mocarski, Mullins) 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.

2 units (Falkow)

alternate years, given 1994-95

**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, trans-splicing, 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 (Boothroyd, Haldar) alternate years, given 1994-95

**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; autoimmune and other problems in clinical immunology. Prerequisites: biochemistry, basic immunology, consent of instructor (for undergraduates); 211 is a prerequisite for 212.

2 units, Win (Lieber, Staff) MWF 2:15-3:05

2 units, Spr (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 (Chien, Staff) 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 (Goodnow, Staff)

alternate years, given 1994-95
233. Antigen Presentation: Critique and Commentary—(Same as Cell Biology 233, Immunology 211.) For experienced graduate students. Current research in antigen presentation to T lymphocytes focusing on genetics and function of the major histocompatibility complex. Critical review of journal articles, the synthesis of knowledge in related fields, and on the directions for future research. Student preparation of written critiques and reviews and their oral presentation. Enrollment limited to 9. Prerequisite: basic knowledge of immunology.

3 units (Parham) not given 1993-94

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, Frederick A. Fuhrman, Eugene D. Robin
Chair: Richard W. Tsien
Professors: Richard W. Aldrich, Richard H. Scheller, Richard W. Tsien
Associate Professors: W. James Nelson, Stephen J. Smith
Assistant Professors: Brian Kobilka (jointly with Medicine), Richard S. Lewis, V. Daniel Madison, Thomas L. Schwarz
Courtesy Associate Professors: William T. Clusin, Andrew R. Hoffman, Ron R. Kopito, Timothy Meyer

The Department of Molecular and Cellular Physiology is located in the Beckman Center for Molecular and Genetic Medicine, where the department occupies 17,500 square feet, mostly on the first floor.

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 inter-organ communication. The department is developing a special focus on molecular mechanisms controlling excitability, contraction, secretion, neurotransmission, membrane and axonal transport, and other key physiological processes. The research programs draw upon 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 the Graduate Admissions Section of 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. In addition, students must take the Molecular and Cellular Physiology Seminar Series (219) for credit. 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 com-
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 Daniel Madison, Thomas Schwarz, Stephen Smith, and 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 departmental funds, or by extramural funds. Students are encouraged to obtain funding from outside sources (e.g., NIH, NSF, Hughes, etc.).

**COURSES**

Course work and lab instruction in the Department of Molecular and Cellular Physiology conforms 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, Maffly, Jamison; Respiratory: Raffin) MW 10-11:50, Th 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. Reviews, integrates, and enriches physiology of individual organ systems. Discusses genetics and physiology of diseases such as cystic fibrosis, muscular dystrophy, and hypertension.

*2 units, Win (Tsien, Hoffman) MWF 9-10:50*

**210. Molecular and Cellular Physiology** — Required for all 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 upon 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, Spr (Smith, Schwarz, Madison) TTh 1:15-4:05, 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 experimental results, and critical evaluation of evidence. Topics: gating mechanisms in voltage sensitive and chemosensitive ion channels and ionic
mechanisms in sensory transduction. Student presentations and small group discussions.

3 units (Aldrich, Baylor) not given 1993-94

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. Lecture/discussion emphasizes recent research developments and examines the value of various experimental approaches for the study of receptors.

2 units (Kobilka) not given 1993-94


1 unit, Aut, Spr (Staff) T 4:15

221. Cell Biology of Physiological Processes — (Same as Biology 214.) 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, organellar biogenesis, cell division motility and adhesion, and multicellularility. Prerequisites: Biology core, Biochemistry 201.

5 units, Win (Kopito, W. Nelson) MWF 9-10:50

222. Microscopy for Biologists — (Same as Biology 170.) 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. Prerequisites: some college physics, 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 interested, qualified medical or graduate students. Research fields include endocrinology, neuroendocrinology, and topics in molecular and cellular physiology.

any quarter (Staff) by arrangement
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 contemporary 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 Pharmacology conforms to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

BASIC

Pharmacology 201 and 202 provide the medical and graduate student with a broad exposure to the principles of pharmacology and the properties of the major drug groups relevant to the proper use of drugs in man.

201. Pharmacology — Lectures on the principles of pharmacology. Topics: drug-receptor interaction; kinetic aspects of drug absorption, distribution, and elimination; drug metabolism; problems of drug addiction. Major drug groups including those affecting the peripheral nervous system, the cardiovascular system, and the central nervous system. Emphasis is on the mechanisms of action of drugs in relation to their use in man. Prerequisite: biochemistry.

5 units, Aut (Staff) MTWTh 8, F 11

202. Pharmacology — Continuation of 201. Major drug groups include chemotherapeutic agents, antibiotics, antiparasitic drugs, and anticancer agents. Also, toxicology. Emphasis is on the mechanisms of action drugs in relation to their use in man.

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.

207. Signal Transduction and Hormone Action — Molecular mechanisms for transduction and transmission of biological signals. Possible topics: molecular basis for the action of polypeptides including growth factors and interleukins, receptor desensitization, and translocation; tyrosine and serine/threonine kinases; GTP binding proteins. Lecture/discussions.

2 units (Roth) not given 1993-94

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, Aut (D. Goldstein)

221. Biochemical and Genetic Aspects of Chemical Carcinogenesis — Analysis of the multi-step mechanisms by which chemicals produce neoplasia.

2 units (Whitlock) not given 1993-94

225. Frontiers of Pharmacology: Biogenic Amine Receptors — Lectures/discussions on the localization, characterization, and control of different biogenic amine receptors. Emphasis on biochemical and molecular aspects of these receptors in vertebrate and invertebrate animals. Weekly lecture and group analysis of assigned papers. Prerequisite: Biochemistry 200 or equivalent.

2 units (Mansour) not given 1993-94

231. Cell and 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, student, and guest presentations. Prerequisites: introductory biochemistry and molecular biology.

2 units (Blau) not given 1993-94

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, Spr (Staff)

270. Research Seminar — Weekly seminars by outside speakers 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

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 faculty and, if possible, indicate their preference on the application form which is submitted directly to the Neurosciences Program.

Medical students also are encouraged to enroll in the Ph.D. program. The requirements of the Ph.D. program are fitted to the individual interests and time schedules of the student. Postdoctoral training is available to graduates holding Ph.D. or M.D. degrees, and further information is obtained directly from the faculty member concerned.

Research interests of the department include: mechanisms of visual transduction and information transmission in vertebrate retina; structure, function, and development of auditory and visual systems; integrative mechanisms and regeneration in the central and peripheral nervous system; mechanisms of ion channel function; and neuronal growth and differentiation.

Course work and lab instruction in the Department of Neurobiology conforms 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 for general work in neurology, neuropsychology, clinical medicine, and for more advanced work in neurobiology. Lecture and lab components must be taken together.

9 units, Win (Aldrich, Baylor, Knudsen, McMahan, Newsome, Shooter)

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.

3 units, Spr (Schulman)

alternate years, not given 1994-95

216. Ion Channels and Membrane Physiology — (Same as Molecular and Cellular Physiology 216.) For students with some background in neurobiology who wish to learn basic mechanisms of signaling in nerve cells. Reading/discussion of original research papers, emphasizing concepts, quantitative analysis of experimental results, and critical evaluation of evidence. Topics: gating mechanisms in voltage sensitive and chemosensitive ion channels and ionic mechanisms in sensory transduction. Student presentations and small group discussions.

3 units (Aldrich, Baylor)

alternate years, given 1994-95

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 1994-95

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, Spr (Knudsen, Newsome)

alternate years, not given 1994-95

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.

3 units, Aut (Stryer)

alternate years, not given 1994-95
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. This is a no option pass/fail course graded on student presentation and participation.

1 unit, Aut, Win, Spr (Schulman, Staff) T 12

399. Individual Research—Prerequisite: consent of instructor.

1-18 units, any quarter (Staff) by arrangement

Molecular and Cellular Physiology: Richard Aldrich (Professor), Richard S. Lewis (Assistant Professor), Daniel Madison (Assistant Professor), Richard H. Scheller (Professor), Thomas Schwarz (Assistant Professor), Stephen Smith (Associate Professor), Richard Tsien (Professor)

Molecular Pharmacology: Helen Blau (Professor), Stuart Leff (Assistant 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)

Ophthalmology: Michael F. Marmor (Professor)

Pathology: Lawrence F. Eng (Professor, Research)

Psychiatry and Behavioral Science: Roland D. Ciaranello (Professor), William C. Dement (Professor), Seymour Levine (Professor), Dona Wong (Associate Professor)

Psychology: Russell D. Fernald (Professor), John Gabriel (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 predoctoral 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 participating 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 conforms 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**

**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 is applied to a specific research project. Enrollment limited to 10; admission by application.

4 units, Win (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. Taught at Hopkins Marine Station.

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: Biological Sciences 158/258, consent of instructor.

1 unit, Aut, Win, Spr (McConnell) alternate years, not given 1994-95

**MOLECULAR AND CELULAR PHYSIOLOGY**

**213. Special Topics in Molecular and Cellular Physiology** — Seminar of guided reading/discussion in introductory and advanced physiological topics agreed upon by an individual instructor and interested students. Prerequisite: consent of instructor.

(Staff) by arrangement

**215. Synaptic Transmission** — Primarily for graduate students interested in synaptic function; medical students and advanced undergraduates may also enroll. 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, Spr (Smith, Schwartz, Madison)

**MOLECULAR PHARMACOLOGY**

**201. Pharmacology** — Lectures on the principles of pharmacology. Topics: drug-receptor interaction; kinetic aspects of drug absorption, distribution, and elimination; drug metabolism; problems of drug addiction. Major drug groups including those affecting the peripheral nervous system, the cardiovascular system, and the central nervous system. Emphasis is on the mechanisms of action of drugs in relation to their use in man. Prerequisite: biochemistry.

5 units, Aut (Staff) MTWTh 8, F 11

**209. Topics in Molecular Neuropharmacology** — Advanced survey into the action of the neurotransmitters and modulators in the peripheral and central nervous systems. Topics: receptor structure and function, the regulation of receptor sensitivity, control of neuropeptide synthesis and processing, the role of transmitters in regulating gene expression, and neuronal growth and differentiation. Lectures and student presentations. Recommended: introductory biochemistry and neurobiology.

2 units (Leff)

**NEUROBIOLOGY**

**200. The Nervous System** — Introduction to the structure and function of the nervous system, including neuroanatomy, neurophysiology, and neurochemistry. Topics: properties of neurons to the
mechanisms and organization underlying higher functions. Coherent framework prepares for general work in neurology, neuropathology, and clinical medicine and for advanced work in neurobiology. Lecture and lab components must be taken together. 9 units, Win (Aldrich, Baylor, Knudsen, McMahan, Newsome, Shooter)

211. Molecular Basis of Learning and Memory — Explores 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.
3 units, Spr (Schulman) alternate years, not given 1994-95

216. Ion Channels and Membrane Physiology — (Same as Molecular and Cellular Physiology 216.) For students with background in neurobiology who wish to learn the basic mechanisms of signaling in nerve cells. Reading/discussion of original research papers, emphasizing concepts, quantitative analysis of experimental results, and critical evaluation of evidence. Topics: gating mechanisms in voltage sensitive and chemosensitive ion channels and ionic mechanisms in sensory transduction. Student presentations and small group discussions.
3 units (Aldrich, Baylor) alternate years, given 1994-95

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 and present written summaries for discussion.
4 units (McMahan) alternate years, given 1994-95

218. Neural Basis of Behavior — Advanced seminar on 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 discussion, and student presentations. Prerequisite: 200 or consent of instructor.
4 units, Spr (Knudsen, Newsome) alternate years, not given 1994-95

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 and the phosphoinositide cascades; molecular evolution of transducing proteins. The structure and interplay of receptors, enzymes, and ion channels mediating the 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 of their evolution.
3 units, Aut (Stryer) alternate years, not given 1994-95

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.
4 units, Win, Spr (Schulman, Staff) T 12

NEUROLOGY

205. 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

270. 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 plus either 167 or Biochemistry 200 and Neurobiology 200.
3 units, Spr (Wong)

PSYCHOLOGY

1-3 units (Gabrieli)
alternate years, given 1994-95
203. Perception — Topics in visual and auditory perception, emphasizing quantitative and physiological approaches.
1-3 units, Aut (Wandell) MW 11-12:15

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.
3 units (Wandell, Wine) alternate years, given 1994-95

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).
3 units, Spr (Wine)

262. Memory Systems — Recent findings indicating 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, Win (Gabrieli) TTh 2:15-3:30

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 (Rumelhart) alternate years, given 1994-95

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, auditory localization, music perception, attention.
1 unit, Win (Heeger) Th 4-5:15

PATHOLOGY

Emeriti: (Professors): Lysia K. Forno, Bruno Gerstl, David Glick
Chair: Klaus G. Bensch

Associate Professors: Eugene C. Butcher, Michael L. Cleary, Joanne Combleet, Steven K. H. Fong, Michael R. Hendrickson, Robert V. Rouse, Richard K. Sibley, Bruce R. Smoller, Raymond A. Sobel

Assistant Professors: Gerald J. Berry, R. Eric Davis, Susan A. Galel, Sharon M. Geaghan, Michael Lieber, Sara A. Michie, Kent W. Nowels, Donald P. Regula

Senior Research Associates: Hung T. Nguyen, Albert C. Yu

Research Associates: Claudia J. Benike, Peggy A. Bradshaw, William C. Copeland, Debra D. Hiraki, Anita R. Mehta

Assistant Courtesy Professor: Julie A. Neidich

Lecturer: Glen B. Haydon

Acting Assistant Professors: Chih-Lin Hsieh, G. Jackson Snipes

Clinical Professors: James L. Bennington, John T. Differding, Seth L. Haber, John E. McNeal, Mahendra Ranchod

Clinical Associate Professors: Robert W. R. Archibald, Stephen S. Chen, Paul L. Herrmann, Michael D. Lagios, Steven Levine

Staff Physician and Clinical Associate Professor: Maie E. Herrick

Clinical Assistant Professors: Stephen Bell, Robert M. Cardelli, Barbara M. Egbert, Meredith Halks-Miller, Charles M. Lombard, James E. Meeker, William C. Pitts, Thomas W. Rogers, Jon C. Ross, William W. Rugh, Charles T. Uyeda, Sharon H. Van Meter

Staff Physicians and Clinical Assistant Professor: Maritza Gonzalez

Clinical Instructor: Claire Hashimoto

Clinical Assistant Professors: Onsi W. Kamel, Timothy P. Singleton

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 and to qualified graduate students. 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 depression 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 leukogenesis, 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.

** 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.

2 units, Win (Kosek, Fajardo, Forno, Chen, Rouse) MF 3:15-5:15

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) 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. 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 mutagens and carcinogens with DNA. Response of living systems to damaged genetic material, including molecular mechanisms for DNA repair. Enzymology of DNA modification and repair. Inducible repair responses and "error-prone" mechanisms. Human hereditary deficiencies in DNA repair. Relationships of DNA repair and mutagenesis to carcinogenesis. Prerequisite: Biological Sciences 31 or 41, or consent of instructor.

3 units (Hanawalt)

alternate years, given 1994-95

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

Although the department does not offer degrees, its faculty teaches 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 conforms 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


3 units (Staff) alternate years, not given 1994-95

RADIATION ONCOLOGY

Emeriti: Malcolm A. Bagshaw, Robert F. Kallman, Clarence J. Karzmark, Kendric Smith

Professors: J. Martin Brown, Sarah S. Donaldson, Don R. Goffinet, George M. Hahn, Richard T. Hoppe, Daniel S. Kapp

Associate Professor: Steven L. Hancock

Assistant Professors: Eamonn P. Dunphy, Susan J. Knox, Melanie C. Smitt

Assistant Professor (Research): Amato J. Giaccia

Professor (Teaching): Peter Fessenden

Acting Assistant Professor: Joseph C. Poen

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; in radiation biology and tumor biology.
299. Directed Reading
any quarter (Staff) by arrangement

399. Research
any quarter (Staff) by arrangement

RADIOLOGY


Associate Professors: Robert J. Herfkens, Michael E. Mosley, Norbert J. Pelc, F. Graham Sommer, Stuart W. Young

Assistant Professors: Ann C. Bergman, Michael Dake, John Drace, Debra M. Ikeda, Elvira V. Lang, King C. P. Li, Michael Marks, Sandy A. Napel, Geoffrey D. Rubin, George Segall, Charles P. Semba, Daniel M. Spielman

Professor of Radiology (Clinical): Bruce R. Parker

Associate Professors of Radiology (Clinical): Richard A. Barth, Barton Lane, Robert E. Mindelzun, Matilde Nino-Murcia

Although the Department of Radiology does not offer degrees, 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.
1 unit (Jones, Staff)

299. Research
any quarter (Staff) by arrangement
INDEPENDENT RESEARCH LABORATORIES, CENTERS, AND INSTITUTES

Vice Provost and Dean of Research and Graduate Policy: Charles H. Kruger
Associate Dean of Research: Patricia L. Devaney
Associate Dean of Graduate Policy: George G. Dekker

Independent Research Laboratories, Centers, and Institutes perform multi-disciplinary research which 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 Stanford Linear Accelerator Center, which reports to the President and Provost, 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 U.S., 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 which affect Chicanos and other Latinos in American society.

SCCR holds research colloquia for faculty, graduate students, and undergraduates; sponsors public forums, the Annual Ernesto Galarza Lecture each spring; publishes a Working Paper Series; and provides a summer research stipend to an undergraduate or graduate student through its Escobedo Fund. In addition, SCCR sponsors the Latino Leadership Opportunity Program (LLOP), a one-year program of study and practicum designed for undergraduate Latina/o students interested in public policy and governance.

Beginning academic year 1993, SCCR will receive additional grant support from the James Irvine Foundation. Center faculty will mentor and support minority undergraduate and graduate students serving as research assistants on center-based projects.

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 interrelated goals in support of this mission: (1) stimulating graduate student and faculty research on economic policy issues of continuing importance; (2) communicating its findings broadly; (3) building a community of scholars conducting research on policy issues; and (4) linking the policy community at Stanford with decision makers in business, government, and academia.

CEPR is a University-wide research center, involving 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's General Research Program fosters policy research initiatives on newly developing issues in the policy arena. This program also provides seed money funding for junior faculty and for faculty members with an interest in starting research on economic policy issues.


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 that is 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:** Richard H. Pantell  
**Assistant Director:** Marilyne A. Elverson  


**Associate Professors:** David M. Bloom (Electrical Engineering), Aharon Kapitulnik (Applied Physics and Physics)  
**Assistant Professors:** Connie Chang-Hasnain (Electrical Engineering), Martin M. Fejer (Applied Physics)

**Professors (Research):** B. T. Khuri-Yakub (Electrical Engineering)  
**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, and Materials Science and Engineering. The multi-disciplinary foundations of faculty, students, and research provide a dynamic academic environment for a broad spectrum of scientific research interests including fiber optics, laser physics and technology, microwave acoustics, non-destructive evaluation technology, pico-second optical electronics, quantum electronics, superconductors and electronics, 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  
**Associated Faculty:** B. Cabrera (Physics), C. W. F. Everitt (HEPL), J. Lipa (Physics), P. Michelson (Physics), B. Parkinson (Aeronautics and Astronautics), P. Scherrer (Applied Physics), H. A. Schwetman (Physics), T. Smith (Physics), G. Timothy (Applied Physics), J. Turnearue (Physics), A. Walker (Physics and Applied Physics), M. Yearian (Physics)

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.
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; (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 Fellows (internal fellows), Faculty Fellows from other universities (external fellows), and Stanford Graduate Fellows. All fellows are in residence during the academic year and meet regularly.

Faculty Fellows, selected on the basis of an open competition, not only pursue their own research but contribute to the intellectual life of the Stanford community by giving departmental courses or by leading other activities. The courses given by fellows in 1993-94 are shown below:

### COURSES

#### ANTHROPOLOGY
268. "Post" NeoColonialism and Identity  
5 units, Spr (Lavie)

#### CLASSICS
402. The Cynic Movement in Antiquity and its Legacy for Europe  
4-5 units, Aut (Branham)

#### DRAMA
357. Seminar: The Past as Present in Contemporary African American Drama  
3-5 units, Spr (Elam)

#### HISTORY
347B. Graduate Core Colloquium in African History: The Colonial Period  
4-5 units, Spr (R. Roberts)

#### HUMANITIES SPECIAL PROGRAM
160. Introduction to the Humanities Honors Program  
5 units, Aut (Eisen)

#### LAW
587. The History and Politics of Sexual Orientation  
4-5 units, Win (Kaplan)

### PHILOSOPHY
135/235. Wittgenstein: Meaning and Modernity  
3 units, Win (Eldridge)

380. Graduate Seminar: Mind and Action—Animal Awareness  
3 units, Aut (Dretske)

### THE INSTITUTE FOR INTERNATIONAL STUDIES (IIS)

Director: Walter P. Falcon  
Associate Directors: Brigitte Carnochan (External Affairs), Nancy E. Okimoto (Academic Affairs)

IIS coordinates numerous activities at Stanford in the fields of international, comparative, and regional studies. Its mission is to promote excellence in teaching, research, and public service in these fields. It supports the scholarly community at Stanford by strengthening existing programs in international studies, aiding in the formation of new programs, and stimulating the development of an international perspective in subject matter not traditionally regarded as international.

IIS provides the University with a means to plan, finance, inaugurate, and coordinate activities and programs in the international field. It supports Stanford's regional area centers and major research programs in the fields of international security, global environment, and international political economy. IIS raises and administers funds from government, foundation, and private sources to support the University’s activities in the international field and uses these funds in part to finance related faculty research, student fellowships, graduate student field research, library development, and appointment of new faculty members and international visiting professors.

The operations of IIS are University-wide and involve faculty members in the Schools of Business, Education, Humanities and Sciences, Law, Medicine, and scholars from the Hoover Institution. Its relations with departments in the social sciences and humanities are especially close, but it also seeks to develop new programmatic relationships with departments in science, engineering, and the professional schools. Other relationships include the libraries, particularly the library of the Hoover Institution, which houses major native-language collections; the International Relations Program; and the Overseas Studies Program. The institute and Overseas Studies share an interest in developing programs at the overseas campuses that provide more opportunities for Stanford
students and faculty to conduct their research in collaboration with experts abroad. The institute administers the research operations of the Stanford Japan Center, located in Kyoto, Japan.

In the sphere of public service, IIS administers three interrelated programs which develop internationally oriented curriculum for use by public school teachers and provide staff development opportunities for pre-collegiate educators interested in other cultures, world regions, international systems, and foreign languages. Curriculum materials 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), two of several regional centers affiliated with the California International Studies Project (CISP) and the California Foreign Language Project (CFLP), provide staff development activities for pre-collegiate teachers in the Bay Area.

The institute administers, on behalf of two consortia of major universities, the Inter-University Center for Japanese Language Studies in Yokohama and the Inter-University Program for Chinese Language Studies in Taipei. Both centers provide programs for advanced professional training in the Japanese and Chinese languages.

Information on Stanford programs abroad can be found in the “Overseas Studies Program” section of this bulletin. Information on services for foreign students at Stanford, on overseas studies programs administered by universities other than Stanford, and on all matters at Stanford related to visa and immigration issues is available from the Bechtel International Center.

While IIS shares a number of academic faculty appointments with departments or 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, described below. The IIS central office is located at 200 Encina Hall, telephone (415) 723-4581.

RESEARCH CENTERS

The institute administers six research centers: the Asia/Pacific Research Center (A/PARC), the Center for International Security and Arms Control (CISAC), the Environmental Policy Forum, the North America Forum, the Stanford Center for European Studies, and the Stanford Japan Center-Research. Each of these programs brings together Stanford faculty members from several scholarly disciplines and senior specialists from around the world for research projects, seminars and conferences, and international scholarly exchange. Publications from the research programs include special reports, occasional papers, working papers, conference papers, reprints, and books issued through Stanford University Press. Each program within the institute is organized separately with faculty directors, affiliated faculty, research associates, fellows, visiting scholars, and administrative staff. While they are not degree-granting programs, the research centers play an important role in organizing and administering interdisciplinary courses which are cross-listed by many departments.

THE ASIA/PACIFIC RESEARCH CENTER

Co-Directors: Lawrence J. Lau (Professor, Economics), Daniel I. Okimoto (Professor, Political Science)

Director of Research: James H. Raphael

The Asia/Pacific Research Center (formerly the Northeast Asia-United States Forum on International Policy) is a research and training institute with a focus on contemporary political, economic, strategic, and social issues of importance to the Asian region and to the interaction of the United States with the nations in the regions.

Approximately 50 Stanford faculty members are involved with A/PARC as participants in projects and/or as members of the center. In addition, each year the center has visiting fellows from Asia in residence, and graduate research assistants who work under the direction of faculty members on center projects. Research at the center is normally interdisciplinary and collaborative in nature, and seeks to improve knowledge and understanding of topics with significant policy implications. Current projects include studies of the organization and operation of Japanese R&D, U.S.-Japan health care systems and policies, global competition and the future of the computer industry, economic reform and growth in China, the economic and political regionalization of Asia, and Japanese capitalism in historical and comparative perspective.

Training efforts include a course for undergraduate students on “The Rise of Industrial Asia” offered by faculty members associated with the center. A/PARC maintains an industrial affiliates program, and actively interacts with U.S. and Asia public- and private-sector leaders. The center also coordinates research activities between the Stanford Japan Center and the home campus.

A/PARC is located at 200 Encina Hall, telephone (415) 723-9741.

THE CENTER FOR INTERNATIONAL SECURITY AND ARMS CONTROL

Co-Directors: David Holloway (Professor, Political Science), Michael May (Professor—Research, Engineering-Economic Systems)
The Stanford Center for International Security and Arms Control has grown over time from the Arms Control and Disarmament Program first established at Stanford in the early 1970s. Faculty from business, communication, engineering, history, law, medicine, political science, the Stanford Linear Accelerator Center, and specialists from outside the University comprise the membership of the center. Members work collectively on research, training, and outreach related to arms control and international security. Research foci include the development of U.S.-Russian security relations, industrial demilitarization and defense conversion, regional security relationships (with emphasis on the Asian-Pacific region and Central and Eastern Europe), proliferation of advanced weapons technologies, and ethical issues of organized violence in the nuclear age.

The training efforts of the center include an undergraduate lecture course and follow-on seminar taught under the auspices of the Department of Political Science (Political Science 38 and 138B). International Security in a Changing World) and an annual program of visiting fellowships which brings predoctoral and postdoctoral fellows to the center each year from the U.S. and abroad. In addition, a program for science fellows, initiated in 1983, brings midcareer scientists to the center for training in the technical and political aspects of arms control and international security.

The center is located in Galvez House, 320 Galvez Street, telephone (415) 723-9725.

ENVIRONMENTAL STUDIES POLICY FORUM

Co-Directors: Donald Kennedy (President Emeritus, Professor, Biological Sciences); Stephen Schneider (Professor, IIS and Biological Sciences)

Director of Studies: Rosamond Naylor (Fellow, IIS)

The institute provides a campus-wide focus for research activities of faculty and students interested in the multidisciplinary and policy aspects of environmental issues. The Environmental Policy Forum serves as a channel of communication between scholars at the University and international policymakers. Weekly faculty seminars are held on specific research topics, from which emerge integrated multidisciplinary research and policy agendas. In developing research projects, the forum places emphasis on global change: science and policy; population, poverty, and health; agriculture and sustainable development; the conservation of biodiversity; and market-based incentive systems. The forum draws its membership from the Schools of Business, Earth Sciences, Engineering, Humanities and Sciences, Law, and Medicine. The Environmental Studies Forum is located at 200 Encina Hall, telephone (415) 723-5697.

NORTH AMERICA FORUM

Director: William F. Miller (Professor, Business and Computer Science),

Executive Director: Clint E. Smith (Senior Research Scholar, IIS)

The forum originated as the Project on United States-Mexico Relations. With funding from the Hewlett Foundation, the program continues its research into bilateral economics, specifically emphasizing trade and investment, migration, and agriculture. In 1987, the U.S.-Mexico Project became the Americas Program with the intent of studying interdependence among the economies of the Western Hemisphere on a broader level. During the 1992-93 academic year, the program further expanded as a research center focused on North American (U.S., Canada, and Mexico) interdependence and integration. The center has continuing ties with other organizations both within Stanford and at other academic institutions. The program co-sponsors visiting scholars, research assistants, and the development of new curricula.

The forum is located at Littlefield Center, room 14, telephone (415) 723-3096.

STANFORD CENTER FOR EUROPEAN STUDIES

The Stanford Center for European Studies is the focal point for promoting research on Western Europe. It is not a degree-granting program, but encourages students and faculty to include a European component in research and study within the established disciplinary or professional programs. The center concentrates its efforts on increasing interdisciplinary communication among its members and attracting distinguished visitors to the campus. The center sponsors a range of activities: conferences, workshops, special seminars, lectures by European scholars, informal discussion groups, and other similar events. The center brings to the campus each year visiting scholars from Europe. Subject to funding, it also offers post-doctoral fellowships selected through a competitive process and a number of pre-dissertation grants that enable Stanford students to conduct research in Europe during the summer months.

The center is housed in rooms 162K-162N in Building 160 (Department of Political Science), telephone (415) 723-9593.
The Stanford Japan Center in Kyoto includes a research division (SJC-R) established to broaden collaborative research between Stanford and Japan, particularly in the social science, technical, and scientific areas. Research collaboration via the Stanford Japan Center takes place through individual faculty initiatives, extension of existing interdisciplinary research at Stanford to Japan, and new alliances among faculty organized on a project basis. A faculty governing committee at Stanford monitors availability of office space at the center for short-term visits by Stanford faculty and requests for center staff to organize exchanges with Japanese laboratories and research conferences in Kyoto. Interdisciplinary research initiatives focus on the technical and economic dynamics in production, marketing, and R&D in advanced industrial economies and on the implications of information systems breakthroughs for industrial organizations.

The Stanford Japan Center Research is located at 52-2 Okazaki Hoshoji-cho, Sakyo-ku, Kyoto 606, Japan; telephone 75-752-7073; facsimile 75-752-1120. Information on the educational programs at the Stanford Japan Center (Kyoto Center for Japanese Studies and the Stanford Center for Technology and Innovation) can be obtained from the Overseas Studies Program. The campus contact for SJC-R activities is A/PARC at (415) 723-9741.

LANGUAGE AND AREA CENTERS

Stanford has four interdisciplinary language and area programs: African Studies, East Asian Studies, Latin American Studies, and Russian and East European Studies. These are separately organized as centers to coordinate the University’s resources for teaching and facilitate faculty research relating to each area. Participating faculty members come from a broad range of schools and departments, although the large majority of faculty affiliated with the four centers are appointed within the School of Humanities and Sciences. For the most part, area-related courses and seminars are offered within departments. Undergraduate degree and honors programs in East Asian Studies and Latin American Studies are offered within the relevant center; a certificate for concentration in African Studies is available through the Center for African Studies.

Special graduate programs leading to the A.M. in Latin American Studies, East Asian Studies, and Russian and East European Studies are available and are described separately in this bulletin. The area studies programs do not offer the Ph.D., but qualified doctoral candidates may develop an area specialization within their discipline. Students may also design a cross-disciplinary specialization which emphasizes the area interest within an individually organized program of interdisciplinary preparation. For course information, see individual listings under the “School of Humanities and Sciences” section in this bulletin.

UNDERGRADUATE PROGRAMS

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. The program combines a year-long research seminar that builds on prerequisite course work, the preparation of an honors thesis by each student, an oral presentation of honors research and, where relevant, field study related to the central problem under discussion. Students receive 3 units per quarter of active participation in the honors program (minimum of 9 units, maximum of 15 units), granted and graded at the time of thesis completion and acceptance. The thesis is certified by the Interschool Faculty Committee for the program.

By 1994, the institute program expects to provide fellowship funds to support honors research projects and internships in public and private environmental policy organizations.

Courses in environmental studies appear under the course listings of Schools of Earth Sciences, Engineering, and Humanities and Sciences. Information about and applications to this honors program may be obtained from the Environmental Policy Forum, located at 200 Encina Hall, telephone (415) 723-5697.

INTERNATIONAL RELATIONS AND INTERNATIONAL POLICY STUDIES

A special interdisciplinary program in International Relations is one of the largest undergraduate majors offered within the School of Humanities and Sciences. Relevant course offerings are described in the “International Relations Program” section of this bulletin. It is possible for students majoring in International Relations to work simultaneously for a coterminal master’s degree in International Policy Studies (IPS). The IPS graduate program (terminal and coterminal) and relevant course offerings are described in the “International Policy Studies” section of this bulletin.
INTER-UNIVERSITY PROGRAM
FOR CHINESE LANGUAGE
STUDIES IN TAIPEI

The Inter-University Program (IUP) for Chinese Language Studies in Taipei, Taiwan, is sponsored by 10 American universities, with Stanford University as the administrative agency. The program is a cooperative effort drawing upon the accumulated experience of the profession, and provides intermediate and advanced language training to a carefully selected group of students.

The purpose of the program is to provide graduate and undergraduate students with intensive audio-lingual language instruction, as well as to further familiarity with Chinese texts and materials preparatory or leading to research in given disciplinary or professional fields. Instruction normally comprises 20 hours per week. The program is a language-training facility, not a research institution.

Undergraduate, graduate, or postdoctoral candidates are eligible to apply to the academic year and summer intensive programs if they have successfully completed a minimum of two academic years, or the equivalent, of Chinese language study at the college level. Graduates who are currently unaffiliated but intending to apply to graduate programs are also eligible. Applicants must take a screening examination in the Chinese language. Partial fellowship support is available for most students for the academic year program only.

Stanford students attending the Inter-University Program for credit should enroll in Asian Languages C400, Advanced Language Training (15 units per quarter) graded on a Satisfactory/No Credit basis.

For further information write to:
Inter-University Program for Chinese Language Studies
Littlefield Center, Room 14, 300 Lasuen Street
Stanford University
Stanford, California 94305-5013

INTER-UNIVERSITY CENTER
FOR JAPANESE LANGUAGE
STUDIES IN YOKOHAMA

The Inter-University Center for Japanese Language Studies in Yokohama, Japan, is a cooperative enterprise of 15 major academic institutions in the U.S. and Canada, with Stanford University as the administrative agency. The purpose of the center is to provide qualified graduate and undergraduate students with intensive audio-lingual Japanese language instruction, as well as to further the students' familiarity with Japanese texts and materials, preparatory or leading to research in given disciplinary or professional fields. The location of the center in Japan provides maximum opportunities for students to gain fluency in both the written and spoken language in a Japanese-speaking and cultural environment. Language study is carried on in small classes or in individual tutorial sessions by Japanese instructors. Advanced and postdoctoral students may be given opportunities for specialized work in the language, as well as other individual study, depending upon programs established by their home institutions.

The academic year at the center is equivalent to three full quarters, beginning in early September. Any student may apply for admission provided that he or she: (1) is a student in good standing, and is a degree candidate at an accredited university or college, or provides sufficient evidence of intent to enroll in a graduate program after attending the center; (2) will have successfully completed prior to attendance a minimum of two years of Japanese or its equivalent at the college level; and (3) takes a written screening examination in the Japanese language.

Stanford students attending the Inter-University Center for credit should enroll in Asian Languages J400, Advanced Language Training (15 units per quarter) graded on a Satisfactory/No Credit basis.

For further information write to:
Inter-University Center for Japanese Language Studies
Littlefield Center, Room 14, 300 Lasuen St.
Stanford University
Stanford, California 94305-5013

CENTER FOR THE
STUDY OF LANGUAGE
AND INFORMATION

Director: John Perry
Associate Director: Betsy Macken
Associated Faculty: Michael Bratman (Philosophy), Joan Bresnan (Linguistics), Eve V. Clark (Linguistics), Herbert Clark (Psychology), Fred Dretske (Philosophy), John Etchemendy (Philosophy), James Greeno (Education), Martin Kay (Linguistics), Paul Kiparsky (Linguistics), John McCarthy (Computer Science), Grigori Mints (Philosophy), John Mitchell (Computer Science), Julius Moravcsik (Philosophy), Nils Nilsson (Computer Science), John Perry (Philosophy), Stanley Peters (Linguistics), William Poser (Linguistics), David Rumelhart (Psychology), Ivan Sag (Linguistics), Peter Sells (Linguistics), Yoav Shoham (Computer Science), Barbara Tversky (Psychology), Thomas Wasow (Linguistics and Philosophy), Terry Winograd (Computer Science)
Associated Consulting Faculty: Philip Cohen (Linguistics), Per-Kristian Halvorsen (Linguistics), Patrick J. Hayes (Computer Science), David Israel (Philosophy), Ronald M. Kaplan (Linguistics), Lauri Karttunen (Linguistics), Geoffrey Nunberg (Linguistics), C. Raymond Perrault (Philosophy), Stanley. Rosenschein (Computer Science), Brian Cantwell Smith (Philosophy), Annie Zaenen (Linguistics)

The Center for the Study of Language and Information (CSLI) was founded by means of a large gift from the System Development Foundation (SDF), augmented by generous support from Stanford University, Xerox Palo Alto Research Center (PARC), and SRI International. These gifts have been supplemented by sponsored projects and the center’s Industrial Affiliates Program (IAP). The IAP currently has 11 members: ATR Interpreting Telephony Research Labs, Boeing Computer Services, Fujitsu Ltd., Hitachi Ltd., Matsushita Electrical Industrial Co., Mitsubishi Electric Corporation, NEC Corporation, Nippon Telegraph and Telephone Corporation (NTT), Tokyo Electric Power Company (TEPCO), and (as founding members) SRI International and Xerox PARC. CSLI’s core researchers are Stanford faculty and members of research groups at local industrial labs. This core is augmented by visiting IAP researchers, visiting scholars from other academic institutions, and graduate students.

CSLI is devoted to research in the emerging science of information, computing, and cognition. It is an interdisciplinary endeavor, bringing researchers together from academe and industry in the fields of artificial intelligence, computer science, linguistics, logic, philosophy, and psychology. CSLI’s researchers are united by their common interest in the communication and information-processing that ties together people and machines. They are pursuing a wide variety of topics, including robotics design, planning and reasoning, speech recognition, machine-aided translation, language acquisition, text understanding, computer languages, and software design strategies, among others. Roughly half the projects at CSLI deal with languages (natural languages and computer languages), vehicles by which information is communicated between agents. The others deal with a variety of questions involving the acquisition and manipulation of information: how agents acquire and use information to guide action; what information-processing architectures are best suited to various tasks; how representational format affects information processing and human comprehension, and so forth.

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 77 members from the following departments and laboratories): Aeronautics and Astronautics, Applied Earth Sciences, Applied Physics, Chemical Engineering, Chemistry, Civil Engineering, Electrical Engineering, Geology, Materials Science and Engineering, Mechanical Engineering, Physics, Hansen Laboratories, and 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 Laboratory (MRL) Program.

The purpose of MRL 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 so-called “thrust research” — coherent multi-investigator projects in major thrust areas 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 fourteen summer programs for undergraduates; ten programs for women; four seed programs; seven programs for minorities; and five multi-investigator, multi-discipline thrust programs. CMR’s professional staff also conducts research in areas related to advanced materials synthesis and characterization.

STANFORD CENTER FOR ORGANIZATIONS RESEARCH (SCOR)

Director: W. Richard Scott (Professor, Sociology)
Associate Director: Michael T. Hannan (Professor, Sociology and Business)
Administrator: Lisa Hellrich

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
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 inter-university research and research training on organizations. Specific activities in service of these objectives include:

- Developing forums for the discussion of research issues and methods (e.g., conferences, colloquia, seminars).
- Devising and sponsoring new approaches to research training (e.g., intensive workshops focused on specific research skills).
- Developing more effective ties with other organization research centers (e.g., the creation in 1990 of the Consortium of Centers for Organizations Research [CCOR]).
- Providing support for visiting scholars from other universities, over half of whom to date 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 policy-making 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.

Participants in these projects include:

1. **Stanford Faculty and Academic Research Staff:** faculty and staff who present and share the results of their research at the institute while maintaining their appointments in their own departments. Faculty receive help in seeking funds for future projects and are eligible to apply for small research stipends. Institute-affiliated faculty also participate in the Faculty Seminars on Feminist Theory. Over 60 faculty members have been associated with the institute.

2. **Associate Faculty Research Fellows:** through fundraising efforts of institute Associates, an annual award of $10,000 is made to a Stanford faculty member to support research on women and gender.

3. **Fellows in Women’s Health Research Training Program:** six junior faculty members are provided fellowships of $5,000 each for their participation. The program is designed to develop the necessary new paradigm for training future researchers in women’s health.

4. **Graduate Students:** Stanford graduate students work as research assistants at the institute, and have ongoing opportunities for interchange among colleagues and faculty. The institute also houses the Graduate Women’s Network which coordinates student activities. Through the institute, they can obtain exposure to the most advanced thinking in gender-related scholarship.

5. **Undergraduate Students:** projects undertaken at the institute by Stanford faculty sometimes provide undergraduate research or work-study opportunities for students. Available research possibilities are listed through Undergraduate Research Opportunities. Determination of credit is left to the researcher and the student within guidelines established by the appropriate department. Courses are not offered through the institute, but within academic departments. Course information may be located under the “Feminist Studies” section and other departments in this bulletin.

6. **Visiting Scholars:** about half a dozen scholars affiliated with other universities are in residence.
Laboratory (SSRL), a division of SLAC, operates particle detectors. The Stanford Synchrotron Radiation accelerators, and to research and development in particular.

Affiliated Scholars: approximately 20 San Francisco Bay Area scholars working independently without other academic affiliation are selected for two-year renewable terms. This innovative program makes it possible for scholars with advanced degrees, who are not Stanford faculty members, to pursue their own research on women and gender through association with Stanford scholars.

Institute Associates: these are individuals and corporate sponsors who provide financial support to the institute and help extend its research and educational activities to the broader public. Associates attend institute activities and organize seminars designed to transmit the new scholarship on women and gender to the surrounding community.

STANFORD LINEAR ACCELERATOR CENTER

Director: Burton Richter
Deputy Director: Sidney D. Drell
Executive Officer of the Faculty: Martin Perl
Associate Directors: Arthur I. Bienenstock (SSRL Division), Jerry Jobe (Business Services Division), Kaye D. Lathrop (Technical Division), David W. G. S. Leith (Research Division)
Associate Professors: David L. Burke, Lance Dixon, Thomas M. Himel, Rafe H. Schindler
Assistant Professor: Morris Swartz

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.

The two-mile-long linear accelerator can provide electron and positron beams at energies up to 50 GeV. Electron-scattering experiments in the late 1960s, with lower energy beams, established the existence of point-like constituents within the proton — the first evidence for the quark sub-structure of matter. (As a result of these investigations, Professor Richard E. Taylor at SLAC and Professors Henry Kendall and Jerome Friedman at M.I.T. received the 1990 Nobel Prize in Physics.) In addition, polarized electron beams can be produced. In 1978, one of the experiments performed using this beam established the existence of clear connections between the weak and electromagnetic interactions.

The SPEAR electron-positron storage-ring facility experiments resulted in the discovery of the psi particle, for which the 1976 Nobel Prize in Physics was awarded to Burton Richter, and in the discovery of the tau lepton, for which the 1983 Wolfe Prize was awarded to Martin Perl. In 1990 the SPEAR ring was turned over to SSRL.

There are four main areas of elementary particle and accelerator physics research at SLAC. First, since the construction of SPEAR, SLAC has been in the forefront of the contribution and use of electron-positron colliders. In 1980 a second, larger electron-positron colliding beam storage ring, PEP, was built as a collaborative effort between SLAC and the Lawrence Berkeley Laboratory. Throughout the decade of the 1980s, experiments were carried out in all six of the machine's interaction regions, at center-of-mass energies up to 29 GeV. These experiments greatly expanded the knowledge of elementary particles such as the charm quark, the bottom quark, and the tau lepton.

The most recent electron-positron colliding beam facility at SLAC is the first of an entirely new class of accelerators called linear colliders. Extensive modification of the existing two-mile-long linac has resulted in the SLAC Linear Collider (SLC), which can simultaneously accelerate electrons and positrons to beam energies up to 50 GeV. These beams are then separated and guided around two different magnetic arcs to a single collision point. Experiments began in 1988, and since then SLC has been used to produce and study the Z° particle, the neutral mediator ("carrier") of the weak interaction. With a high degree of confidence, these studies established the existence of not more than three kinds of conventional light neutrinos and therefore, by inference, not more than the three "generations" of particles that are presently known within the Standard Model. In 1991, a powerful new de-
tection facility was installed at the SLC interaction region for a continuing experimental program in the important energy region of the $Z'$ resonance. In addition to its utility as a particle physics vehicle, the SLC is a pioneering embodiment of a new colliding-beam technique that carries on Stanford's leading role in high energy electron machines. Continuing development of the linear collider idea is a central element in SLAC's long-term program.

The second area of research at SLAC is the design of a special electron-positron circular collider with asymmetric energies to be used for the intense production of particles containing bottom quarks. Construction of this facility, called a B-Factor, has been proposed to the U.S. Department of Energy. Such a collider will allow experimenters to probe deeply into the physics of the bottom quark, the heaviest quark so far discovered. In the decay of the bottom quark, physicists expect to see a breakdown of one of the fundamental properties of the universe, i.e., that forces and matter behave the same when time is reversed. Breakdown of time reversal, called CP violation, is very rare and occurs in the decays of only one other elementary particle, the K meson.

The third area of research by SLAC physicists concerns the charm quark and the tau lepton. The physicists are now using an electron-positron collider in Beijing, China, which SLAC helped build. In addition, SLAC physicists are helping with a proposal to build a Tau-charm factory in Europe, an electron-positron collider with a thousand times the collision intensity of SPEAR.

The fourth area of research at SLAC, fixed target experiments using uncharged or polarized electron beams or positron beams, continues the tradition which led to the 1990 Nobel Prize in Physics. These experiments are the most precise way to probe and measure the structure and dynamics of nucleons and nuclei, and in the next few years these experiments will be carried out at energies up to 50 GeV.

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. As of June 1993, physicists from more than 130 other institutions have had research programs accepted for execution at the center. The faculty of the center leads a group of some 135 physicists in research programs on theoretical and experimental particle physics. In addition, the faculty offers lecture series on various aspects of high energy physics and conducts seminars on topics of current interest. The SLAC Summer Institute on Particle Physics is an annual meeting which combines pedagogic lectures with a critical review of recent progress in high energy physics.

The experimental research program at SLAC has dealt with almost all areas of elementary particle physics at high energies. The work in theoretical physics deals with all phases of elementary particle theory.

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.

**STANFORD SYNCHROTRON RADIATION LABORATORY (SSRL)**

*Director:* A. Bienenstock  
*Deputy Associate Director:* H. Winick  
*Assistant Directors:* M. Cornacchia, R. Gould, K. Hodgson, P. Pianetta  
*Professors:* A. Bienenstock, S. Doniach, K. Hodgson, P. Pianetta, W. Spicer, H. Wiedemann, H. Winick  
*Assistant Professor:* Z. X. 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.

Synchrotron radiation is electromagnetic radiation emitted by relativistic charged particles curving in magnetic fields. SSRL has 26 experimental stations on the storage ring SPEAR located at SLAC. The radiation emitted from this ring extends from the infrared to 100 keV x-rays with intensity 1,000 to a million times that available from conventional sources. The radiation is used for studies of fundamental properties of matter as well as studies of technological interest. Among the types of basic experimental studies being performed are: atomic physics, non-invasive angio-graphy, photoelectron diffraction, photoemission, spectroscopy, time-
resolved fluorescence spectroscopy, x-ray absorption, x-ray diffraction, x-ray fluorescence analysis, x-ray lithography, and x-ray microscopy. There is also significant research in solving important technological problems in areas that include detecting trace impurities on silicon wafers used in advanced semiconductor manufacturing, investigating industrial semiconductor growth processes, determining the structure of proteins and designing pharmaceutical drugs, studying novel thin film materials for magnetic storage devices, and improving the performance of industrial cracking catalysts.

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.

LIBRARIES AND INFORMATION RESOURCES

Vice Provost for 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.


EMACS Introduction — Introduction to EMACS, the screen-oriented text editor on L&IR’s Distributed UNIX Systems.
0 units, Aut, Win, Spr

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 fileservers. Accelerated class assumes prior knowledge equivalent to that of the beginning course, and covers materials specific to the Macintosh cluster (file and printing services, electronic mail services, and the cluster’s priority system).
0 units, Aut, Win, Spr

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, logging out, features of the UNIX™ file system, useful utilities, creating and editing files, and running applications.
0 units, Aut, Win, Spr

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.
0 units, Aut, Win, Spr

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.
0 units, Aut, Win, Spr
Introduction to Newsgroups — Introduction to the UNIX based news service. Demonstrates the process of reading and submitting news articles.

0 units, Aut, Win, Spr

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 use 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 ES9900 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 thesis; SPIRES, the Stanford-developed data base management system; Prism, the on-line collection of Stanford administrative files and services; and Folio, a system which 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 MVS-ESA 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 micro-mainframe 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 non-credit 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:
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 Data.Center.Maintenance@Forsythe.

Discussion: 

The libraries also produce publications about the libraries' physical facilities, scope of collections, 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 upon 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, audio-visual facility, and language lab.

The libraries also produce publications about physical facilities, scope of collections, and services for those patrons interested in self-learning. Examples include the "Library Resource Guide" distributed in the Stanford Daily each Autumn.

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 also 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."

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 the instructors. Introduction to reference works and library techniques essential to the study of art history and architectural history. Sources of artistic, historical, and cultural information are covered in their printed and automated forms.

4 units, Aut (Ross)
alternate years, not given 1994-95

French 265. Definition and Inquiry: Colloquium on Research Methods in French and Italian Studies—(Same as Italian 302.) Acquaints graduate students with general and specialized resources for French and Italian studies. Emphasis is on overall strategy for research, but with an opportunity to explore bibliographical sources in students' particular fields of interest.

3 units, Aut (Parrine)

Latin American Studies 260. Latin American Bibliography—Open to all graduate students. Introduction to research use of Stanford library collections on Latin American topics.

3 units, Aut (Breedlove)

Slavic Languages 200A,B. Introduction to Slavic Bibliography/Advanced Slavic Bibliography—Beginning level (200A, 1 unit) introduces students to library's bibliographic and book resources, and reference sources in English and Western languages. Advanced level (200B, 2 units) 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 advanced level. Both levels may be taken within one quarter or over two consecutive years.

200A. 1 unit, Aut (Zalewski) W 3:15-4
200B. 2 units, Win (Zalewski) W 4:05-5:15

Music 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 (Cohen, Nagy)

LIBRARIES — COORDINATES

Hoover Institution
See below.

J. Hugh Jackson Library, Graduate School of Business
Director: Tim Wei
Assistant Director/Head Technical Services Librarian: Karen A. Wilson
Head Public Services Librarian/Assistant Director: Robert E. Mayer

Lane Medical Library
Director: Peter Stangl
Deputy Director and Head of Public Services: Valerie Su
Head of Technical Services and Systems Librarian: Dick Miller

Crown Law Library
Law Librarian: Lance E. Dickson
Associate Law Librarian: Rosalee M. Long
Public Service Librarian: J. Paul Lomio

Stanford Linear Accelerator Center Library
Head Librarian: Robert Gex

HOOVER INSTITUTION
ON WAR, REVOLUTION
AND PEACE

Director: John Raisian
Counselor: W. Glenn Campbell
Deputy Director: Charles G. Palm
HOOVER INSTITUTION ON WAR, REVOLUTION, AND PEACE

Associate Directors: Thomas H. Henriksen, Richard Sousa
Assistant Director: Noel S. Kolak
Acting Budget and Finance Officer: Claudia Hubbard
Public Affairs Manager: Gloria J. Walker
Staff Affairs Officer: Helen M. Corrales

Research and Publications
Honorary Fellows: Ronald W. Reagan, Alexander Solzhenitsyn, Margaret Thatcher
Distinguished Fellow: George P. Shultz
Consultant: Yuan-li Wu
Executive Secretary of National, Peace, and Public Affairs Fellows Program: Thomas H. Henriksen

Distinguished Visiting Fellows: Gidon Gottlieb, Jack Kemp, Edwin Meese III, Abraham Sofaer

Library and Archives
Deputy Director: Charles G. Palm
Head Librarian: Judith Fortson
Cataloguing 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 Labour Collection — Honorary Curator: Peter Stansky
Central and West European Collection — Curator: Lewis H. Gann

Russian and Commonwealth of Independent States Collection — Curator: Robert Conquest; Deputy Curator: Joseph D. Dwyer; East Central Europe Collection — Curator: Maciej Sierkierski
East Asian Collection — Curator: Ramon H. Myers; Deputy Curator: Mark Tam

Hanna Education Collection — Curator: Gerald A. Dorfman

Hoover Institution Archives — Archivist: Anne Van Camp; Deputy Archivists: Robert Hessen, Dale Reed; Associate Archivist: Elena Danielson; Assistant Archivist: Carol Leadenham

Latin and North American Collections — Curator: William E. Ratliff

Since its founding by Herbert Hoover in 1919 as a special collection dealing with the causes and consequences of WWI, 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 institution has a resident research staff of historians, economists, educators, political scientists, and sociologists who publish basic research, documentary studies, and current public policy analyses in their respective fields.
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, etc. 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.

In addition to its resident scholars, a limited number of fellowships are granted to visiting scholars each year. Especially important are the National, Peace, and Public Affairs Fellowship Programs, which annually provide approximately 14 scholars the opportunity to pursue advanced postdoctoral research.

The institution also maintains a publications program. In addition to books published by the Hoover Institution Press, research results are disseminated through seminars, conferences, journal articles, lectures, testimony, and the news media.

The many interrelationships with Stanford University include library cooperation, joint and courtesy appointments, co-sponsorship of seminars and lectures, and courses offered by Hoover Institution scholars. Individuals who hold joint appointments as senior fellows and as faculty members in academic departments and schools are John Ferejohn, Terry Moe, and Barry Weingast (Political Science); Robert Hall and Thomas Macurdy (Economics); Edward Lazear and Henry Rowen (Graduate School of Business); Alex Inkeles (Sociology); and Seymour Martin Lipset (Sociology and Political Science). Individuals who hold joint appointments as senior research fellows and as faculty members are Myron Scholes (Graduate School of Business) and Mauro Cappelletti and Kenneth Scott (School of Law).

Fellows of the Hoover Institution who hold professorial appointments by courtesy in academic departments and schools are Larry Diamond (Sociology) and Thomas Sargent (Economics). In addition, Deputy Archivist Robert Hessen holds an appointment as lecturer in the Graduate School of Business.

A number of Stanford faculty members hold senior fellow appointments by courtesy at the Hoover Institution. They include John McCarthy (Computer Science); Kenneth Arrow (Economics); David Brady and Gerald Meier (Graduate School of Business); Peter Duus, Norman Naimark, and Peter Paret (History); Heinz Eulau (Political Science); and Joseph Berger and Nancy Tuma (Sociology). Peter Stansky, Professor of History, is an honorary curator at the Hoover Institution.

Hoover scholars have received many awards and distinctions. Associated with the Hoover Institution are four Nobel laureates, four recipients of the Presidential Medal of Freedom, three recipients of the National Medal of Science, 17 fellows or foreign honorary members of the American Academy of Arts and Sciences, 10 members of the National Academy of Sciences, three members of the National Academy of Education, and eight members of the American Philosophical Society.

The Hoover Institution’s complex includes the tower and two adjacent buildings, one of which is the Herbert Hoover Federal Memorial. An exhibit pavilion displays selected archival and library materials for the public.
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 which cannot reasonably be completed in an existing graduate department or interdisciplinary program. It is administered by the Committee on Graduate Studies (CGS) through a standing subcommittee appointed by the CGS chair which reviews proposals and makes recommendations on admission to CGS.

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) which 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 which originally brought them to Stanford.

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 extant 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.

STATEMENTS 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.

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. Judith Little, Acting 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. Little at (415) 723-3484.

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 contact the Affirmative Action Officer at (415) 723-3484.
POLICY ON THE USE OF VERTEBRATE ANIMALS IN TEACHING ACTIVITIES

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

INFORMATION TO STUDENTS

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

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

PROCEDURES FOR USE OF ANIMALS

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

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

Live vertebrate animals must be cared for according to the Division of Laboratory Animal Medicine policies and procedures governing the use of laboratory animals. Disposal of animal tissue must be in compliance with relevant health and safety regulations.
Following is a guide to Stanford publications of general interest. Requests for these publications and other information about Stanford should be addressed to specific offices at Stanford University, Stanford, CA 94305.

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 visitor's 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 (Bldg. 170).

Minority students, undergraduate and graduate, and their opportunities and experiences at Stanford are addressed in special publications directed to Alaska Natives, American Indians, Blacks, Chicanos, Mexican/Americans, and Puerto Ricans. The Office of Undergraduate Admissions and the Graduate Support Section in the Registrar's Office (Old Union) will respond to requests for the appropriate publication.

Stanford University Bulletins may be obtained as follows: Information is available through the Registrar's Mailroom and the Information Window in the Office of the Registrar (Old Union). Courses and Degrees may be purchased from the Bookstore or by sending a $5.00 check or money order ($5.35 if a California resident; add $2.90 if domestic first class mail 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 Support Section for Information for Prospective Graduate Applicants from Other Countries; 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).

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.).

Conference Planning at Stanford, available at the Conference Office (Encina Commons).


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 and Services (Press 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.

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).
APPENDIX

Courses Certified for 1993-94 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 1993-94. 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 — Courses offered overseas during 1993-94 which satisfy Distribution Requirements are listed at the end of this section following Area 9.

NOTE 4 — 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 the appendix.

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))
STS 1, 2, 3; Technology and Culture (entire sequence must be completed) (not offered 93-94)

AREA 2: WORLD CULTURES

(Area-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 (same as Feminist Studies 140); Sex Roles and Society
†Anthropology 11C; (same as Feminist Studies 140) Gender in Cross-Cultural Perspectives
Anthropology 14; Cultures in Crisis
Anthropology 19; Magic, Witchcraft, and Religion
Anthropology 102; Native Peoples 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 126; The Middle East Through Ethnography
Anthropology 164 (same as Human Biology 134); Ecological Anthropology
Anthropology 165; Psychological Anthropology
Anthropology 168 (same as Human Biology 168); Medical Anthropology
Anthropology 177 (same as Linguistics 162); English Transplanted, English Transformed: Pidgins and Creoles
Anthropology 182A; Archaeology and Education at Zuni Pueblo
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
American Studies 200 (same as History 260A); The American Character: Reflections on American Identity
†American Studies 214 (same as History 262); The American 1960s: Thought, Protest, and Culture
Anthropology 15 (same as American Studies 124C, English 124C, Political Science 92, Spanish 281); Introduction to Chicano Life and Culture
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 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
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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 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 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 44H; Honors Calculus
Mathematics 45H; Honors Calculus
Mathematics 103; Matrix Theory and its Applications
Mathematics 113; Linear Algebra and Matrix Theory
Operations Research 50/150; Models and Applications of Operations Research in Society
Philosophy 57/157; Logic, Reasoning, and Argumentation
Philosophy 138A and 138B or 138C (same as Classics 138A and 138B or 138C; History 138A and 138B or 138C; History and Philosophy of Science 138A and 138B or 138C); Introduction to Cosmology (both courses must be completed to satisfy Area 4 (6))
Philosophy 159 (same as Linguistics 135, Symbolic Systems 159); Basic Concepts in Mathematical Logic
Philosophy 160A (same as Linguistics 136, Symbolic Systems 160A); First-Order Logic
Psychology 50; Statistical Methods
Statistics 40; Chance and Strategy
Statistics 60; Introduction to Statistical Methods I
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
STS 53; The Nature of Mathematics

AREA 5: NATURAL SCIENCES
(Area 7 under the 1980 DR System; Non-Western Culture under the 1980 DR system is indicated by {[*]})
Anthropology 2 (same as Human Biology 1); Genes, Culture, and Human Diversity (*)
Anthropology 6 (same as Human Biology 6); Human Origins
Anthropology 16; Living and Fossil Primates
Biology 1; Introduction to Biology
Biology 11; Biology for Humanists
Biology 50; Biology and the Oceans
Biology 133; Plants and Civilization
Biology 165; Animal Behavior: Ecological and Evolutionary Aspects
Chemistry 31; Chemical Principles
Chemistry 32; Frontiers of Chemical Science
Chemistry 33; Structure and Reactivity
Earth Systems 10; Introduction to Earth Systems
Geological and Environmental Sciences 1; Planet Earth
Geological and Environmental Sciences 2 (same as Earth Systems 110); Earth History
Geological and Environmental Sciences 150; The Oceans: An Introduction to the Marine Environment
Geophysics 10; Plate Tectonics and Geology of California
Human Biology 2A or 3A or 4A; Human Biology Core
Physics 11; Symmetries of Nature
Physics 14; Physics of Music
Physics 15; 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 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 STS 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 STS 51); Nature of Engineering
Engineering 14; Statics and Deformables
Engineering 15; Statics and 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
1
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
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

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 Art
Art 2; Ideas and Forms in Asian Art {*}
Art 3; Introduction to the History of Architecture
Art 10; Introduction to Art
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; Age of Heroes
Classics 12 (same as Drama 153); 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; 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
Slavic Languages and Literatures 145; Survey of Russian Literature in English Translation I: The Age of Experiment
Slavic Languages and Literatures 146; Survey of Russian Literature in English Translation II: The Age of Realism
Slavic Languages and Literatures 147; Survey of Russian Literature in English Translation After 1917
Slavic Languages and Literatures 151; Fyodor Dostoevsky
SLE 91, 92, 93; Structured Liberal Education (entire sequence must be completed and thereby also satisfies Areas 1 and 8 {3})
B) More advanced courses that can still be appropriate:

Art 100A (same as Classics 100A); Ancient Art I
Art 100B (same as Classics 100B); Ancient Art II
Art 103; Late Roman and Byzantine Empire
Art 107; Age of Cathedrals
Art 108; Age of Realism
Art 110A; The Origins of the Renaissance
Art 110B; Early Renaissance Art
Art 110C; High Renaissance Art
Art 115A; Artistic Culture in Italy During the 17th Century
Art 115B; 17th-Century Art in the Low Countries
Art 116; Six Great Artists of the Baroque Age
Art 116A; Art and Architecture in the Age of the Baroque
Art 120A; 18th-Century Art in Europe
Art 120B; Painting in the Age of Revolution
Art 120C; The Age of Naturalism 1830-1874
Art 129; Arts of War and Peace: Late Medieval and Early Japan (*)
Art 130; Early American Culture 1670-1825
Art 130A; 19th-Century Art and Culture
Art 175A; Modern Architecture I
Art 175B; Modern Architecture II
Art 176; American Architecture and Urbanism
Asian Languages 110; Japanese-Western Literary and Cultural Interaction (*)
Asian Languages 131; Chinese Poetry in Translation (*)
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 135; Japanese Drama in Translation (*)
Asian Languages 137; Japanese Fiction in Translation (*)
Asian Languages 138; Modern Japanese Literature in Translation (*)
Asian Languages 142; Constructing the Subject
Asian Languages 181; Japanese Women Writers (*)

English 105; Point of View in Fiction: A Linguistic Approach
English 113; The Renaissance
English 115; Survey of 18th-Century Literature
English 126; 20th-Century American Fiction
English 132G; 19th-Century English Novel
English 133G; 20th-Century Novel in English
English 137; Development of the Short Story
English 160D (same as Communication 128); Cinema and Literature
English 165A (same as History 105A, Medieval Studies 165); Introduction to Medieval Culture

English 167A; Literature of Fantasy
English 173A,B,C (same as Drama 159A,B,C);
Shakespeare
French and Italian 206E (same as Comparative Literature 206E); The Grail in Modern Culture
†French and Italian 233 (same as Comparative Literature 233); Dante’s Divine Comedy
†French and Italian 266E; Women’s Voices in Contemporary Italian Fiction
French and Italian 272E (same as Comparative Literature 272E); Italo Calvino in Translation
French and Italian 281E (same as Comparative Literature 281E); Pirandello, Sartre, and Beckett
German Studies 121; Contemporary German Drama
German Studies 161/161A; Faust
†Religious Studies 112; Sexual Politics in the Ancient World

C) Courses where some foreign language preparation is necessary:

French 130; Middle Ages and Renaissance France
French 131; 17th- and 18th-Century France
French 132; 19th- and 20th-Century France
†French 192; Women’s Writing in France
German Studies 120; Modern Short Prose
German Studies 122; Introduction to German Literature
Italian 127; Italian Literature I
Italian 128; Italian Literature II
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
(One course under the 1980 DR System; Non-Western Culture under the 1980 DR system is indicated by (*))
†Anthropology 152; Symbolic Anthropology
†Anthropology 154 (same as Feminist Studies 147, Religious Studies 154); Creation and Procreation
†Anthropology 160 (same as Feminist Studies 147A, History and Philosophy of Science 160, STS 144); Gender and Science
Asian Languages 142; Constructing the Subject
Classics 18; Greek Mythology
Classics 108; Pagans and Christians
Classics 165 (same as Philosophy 119); Hellenvstic Philosophy
English 65A/165A (same as History 105A, Medieval Studies 165); Introduction to Medieval Culture
†French and Italian 208E (same as Comparative Literature 208E, Feminist Studies 137); Female Saints
French and Italian 281E (same as Comparative Literature 281E); Pirandello, Sartre, and Beckett
German Studies 33A/133; Culture and Politics in Contemporary Germany
†History 37S; Love in the Age of Revolution
History 136A; European Thought in the 19th Century
Philosophy 10; Knowledge, Self, and World
Philosophy 20; Introduction to Moral Theory
Philosophy 30 (same as Political Science 51D, Public Policy 103A); Introduction to Political Philosophy
Philosophy 46 (same as Asian Languages 46, Religious Studies 55); Introduction to Chinese Thought (*)
Philosophy 60 (same as History and Philosophy of Science 60); Introduction to the History and Philosophy of Science
Philosophy 80; Mind, Matter, and Meaning
Philosophy 100 (same as Classics 65); Greek Philosophy
Philosophy 102; Modern Philosophy, Descartes to Kant
Philosophy 138A (same as Classics 138A, History 138A, History and Philosophy of Science 138A); Introduction to Cosmology: Ancient Period
Philosophy 138B (same as Classics 138B, History 138B, History and Philosophy of Science 138B); Introduction to Cosmology: Science and Technology in the Scientific Revolution
Philosophy 138C (same as Classics 138C, History 138C, History and Philosophy of Science 138C); Introduction to Cosmology: Newton to Einstein
Philosophy 151C; History of Political Thought III
Philosophy 175B (same as Political Science 151B); History of Political Thought II
†Political Science 154 (same as Philosophy 175C); Feminist Theory: Gender, Power, and Justice
Religious Studies 1E (same as Philosophy 41); Eastern and Western Conceptions of Self (*)
Religious Studies 5; Basic Issues in Religion
†Religious Studies 8; Religion in America
Religious Studies 11; Religious Classics of Asia (*)
Religious Studies 14; Introduction to Buddhism (*)
Religious Studies 15; Hebrew Bible: Issues of Power
Religious Studies 18; Zen Buddhism (*)
Religious Studies 23; Introduction to Judaism
Religious Studies 24; Introduction to Christianity
Religious Studies 42 (same as Philosophy 42); Philosophy of Religion
Religious Studies 53; Jews and Judaism in America
Religious Studies 65; Introduction to Christian Ethics
†Religious Studies 112 (same as Feminist Studies 155); Sexual Politics in the Ancient World
Religious Studies 142 (same as Classics/History 104); Early Christianity
Religious Studies 164 (same as Philosophy 174); The Morality of Peace and War
Religious Studies 166; Myth and Ritual in Judaism
†Religious Studies 264; Adam and Eve: Sexuality and Gender
SLE 91, 92, 93; Structured Liberal Education (entire sequence must be completed and thereby also satisfies Areas 1 and 7{2})
Sociology 170; Classics of Modern Social Theory
STS 110 (same as Public Policy 103B); Ethics and Public Policy

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 7; Investigating Culture, Introduction to Anthropology {5}
†Anthropology 11C (same as Feminist Studies 140); Gender in Cross-Cultural Perspective {5} (*
†Anthropology 12; Introduction to Feminist Studies
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 118; 20th-Century Chinas {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 145 (same as Feminist Studies 142); 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 155; Food Production, Poverty, and Famine {5}
*Anthropology 160 (same as Feminist Studies 147A, History and Philosophy of Science 160, Human Biology 170, STS 144); 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 177 (same as Linguistics 162); English Transplanted, English Transformed: Pidgins and Creoles {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; Society and Politics in Ancient Greece {5}
Classics 102; Citizens of the Republic {5}
Classics 103; Peace and a Prince: Roman History II {5}
Classics 105; History and Culture of Egypt {5} {*}
*Classics 117; Greek Religion and Society {5}
Classics 120; Athenian Social History {5}
*Classics 190; The Family, Sex, and Marriage in Ancient Rome {5}
Communication 1; Mass Communication and Society {5}
Communication 106/206; Communication Research Methods {5}
Communication 157; Public Information Programs {5}
Communication 169 (same as Sociology 133, STS 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 2; Policy Applications of Elementary Economics {5}
Economics 113 (same as STS 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 31 A/131; Central Europe: Geography, Institutions, and Society {5}
German Studies 58A/158 (same as Linguistics 75); Introduction to the German Languages {4}
German Studies 159/259 (same as Linguistics 176); Introduction to German Dialects {4}
History 155; The Medieval Church and Violence {5}
History 24A; Russian Civilization 9th to 17th Centuries {5} *}
History 80 (same as Latin American Studies 80); Culture, Society, and Politics in Latin America {5}
History 107; Politics and Society in the High Middle Ages: France and Germany 950-1250 {5}
History 109; Society and Culture of the Renaissance {5}
History 115 (same as History and Philosophy of Science 121); Technology and Modern History {5}
History 119; Aristocracy and Absolutism: Early Modern Eastern Europe {5}
History 127D; 20th-Century Germany {5}
History 132B; Modern France from the Enlightenment {5}
History 141; Yorkist and Tudor England 1450-1603 {5}
History 142; Revolutionary England 1603-1689 {5}
History 145; 20th-Century Britain {5}
History 172A; America Since 1945 {5}
*History 173B; 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} {*}
*History 187C; Women in the Contemporary Middle East {5} {*}
*History 205A; Private Lives: Public Stories {5}
*History 207 (same as Feminist Studies 154); Topics in Comparative Women’s History {5}
*History 230A (same as French 189A); Women and Gender in Modern France {5}
History 233A; Modern German Jewry {5}
†History 234; The Family in Early Modern Europe {5}
†History 287A; Modern Jewish Identity {5}
History and Philosophy of Science 152 (same as History 133, Human Biology 152, Philosophy 152,STS 130); The Darwinian Revolution {4}
Human Biology 2B or 3B or 4B; Human Biology Core {4} or {5}
†Human Biology 169; Women, Sexuality, and Health {4}
Latin American Studies 191; Problems in US-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 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}
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} {*}
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} {*}
Political Science 115; Politics in the People’s Republic of China {5} {*}
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} {*}
Political Science 119A (same as History 123A); Soviet History 1917-1993 {5}
Political Science 122G; Political Economy of Contemporary Europe {5}
Political Science 134A; Strategy, War, and Politics {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}
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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
133 (same as Philosophy 133); Hermeneutics and Critical Theory

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
220X (same as Political Science 220X); The Politics of European Integration

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

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
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)

106H (same as Biology 106Z, Human Biology 106H); Man-Environment Interactions: Case Studies

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
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
139W (same as Sociology 139W); English Society in Film and Literature
141V (same as History 141V, Political Science 148X); European Imperialism and the Third World, 1870 - 1970
146V (same as History 146V, English 189Y); Modern African History Through the African Novel
147X (same as Political Science 147X); European Integration: Europe, the U.S.A., and the World
167X (same as Economics 167X); European Economics in a Changing World

PARIS

AREA 7: LITERATURE AND FINE ARTS
(Area 2 under the 1980 DR system)

120X (same as Art 120X); French Painting From 1780 - 1900
178U (same as Art 175Y, Urban Studies 178U); The Architect of Paris

AREA 8; PHILOSOPHICAL, SOCIAL, AND RELIGIOUS THOUGHT
(Area 3 under the 1980 DR system)

132V (same as History 132V); Foundations of French Political Culture: The Old Regime and the French Revolution
230V (same as History 230V); Political Theory of the French Enlightenment

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)

122X (same as Economics 122X); 20th-Century French and European Economies
132V (same as History 132V); Foundations of French Political Culture: The Old Regime and the French Revolution
211 (same as Political Science 211X); Political Attitudes and Behavior in Contemporary France
230V (same as History 230V); Political Theory of the French Enlightenment

OXFORD

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
160Z (same as English 160Z, Feminist Studies 184X); Victorian Women
161Z (same as English 161Z); Literature, Cinema, and Society
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
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