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Stanford, California
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Summer at Stanford and 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

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Editor: Thomas E. Stephens
ACADEMIC CALENDAR 1991-92

AUTUMN QUARTER, 1991

Sep 23-24 (Mon-Tue) Last days to arrange payment of University fees
25 (Wed) Instruction begins
26 (Thu) Conferral of degrees—Summer Quarter
Sep 30-Oct 1 (Mon-Tue) Last day for filing A.B., B.S., and B.A.S. application for January (Autumn Quarter) conferral
Nov 27 (Wed) Centennial Celebration (no classes)
28-Dec 1 (Thu-Sun) Thanksgiving recess (no classes)
Dec 6 (Fri) Last day for filing candidacy applications for Educational Specialist or Engineer degree for April (Winter Quarter) conferral
6 (Fri) Last day for filing University thesis, D.M.A. final project, Ph.D. dissertation, and Notice of Intention for conferral of January (Autumn Quarter) degree
9-13 (Mon-Fri) End-Quarter examinations

WINTER QUARTER, 1992

Jan 6 (Mon) Last day to arrange payment of University fees
7 (Tue) Instruction begins
9 (Thu) Conferral of degrees—Autumn Quarter
20 (Mon) Observance of Martin Luther King Day (holiday, no classes)
30 (Thu) Last day for filing graduate “Notice of Intention” for June commencement diploma
30 (Thu) Last day for filing A.B., B.S., and B.A.S. application for April (Winter Quarter) and June (Spring Quarter) conferral
Feb 17 (Mon) Observance of Presidents’ Day (holiday, no classes)
Mar 8 (Sun) Observance of Founders’ Day
13 (Fri) Last day for filing candidacy applications for Educational Specialist or Engineer degree for June (Spring Quarter) conferral
13 (Fri) Last day for filing University thesis, D.M.A. final project, Ph.D. dissertation, and Notice of Intention for conferral of April (Winter Quarter) degree
16-20 (Mon-Fri) End-Quarter examinations

SPRING QUARTER, 1992

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

SUMMER QUARTER, 1992

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

Sep 1 (Tue) Quarter closes

1992-93
First day of classes Autumn Sep 30
Winter Jan 5
Spring Mar 30
Summer (8-week term) June 22

Last day of finals Autumn Dec 18
Winter Mar 19
Spring June 9
Summer (8-week term) Aug 14

Commencement Autumn June 13
## CONTENTS

### HISTORY OF THE UNIVERSITY

**HISTORY OF THE UNIVERSITY** ........................................... 6

### DEGREES

**DEGREES** ........................................................................ 8

- Undergraduate Degrees ............................................. 8
- Undergraduate Study at Stanford .......................... 10
- Advanced Degrees .................................................. 14

### COURSES OF INSTRUCTION

**COURSES OF INSTRUCTION** ........................................... 20

### GRADUATE SCHOOL OF BUSINESS

**GRADUATE SCHOOL OF BUSINESS** .................................. 21

### SCHOOL OF EARTH SCIENCES

**SCHOOL OF EARTH SCIENCES** ......................................... 22

- Applied Earth Sciences ........................................... 23
- Environmental Studies ............................................ 35
- Geology .................................................................... 36
- Geophysics .............................................................. 46
- Petroleum Engineering ........................................... 53

### SCHOOL OF EDUCATION

**SCHOOL OF EDUCATION** ............................................... 62

### SCHOOL OF ENGINEERING

**SCHOOL OF ENGINEERING** ........................................... 84

- Aeronautics and Astronautics .................................. 99
- Chemical Engineering ............................................. 112
- Civil Engineering ................................................... 116
- Computer Science .................................................. 130
- Electrical Engineering ........................................... 148
- Engineering-Economic Systems ............................. 166
- Industrial Engineering and Management .................. 176
- Materials Science and Engineering ....................... 182
- Mechanical Engineering ........................................ 189
- Operations Research .............................................. 211
- Scientific Computing and Computational Mathematics Program ........................................... 218

### SCHOOL OF HUMANITIES AND SCIENCES

**SCHOOL OF HUMANITIES AND SCIENCES** .......................... 220

- African and Afro-American Studies, 
  Undergraduate Program in .................................... 221
- African Studies ...................................................... 225
- American Studies .................................................. 230
- Anthropology ........................................................ 235
- Applied Physics ..................................................... 248
- Art ........................................................................ 254
- Asian Languages ..................................................... 268
- Astronomy Course Program ................................... 277
- Athletics, Physical Education, 
  and Recreation .................................................... 280
- Biological Sciences ............................................... 292
- Division of Marine Biology 
  Hopkins Marine Station ........................................ 304
- Biophysics Program ................................................. 306
- Black Performing Arts, 
  Committee on ..................................................... 307
- Chemistry ............................................................ 309
- Chicano Fellows Program ....................................... 315
- Children and Society Curriculum ......................... 317
- Classics .............................................................. 318
- Communication ..................................................... 329
- Comparative Literature ......................................... 336

**Cultures, Ideas, and Values** 
  Program in (CIV) ..................................................... 348

**Drama** ........................................................................ 350

**East Asian Studies, Center for (CEAS)** ......................... 359

**Economics** ............................................................. 368

**English** .................................................................... 385

**Ethics in Society, Program in** ......................... 404

**Feminist Studies, Program in** ............................. 406

**Food Research Institute** ............................................ 414

**French and Italian** .................................................. 418

**German Studies** ..................................................... 435

**History** .................................................................... 447

**History of Science, Program in the** ....................... 466

**Human Biology, Program in** ................................. 469

**Humanities Special Programs** .................................... 476

**International Policy Studies (IPS)** ......................... 479

**International Relations** ............................................ 480

**Jewish Studies, Program in** ..................................... 493

**Latin American Studies, Center for** ....................... 499

**Linguistics** ............................................................ 502

**English For Foreign Students** ................................ 514

**Literature in Translation** ......................................... 514

**Mathematical and Computational Science** ................ 516

**Mathematics** .......................................................... 517

**Medieval Studies** .................................................... 528

**Modern Thought and Literature** ......................... 530

**Music** ....................................................................... 536

**Overseas Studies Program** ....................................... 546

**Philosophy** ............................................................ 555

**Physics** .................................................................... 570

**Political Science** ...................................................... 579

**Population and Resource Studies, 
  Morrison Institute for** ........................................... 595

**Psychology** ............................................................. 597

**Public Policy Program** .............................................. 610

**Religious Studies** .................................................... 615

**Russian and East European Studies, 
  Center for (CREES)** ............................................... 623

**Slavic Languages and Literatures** ......................... 628

**Sociology** ............................................................... 637

**Space Sciences and Astrophysics, 
  Center for** ............................................................. 650

**Spanish and Portuguese** .......................................... 652

**Statistics** ............................................................... 666

**Structured Liberal Education, 
  Program in** ............................................................. 674

**Symbolic Systems, Program in** ............................. 674

**Urban Studies, Program in** ...................................... 678

**Values, Technology, Science, and Society, Program in** ................................. 684

### SPECIAL PROGRAMS

**SPECIAL PROGRAMS** .................................................. 692

- Individually Designed Majors, Program for ................... 692

- **Innovative Academic Courses (IAC)** ...................... 693
Peters Seminars for Freshmen and Sophomores .......................... 694
SWOPSI (Stanford Workshops on Political and Social Issues) .......... 694
Undergraduate Special Courses ............................................. 695
Public Service, Haas Center for ............................................. 695
Teaching and Learning, Center for (CTL) .................................. 695
Undergraduate Research Opportunities (URO) ............................. 697
Washington, Stanford in ...................................................... 698

SCHOOL OF LAW .............................................................. 699

SCHOOL OF MEDICINE ....................................................... 702
Combined Admissions Mode (CAM) in Biological and Biomedical Sciences ......................................................... 703
Biochemistry ........................................................................... 704
Cancer Biology Program ....................................................... 706
Cell Biology ............................................................................ 707
Developmental Biology ......................................................... 709
Genetics ................................................................................. 710
Health Research and Policy .................................................... 712
Immunology Program ............................................................ 715
Medical Information Sciences Program .................................... 717
Microbiology and Immunology .............................................. 722
Molecular and Cellular Physiology ......................................... 725
Neurobiology .......................................................................... 727
Neurosciences Program ....................................................... 728
Pathology ................................................................................ 732
Pharmacology ......................................................................... 734
Radiation Oncology ............................................................... 735
Radiology ................................................................................ 736

INDEPENDENT RESEARCH LABORATORIES, CENTERS, AND INSTITUTES .............................................. 738
Chicano Research, Stanford Center for (SCCR) ......................... 738
Economic Policy Research, Center for (CEPR) ............................ 738
Edward L. Ginzton Laboratory ................................................. 739
Hansen Experimental Physics Laboratory, W. W. (HEPL) .......... 739
Humanities Center, Stanford (SHC) .......................................... 739
International Studies, Institute for (IIS) .................................... 740

Chinese Language Studies in Taipei, Inter-University Program for .......................................................... 743
Japanese Language Studies in Yokohama, Inter-University Center for .......................................................... 743
Language and Information, Center for the Study of (CSLI) .......................................................... 744
Materials Research, Center for (CMR) .................................... 744
Mathematical Studies in the Social Sciences, Institute for (IMSSS) .......................................................... 745
Research on Women and Gender, Institute for .......................... 745
Stanford Linear Accelerator Center (SLAC) ............................. 746
Stanford Synchrotron Radiation Laboratory (SSRL) .................. 747

LIBRARIES ........................................................................... 748
Hoover Institution on War, Revolution and Peace ...................... 748
University Libraries ............................................................... 750

LIBRARIES AND INFORMATION RESOURCES .......................................................... 752
Meyer and the Research Branch Libraries .................................. 752
Networking and Communication Systems .................................. 753
Stanford Data Center .................................................................. 753

GRADUATE INTER-SCHOOL PROGRAM ........................................ 755
Graduate Division Special Program .......................................... 755

CONTINUING STUDIES PROGRAM ........................................... 756

STATEMENTS OF NONDISCRIMINATORY POLICY .................................................. 756

POLICY ON THE USE OF VERTEBRATE ANIMALS IN TEACHING ACTIVITIES .................................. 757

UNIVERSITY PUBLICATIONS .................................................... 758

APPENDIX .............................................................................. 760
Distribution Requirements ....................................................... 760

INDEX .................................................................................. 769
Stanford University is celebrating its “Centennial Years” (1985-1991), a period for reflection upon its past, a clearer understanding of its present, and exceptional opportunities to plan its future.

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 Ac-
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 government's recognition of its stake in graduate education, based on wartime experience, were contributing factors. In 1930 Stanford granted 41 Ph.D. degrees. By 1950 the number was 100, and in 1986 it was 517.

The University does not use any racial, religious, ethnic, geographic, or sex-related quotas in admissions. It is committed to the principles of Affirmative Action in the admission of students and in the employment of faculty and staff. Enrollment in Autumn Quarter 1989 totaled 13,354, of whom 6,505 were undergraduates and 6,849 were graduate students. Blacks, Hispanics, Puerto Ricans, and Native Americans numbered 1,220 undergraduates and 581 at the graduate level. Stanford awarded 4,130 degrees in 1988-89, of which 1,621 were baccalaureate and 2,499 were advanced degrees.

Among the 1,324 faculty, there are 8 Nobel laureates, 84 members of the National Academy of Sciences, 134 members of the American Academy of Arts and Sciences, 62 members of the National Academy of Engineering, 12 members of the National Academy of Education, 16 winners of the National Medal of Science, 21 members of the American Philosophical Society, and 5 Pulitzer Prize winners.

On October 12, 1980, the University inaugurated Donald Kennedy as its eighth president. Like Stanford's first president, he too is a widely known biologist and an innovator in education. Dr. Kennedy succeeded Richard W. Lyman whose 10 years in office were as troubled as any since Jordan's time; and yet he presided during a period that not only brought Stanford spectacular growth, but its maturity.

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

- Clark, G. T., *Leland Stanford*, 1931
- Elliott, O. L., *Stanford University: The First Twenty-five Years*, 1937

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 Information issue of the Stanford University Bulletin. 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 upon 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 Values, Technology, Science, 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 A.B. AND B.S. DEGREE PROGRAMS

A Stanford undergraduate may work concurrently toward an A.B. degree and a B.S. degree. A student interested in dual bachelor's degrees should file a statement of intention with the Office of the Registrar's Academic Standing section, Old Union, room 131. 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.

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. Specific requirements affecting second bachelor's degrees are available from the Office of the Registrar's Graduation Assistant, Old Union, room 142.

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 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.

To apply for admission to a coterminal master's program, students must submit to the prospective department the following: coterminal application, statement of purpose, program plan, two letters of recommendation from Stanford professors, and a current Stanford transcript. 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 of residency or three 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 residency of 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 coterminous master’s program may be used to meet the 36-unit University minimum.

For coterminous 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, coterminous students are subject to graduate student policies and procedures, as described in the “Advanced Degrees” section of this bulletin. In the first graduate quarter, a coterminous 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 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 distinguished 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 distinguishing mark of the University is that its faculty is engaged in the discovery and creation of knowledge as well as in its dissemination. Thus, it offers students an unusually rich and varied set of opportunities to gain a liberal education.

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. In most cases, however, a liberal education is not preparation for a particular career or profession. Rather, a liberal education equips the graduate for pursuit of a richer personal and professional life through the enlargement of mind and spirit. It also develops the rigor of mind needed for professional training.

There is no single liberal education, and the purposes served by undergraduate study programs are, quite properly, many and diverse. A governing principle, however, is that 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 have prepared them.

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

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

**THE FRESHMAN WRITING REQUIREMENT**

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

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

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

1. English 1-2, a two-quarter sequence of composition courses. (Note: a few students who demonstrate sufficient skill in the first quarter of the English 1-2 sequence will be exempted from English 2 upon certification by the instructor.

2. English 3, an intensified one-quarter course open only to students with a score of 4 or 5 on the CEEB Advanced Placement Test.

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

4. Approved transfer credit.

A complete list of Freshman English courses is distributed to all entering undergraduates and is also available at the Freshman English 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 (C-US), under the authority of the Senate of the Academic Council, certifies courses nominated by departments that fulfill the Distribution Requirements in the required areas of study. Information regarding specific courses that satisfy the Distribution Requirements and regarding individual student distribution status is available at the Office of the Registrar. Course planning and advising questions related to the Distribution Requirements should be directed to the Undergraduate Advising Center.

It is the responsibility of each student to ensure that he or she has fulfilled the requirements by checking with the Office of the Registrar. This check should be made at least two or three 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 Fine Arts—DR:7

Area 8: Philosophical, Social and Religious Thought—D: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 enter 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 Stanford University bulletin appropriate to their year of entrance or seek the advice of the Registrar’s Graduation Assistant, room 142, 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 and the Registrar’s Graduation Assistant, to the Academic Standing Office, room 131, 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 can satisfy either the distribution program in place at the time of matriculation or the current program of requirements. Such a student should consult the Stanford University bulletin appropriate to the original entrance year or seek the advice of the Registrar’s Graduation Assistant, room 142, 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 bulletin, except for certain honors degree programs that require application and admission in advance, are open to all students. Students may change their majors at any time upon request; in some fields, 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 a field of study has no baccalaureate degree, that field is not available as a regular undergraduate major.

Faculty set the minimum requirements for the major fields of study 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 cognizant 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 142.

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 preliminary academic interest. Freshmen advisers work with advisees each quarter to plan their academic programs; advisers must sign Study List cards 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 signatures on their Study Lists. 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.

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 Majors' Event, 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 quarter 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 Division 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 a Notice of Intention to Com-
plete Advanced Degree Requirements is filed 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 a Notice of Intention to Complete Advanced Degree Requirements 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 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 Registrar's Office Graduate Degree Support section.

**ADDITIONAL DEGREES AND CHANGES OF MAJOR OR DEGREE LEVEL**

Graduate students who wish to obtain an additional degree or change to a new degree program must obtain departmental approval of the Graduate Program Authorization Petition.

Students who seek a degree in another department must submit a statement of purpose and a current Stanford transcript. 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 Notice of Intention to Complete Advanced Degree Requirements is submitted to the Office of the Registrar's Graduate Support section to initiate approval for conferral for all graduate degrees. Preferably, it should be submitted 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 Office of the Registrar's Graduate Support section should be notified in writing when conferral plans change. Students who withdraw their conferral request or who fail to complete degree requirements must file a new Notice of Intention for a subsequent quarter. A separate Notice of Intention is required for each degree and conferral quarter.

**MASTER OF ARTS AND MASTER OF SCIENCE**

Upon recommendation to the Senate of the Academic Council by the faculty of the major department and by the Committee on Graduate Studies, the degrees of Master of Arts (A.M.) and Master of Science (M.S.) are conferred on students who have satisfactorily completed at least three full-tuition quarters of residency as graduate students in the University and have fulfilled other requirements prescribed by the schools or departments concerned. The University minimum unit requirement for the A.M. or M.S. 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 instructor under whose supervision it was prepared, must be submitted to Office of the Registrar, Graduate Degree Support section, on or before the quarterly deadline indicated in the University's academic calendar.

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 instructor under whose supervision it was prepared, must be submitted to the Office of the Registrar, Graduate Degree Support section, on or before the quarterly deadline indicated in the University's academic calendar. A fee is charged for binding three copies of the thesis. Two copies are sent to the University Library and one to the major department.

**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 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 Law School bulletin.

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 Law School bulletin.

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 School of Medicine bulletin.

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 acknowledgment of the student's potential to complete successfully the requirements for the Ph.D. Students are expected to complete departmental qualifying procedures and apply for candidacy by the end of the second year of doctoral study. The Application for Candidacy specifies a departmentally approved program of study to fulfill degree requirements. If the program includes a minor, approval by the department awarding the minor is also required. Doctoral students are expected to complete their degree requirements 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 must be from a department not represented by another committee member.

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 Office of the Registrar, Graduate Degree Support section. 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 and binding copies of the dissertation and for publishing the abstract.

Ph.D. MINOR

A minor may be offered by any Ph.D. granting department or program. Doctoral students from other departments or programs may pursue minors to complement their Ph.D. programs. The minor should represent a program of graduate quality and depth, including core requirements and electives or examinations. The department offering the minor establishes the core and examination requirements. Elective courses are planned in conjunction with the minor department and the Ph.D. department.

The minimum University requirement for a Ph.D. minor is 20 units of course work at the graduate level. 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 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 admission 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 and Distribution Requirements (DR). Effective Autumn Quarter 1991, a new system of Distribution Requirements is in effect. Prior to this current 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 indicates the course fulfills 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 new 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 new 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 February.
GRADUATE SCHOOL OF BUSINESS


Dean: A. Michael Spence

Associate Deans: Charles P. Bonini, Paul R. Johnson, Charles W. Sizemore, Mark A. Wolfson

Assistant Dean: Jeffrey H. Moore


Professor (Teaching): George C. Parker


Courtesee Associate Professors: Timothy F. Brennan, Robert L. Sutton

Senior Lecturers: Steven C. Brandt, Kirk O. Hanson


Visiting Professors: Henri-Claude de Bettignies, Louis H. Masotti, R. Bruce McKem

The Graduate School of Business, since its founding in 1925, has provided 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 and a program leading to the joint J.D./M.B.A. degree.

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

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

For detailed information on programs, curricula, and faculty write to the Graduate School of Business, Stanford University, Stanford, California 94305-5015 for the current bulletin.
The School of Earth Sciences includes the Departments of Applied Earth Sciences, Geology, Geophysics, and Petroleum Engineering. The aims of the school are (1) to prepare students for careers in the fields of engineering geology, environmental studies, 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 by contacting the appropriate department office. 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 curriculum 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 offers an honors program which involves research during the senior year.

**THE EARTH SYSTEMS PROGRAM**

The Earth Systems program was conceived in 1990 to meet new teaching and research needs at Stanford. Senate approval is expected shortly after this bulletin goes to press.

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 taking place today, and in the past, on the planet. Understanding these processes is inherently interesting, and 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 and graduate study with courses from traditional departments, together with courses it has originated. 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 synthetic perspective on 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. Finally, each track concludes with a senior project that provides an opportunity for research experience, work experience, or an internship with a government, conservation, or other appropriate agency. The electives and senior project must be approved by an Earth Systems adviser. Sample senior projects are available at the program office.

**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, e.g., a B.S. in Physics and an M.S. in Geology. Students are encouraged to discuss the coterminal program with their advisors 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 four 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.
UNDERGRADUATE PROGRAMS
BACHELOR OF SCIENCE
EARTH RESOURCES

The Earth Resources program is intended for students whose career objectives include the business and management aspects of earth sciences commodities. The program consists of a basic core and an in-depth option dealing with one of four categories of earth resources commodities. The specializations available are: (1) land, (2) mineral resources, (3) oil and gas, and (4) water. Students from this program have entered graduate work in business, management, and law, as well as the earth sciences.

**BASIC CORE**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mathematics</strong></td>
<td></td>
</tr>
<tr>
<td>AES 190. Fundamentals of Geostatistics</td>
<td>A 3-4</td>
</tr>
<tr>
<td>Comp. Sci. 105A. Introduction to Computers; or Comp. Sci. 106A. Programming Methodology</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>Math. 41, 42, 43. Calculus and Analytic Geometry</td>
<td>A,W,S 15</td>
</tr>
<tr>
<td>Op. Res. 50, 150, 152; or Engr. 62</td>
<td>3-4</td>
</tr>
<tr>
<td>Stat. 60. Introduction to Statistical Methods I</td>
<td>A,W,S,Sum 5</td>
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<td><strong>Total</strong></td>
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**Business and Economics**

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<th>Qtr. and Units</th>
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<tbody>
<tr>
<td>Econ. 1. Elementary Economics</td>
<td>A,W,S 3</td>
</tr>
<tr>
<td>Engr. 60. Engineering Economics</td>
<td>A,W 3</td>
</tr>
<tr>
<td>Indust. Engr. 133. Industrial Accounting</td>
<td>A,Sum 3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>9</td>
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</table>

**Chemistry and Earth Sciences**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
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</thead>
<tbody>
<tr>
<td>AES 180. Analysis of Geologic Structures</td>
<td>S 4</td>
</tr>
<tr>
<td>AES 184. Management of Geologic Hazards</td>
<td>A 3</td>
</tr>
<tr>
<td>Chem. 31. Chemical Principles</td>
<td>A,W,Sum 4</td>
</tr>
<tr>
<td>Geol. 1. Interpreting the Earth</td>
<td>A,W,S,Sum 4-5</td>
</tr>
<tr>
<td>Geol. 80. Rocks and Minerals</td>
<td>S 5</td>
</tr>
<tr>
<td>Geol. 102. Introduction to Field Geology</td>
<td>Sum 3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>23-24</td>
</tr>
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</table>

**Earth Resources**

<table>
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<tbody>
<tr>
<td>AES 1. Introduction to Earth Resources</td>
<td>W 3</td>
</tr>
<tr>
<td>AES 100. Management of Earth Resources</td>
<td>S 3</td>
</tr>
<tr>
<td>AES 145. Mineral Economics</td>
<td>S 3</td>
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**OPTIONS**

**Land**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
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<tbody>
<tr>
<td>AES 130, 131, 132. Environmental Earth Sciences</td>
<td>A,W,S 15</td>
</tr>
<tr>
<td>AES 185. Engineering Geology</td>
<td>S 3</td>
</tr>
<tr>
<td>Urban Studies 170. Introduction to Urban Design</td>
<td>W 5</td>
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<tr>
<td><strong>Total</strong></td>
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</table>

**Mineral Resources**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
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<tbody>
<tr>
<td>AES 120. Introduction to Mineral Deposits</td>
<td>A 3</td>
</tr>
<tr>
<td>AES 124. Mineral Processing and Metal Extraction</td>
<td>A 2</td>
</tr>
<tr>
<td>Chem. 33. Structure and Reactivity or Chem. 135. Physical Chemical Principles</td>
<td>W,S 3-4</td>
</tr>
<tr>
<td>Geol. 170. Introduction to the Chemistry of the Earth</td>
<td>A 4</td>
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<tr>
<td><strong>Total</strong></td>
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</table>

**Oil and Gas**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>AES 251. Oil Field Exploration and Development</td>
<td>S 3</td>
</tr>
<tr>
<td>AES 252. Sedimentary Basins</td>
<td>A 3</td>
</tr>
<tr>
<td>AES 253. Petroleum Geology and Exploration</td>
<td>S 3</td>
</tr>
<tr>
<td>AES 298. Risk Analysis in Petroleum Exploration</td>
<td>S 3</td>
</tr>
<tr>
<td>Geol. 151. Sedimentary Geology and Petrography</td>
<td>W 4</td>
</tr>
<tr>
<td>Geophys. 180. Geologic Interpretation of Reflection Seisograms</td>
<td>W 3</td>
</tr>
<tr>
<td>Pet. Engr. 103. Energy Resources</td>
<td>S 3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>22</td>
</tr>
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</table>

**Water**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
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</thead>
<tbody>
<tr>
<td>AES 230. Hydrogeology</td>
<td>A 5</td>
</tr>
<tr>
<td>AES 258. Role of Fluids in Geologic Processes</td>
<td>S 3</td>
</tr>
<tr>
<td>Civ. Engr. 160. Water Resources</td>
<td>W 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>Engr. 21. Mechanics of Fluids</td>
<td>A,S 4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>22</td>
</tr>
</tbody>
</table>

**ENGINEERING GEOLOGY**

The Engineering Geology program is for students interested in the application of earth sciences data and principles to the planning, design, construction, and maintenance of engineering structures and to the development of surface and ground-water resources. An integral part of the engineering geology program is the development of the knowledge and fundamentals to recognize, adequately characterize, and assess the risks associated with natural geologic hazards such as landslides, earthquakes, volcanic activity, floods, and coastal erosion.

**BASIC CORE**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
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<tbody>
<tr>
<td>AES 180. Analysis of Geologic Structures</td>
<td>4</td>
</tr>
<tr>
<td>AES 184. Management of Geologic Hazards</td>
<td>A 3</td>
</tr>
<tr>
<td>AES 185. Engineering Geology</td>
<td>S 3</td>
</tr>
<tr>
<td>Chem. 31. Chemistry Principles</td>
<td>A,W,Sum 4</td>
</tr>
<tr>
<td>Civ. Engr. 190. Geotechnical Engineering</td>
<td>A 4</td>
</tr>
<tr>
<td>Civ. Engr. 291. Foundation Engineering and Earth Structures</td>
<td>W 3</td>
</tr>
<tr>
<td>Civ. Engr. 293. Experimental Soil Mechanics Laboratory</td>
<td>W 1</td>
</tr>
</tbody>
</table>
COMP. SCI. 106A. Programming  
Methodology  A,W,S  5

Engr. 10. Applied Mechanics: Statics  A,W,S  3

Engr. 11. Mechanics of Materials I  W,S  4

Engr. 21. Mechanics of Fluids  A,S  3

Geol. 1. Interpreting the Earth  A,W,S,Sum  4-5

Geol. 2. Earth History  A  3

Geol. 3. Earth History Laboratory  A  2

Geol. 80. Rocks and Minerals  S  5

Geol. 102. Introduction to Field Geology  Sum  3

Math. 41, 42, 43. Calculus and Analytic Geometry  A,W,S  15

Phys. 51. Mechanics  W  4

One course from the following:
AES 230. Hydrogeology  A  5
AES 280. Rock Mechanics and Advanced Structural Geology  A  3-4

Engr. 50. Introduction to Science of Materials  W,S  3

Geophys. 190. General Geophysics  A  4

Geophys. 191. Geophysical Field Techniques  A  3

Mech. Engr. 111. Stress, Strain, and Strength  A  3

Total 76-79

ENVIRONMENTAL PROGRAMS

Two programs are offered: Environmental Earth Sciences and Land Resources Planning. Both have a common core that provides a basic environmental and geological background and analytical tools. In addition, each has individual requirements consistent with its objectives.

COMMON ENVIRONMENTAL CORE

Course No. and Subject  Qtr. and Units
AES 1. Introduction to Earth Resources  W  3
AES 130, 131, 132. Environmental Earth Sciences  A,W,S  15


AES 184. Management of Geologic Hazards  A  3

Chem. 31. Chemical Principles  A,W,Sum  4


Geol. 1. Interpreting the Earth  A,W,S,Sum  4-5

Geol. 80. Rocks and Minerals  S  5

Geol. 102. Introduction to Field Geology  Sum  3

Math. 19, 20. Calculus and Analytic Geometry  or Math. 41  5-6

Stat. 60. Introduction to Statistical Methods I  A,W,S,Sum  5

Environmental Core Subtotal  55-57

ENVIRONMENTAL EARTH SCIENCES

This program is for students primarily interested in the Earth Sciences aspects of the environment. Former students have entered graduate programs in city and regional planning, engineering, landscape and architecture, law, and sciences.

Course No. and Subject  Qtr. and Units
Common Environmental Core  55-57

AES 180. Analysis of Geologic Structures  S  4

AES 185. Engineering Geology  S  3

Geol. 2. Earth History  or Geol. 150. The Oceans: An Introduction to the Marine Environment  3

Chem. 135. Physical Chemical Principles  W,S  3


Hum. Biol. 2A. Genetics, Evolution, and Ecology  A  4

Math. 42, 43, or the equivalent  10

Phys. 21, 22, 23, 24. Elementary Physics (students intending to enter graduate programs in science and engineering should substitute two courses from Phys. 51 series)  A,W  8

Urban Studies 170. Introduction to Urban Design  W  5

Total 99-101

LAND RESOURCES PLANNING

This program prepares students for graduate study in city and regional planning, conservation, landscape architecture, law, resource management, and allied fields. It is not designed for students intending to enter graduate study in engineering or science.

Course No. and Subject  Qtr. and Units
Common Environmental Core  55-57

AES 145. Mineral Economics  S  3

Civ. Engr. 170. Environmental Science and Technology  A  3

Civ. Engr. 171. Environmental Planning  W  4

Econ. 1. Elementary Economics  A,W,S  5

Geol. 2. Earth History  A  3

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

Urban Studies 170. Introduction to Urban Design  W  5

One course from:
Urban Studies 110. Introduction to Urban Studies  A  5

Urban Studies 131. Managing Local Government  S  4

Urban Studies 151. Urban Growth and Change  A  5

Urban Studies 171. Urban Design Studio  S  5


One course from:
Anthro. 146. Urban Problems in Anthropological Perspective  W  5

Food Res. Inst. 121. Development and Population Interaction from the Third World  W  5

One course from:
Art 3. Introduction to the History of Architecture  S  5

Art 175A,B. Modern Architecture I or II  W,S  4
HONORS PROGRAM

The department offers a program leading to the B.S. degree in Applied Earth Sciences with Honors. It is available to seniors having letter grade indicators of at least 3.5.

1. Students should find a research project, either theoretical, or field, 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 AES 199.
4. Upon completion, a written report of the work is required for honors.
5. Before the end of the year, each honors candidate gives a seminar on his or her work. This seminar is announced publicly and is open to the general audience.
6. The decision as to whether a given independent study project does or does not merit an 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 entire academic record.
7. The work done on the honors program should not be used as a substitute for regularly required courses.

GRADUATE PROGRAMS

The department's graduate programs prepare students for careers focused on application of the earth sciences in mineral, energy, and water resources, and environmental management. The programs lead to the M.S., Engineer, and Ph.D. degrees. Diplomas designate the program completed. Typical curricula are described below, but individually tailored interdisciplinary curricula are encouraged.

Graduate students must maintain a letter grade indicator of "B" in the School of Earth Sciences and equivalent status in other schools.

HONORS COOPERATIVE PROGRAM

A number of industrial firms, government laboratories, and other organizations participate in the Honors Cooperative Program (HCP), a plan which permits qualified professional employees to register for Stanford graduate courses on a part-time basis.

MASTER OF SCIENCE

The University's requirements for M.S. degrees are outlined in the "Advanced Degrees" section of this bulletin.

Applied Earth Sciences (AES) requires a minimum of 45 units of course work including the departmental Core Curriculum. A thesis is required, but no more than 15 units of thesis research may be used to satisfy the 45-unit basic requirement. Some students will be required to make up background deficiencies. No more than 9 units of deficiencies may be applied toward satisfaction of the basic 45-unit requirement.

Each student must take the Core Curriculum and one Specialization Core Curriculum.

REQUIRED BACKGROUND COURSES

Courses listed under this requirement are "deficiencies" if taken during the M.S. career at Stanford:
- Calculus and Analytic Geometry: the equivalent of Math. 41, 42, and 43.
- General Geology: the equivalent of Geology 1.
- Mineralogy and Petrology: the equivalent of Geology 80.
- Skill in a computer programming language: the equivalent of Comp. Sci. 106A.

REQUIRED M.S. CORE CURRICULUM

18-27 total units must be in the required Departmental Core.

Course No. and Subject

<table>
<thead>
<tr>
<th>Units</th>
<th>Course Name and Description</th>
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</thead>
<tbody>
<tr>
<td>3-4 units. One course from:</td>
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<tr>
<td>AES 120. Introduction to Mineral Deposits</td>
<td>3</td>
</tr>
<tr>
<td>AES 180. Analysis of Geologic Structures</td>
<td>3</td>
</tr>
<tr>
<td>AES 185. Engineering Geology</td>
<td>3</td>
</tr>
<tr>
<td>Geol. 170. Introduction to the Chemistry of the Earth</td>
<td>4</td>
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<tr>
<td>Geoph. 191. Geophysical Field Techniques</td>
<td>3</td>
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<tr>
<td>3-5 units. One course from:</td>
<td></td>
</tr>
<tr>
<td>AES 133. Measurement of the Environment: Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>AES 277. Field Mapping of Mineral Deposits</td>
<td>3</td>
</tr>
<tr>
<td>Geol. 102. Introduction to Field Geology</td>
<td>3</td>
</tr>
<tr>
<td>Geophys. 180. Geologic Interpretation of Reflection Seismograms</td>
<td>3</td>
</tr>
<tr>
<td>Geophys. 190. General Geophysics</td>
<td>4</td>
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<td>Pet. Engr. 150. Well Log Analysis</td>
<td>3</td>
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<td>6-8 units. Two courses from:</td>
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<tr>
<td>AES 190. Fundamentals of Geostatistics</td>
<td>3-4</td>
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<tr>
<td>Math. 103. Matrix Theory and Its Applications</td>
<td>3</td>
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<tr>
<td>Math. 130. Ordinary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>Stat. 116. Theory of Probability</td>
<td>3-4</td>
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</table>
3-5 units. One course from:
AES 290. Geostatistics for Spatial Phenomena 5
AES 292. Computer Simulation in Geology 3
AES 298. Risk Analysis in Petroleum Exploration 3
Engr. Eco. Syst. 31 or 231. Decision Analysis 3

3-5 units. One course from:
AES 253. Petroleum Geology and Exploration 3
AES 255. Introduction to Groundwater Solute Transport 3
AES 258. Role of Fluids in Geologic Processes 3
AES 280. Rock Mechanics and Advanced Structural Geology 3-4
AES 291. Practice of Geostatistics on Exhaustive Data Bases 3-5

GEOLOGIC REMOTE SENSING

This program covers a wide range of inter-related topics, best understood with a strong geologic background. Specializations may be taken in the following application areas, each with its own set of further requirements: Exploration/Ore Deposits, Exploration/Petroleum, or Geomatics.

Students with non-geologic undergraduate degrees will be considered but are expected to correct academic deficiencies.

**REQUIRED CORE CURRICULUM**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
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</thead>
<tbody>
<tr>
<td>AES 180.* Analysis of Geologic Structures</td>
<td>S 4</td>
</tr>
<tr>
<td>AES 233.* Measurement of the Environment II: Research in Applications</td>
<td>S 3-5</td>
</tr>
<tr>
<td>AES 252. Sedimentary Basins</td>
<td>A 3</td>
</tr>
<tr>
<td>AES 280.* Rock Mechanics and Advanced Structural Geology</td>
<td>alt. A 3-4</td>
</tr>
<tr>
<td>AES 290.* Geostatistics for Spatial Phenomena</td>
<td>W 4-5</td>
</tr>
<tr>
<td>AES 292.* Computer Simulation in Geology</td>
<td>W 3</td>
</tr>
<tr>
<td>Geophys. 190.* General Geophysics</td>
<td>A 4</td>
</tr>
<tr>
<td>Total</td>
<td>24-26</td>
</tr>
</tbody>
</table>

**REQUIRED SPECIALIZATION CURRICULUM**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
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</thead>
<tbody>
<tr>
<td>AES 120.* Introduction to Mineral Deposits</td>
<td>A 3</td>
</tr>
<tr>
<td>AES 190.* Fundamentals of Geostatistics</td>
<td>A 3-4</td>
</tr>
<tr>
<td>AES 296. Advanced Photogeology and Radar</td>
<td>alt. W 3-4</td>
</tr>
<tr>
<td>AES 297. Lithological Mapping</td>
<td>alt. W 3-4</td>
</tr>
<tr>
<td>Geophys. 180. Geologic Interpretation of Reflection Seismograms</td>
<td>W 3</td>
</tr>
<tr>
<td>Total</td>
<td>16-22</td>
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</tbody>
</table>

**OPTIONAL**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engr. Eco. Syst. 234. Artificial Intelligence for Decision Analysis</td>
<td>A 4</td>
</tr>
</tbody>
</table>

Math. 130. Differential Equations A,W,S 3

Total.............................................................. 7

* Denotes AES core curriculum courses

GEOMATHEMATICS IN PROCESS SIMULATION AND PETROLEUM RESOURCE ANALYSIS

This program focuses on the use of mathematics in exploration for petroleum and in analyzing petroleum resource potential. Stress is placed on analyzing and simulating petroleum-bearing sedimentary basins, including the use of detailed, dynamic three-dimensional computer simulation models that represent interdependent geologic processes that create sedimentary basins.

The program has two divisions: (1) Geomathematics in Petroleum Exploration and Resource Analysis, and (2) Geomathematics in Geological Process Simulation. The following courses form the general curriculum for the divisions and include courses selected from the Applied Earth Sciences (AES) core curriculum. Substitutions based on research needs may be approved by petition. A formal thesis is required for the M.S. degree.

**GEOMATHEMATICS IN PETROLEUM EXPLORATION AND RESOURCE ANALYSIS**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>AES 251. Oil Field Exploration and Development</td>
<td>S 3</td>
</tr>
<tr>
<td>AES 252. Sedimentary Basins</td>
<td>A 3</td>
</tr>
<tr>
<td>AES 253.* Petroleum Geology and Exploration</td>
<td>S 3</td>
</tr>
<tr>
<td>AES 258.* Role of Fluids in Geologic Processes</td>
<td>alt. S 3</td>
</tr>
<tr>
<td>AES 292.* Computer Simulation in Geology</td>
<td>W 3</td>
</tr>
<tr>
<td>AES 298.* Risk Analysis in Petroleum Exploration</td>
<td>W 3</td>
</tr>
<tr>
<td>Geophys. 180.* Geologic Interpretation of Reflection Seismograms</td>
<td>W 3</td>
</tr>
<tr>
<td>Math. 103.* Matrix Theory and its Applications</td>
<td>A,W,S 3</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
</tr>
</tbody>
</table>

**GEOMATHEMATICS IN GEOLOGICAL PROCESS SIMULATION**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>AES 230. Hydrogeology</td>
<td>A 5</td>
</tr>
<tr>
<td>AES 252. Sedimentary Basins</td>
<td>A 3</td>
</tr>
<tr>
<td>AES 280.* Rock Mechanics and Advanced Structural Geology</td>
<td>alt. A 3</td>
</tr>
<tr>
<td>AES 292.* Computer Simulation in Geology</td>
<td>W 3</td>
</tr>
<tr>
<td>Civ. Engr. 262. Transport and Mixing in Surface Water Flows</td>
<td>W 3</td>
</tr>
<tr>
<td>Civ. Engr. 263. Modeling Environmental Flows</td>
<td>S 4</td>
</tr>
<tr>
<td>Civ. Engr. 264. Hydrodynamics</td>
<td>A 3</td>
</tr>
<tr>
<td>Engr. 21. Mechanics of Fluids</td>
<td>A,S 4</td>
</tr>
</tbody>
</table>

Total 31

* Denotes AES Core Curriculum courses

Additional courses may be selected from other departments, with choices influenced by the student's interests and relevance of the courses to the thesis topic. Students are expected to begin work on a thesis not later than the beginning of the third quarter of enrollment in the program. Relevant courses include those in computer science, decision analysis, engineering-economic systems, fluid mechanics, geology, geophysics, geostatistics, operations research, petroleum reservoir analysis, statistics, and well-log analysis. Up to 12 credit units may be received for thesis research for the M.S. degree.

GEOMECHANICS

Graduate students may specialize in the Geomechanics program by arranging a curriculum of courses and research, tailored to their specific needs, that is approved by petition to the faculty. This curriculum should include the Department of Applied Earth Sciences M.S. core Curriculum, AES 280, 282, 386A,B,C, Geophysics 262, 288, and 290. Courses are offered in the School of Earth Sciences and the School of Engineering to round out the curriculum. In particular, courses from the fields of applied mechanics, geology, and materials science are recommended. A list of these is available upon request. A thesis is required for the M.S. degree. Correspondence with Professor Pollard before application is suggested to clarify the nature of the program.

Research opportunities in geomechanics involve problems related to earthquake and volcanic hazards and to the recovery of natural resources. The focus is on rock fractures including faults, dikes, veins, joints, and solution surfaces. Students characterize fractures by detailed geologic mapping of ancient and active structures. Solid, fluid, and fracture mechanics are used to analyze the fracture processes, and experimental investigations include physical and numerical model studies of crack propagation. Current fracture research ranges from investigations of microcracks, to out-crop scale studies of faults and joints, to crustal deformation. Effective research projects combine field mapping, laboratory investigation, and theoretical analysis.

GEOSTATISTICS FOR NATURAL RESOURCES MANAGEMENT

Program applicants are expected to have an undergraduate background in earth sciences (geology, mining, petroleum, and civil engineering). The program is open to B.S. students in Math./Statistics, provided they make up for any deficiency in geology (Geol. 1 and 80).

The program focuses on the probabilistic modeling of reservoirs/ore deposits/environmental sites, in view of their development and/or management. Numerical models for the space/time distribution of site attributes (porosity-permeability-mineral grades) are generated to assess the need for additional data, predict recovery performance, and plan production (mining, oil recovery, pollution control, etc.).

SPECIALIZATION CURRICULUM

Course No. and Subject Qtr. and Units
AES 290. Geostatistics for Spatial Phenomena W 5
AES 291. Practice of Geostatistics on Exhaustive Data Bases S 5
AES 293. Topics in Advanced Geostatistics S 5

Total 15

OTHER RECOMMENDED COURSES

Comp. Sci. 137. Fundamentals of Numerical Computation A,S 3-4
Engr. 62. Introduction to Operations Research A,S 4
Engr. 102W. Technical and Professional Writing A,W,S 3
Stat. 201A,B. Data Analysis I-II W,S 3

Total 13-14

A thesis is required for the M.S. degree.

A Ph.D. program in Geostatistics is available for advanced research and/or applications.

Summer training in relevant resources/energy companies is required from students without prior experience.

HYDROGEOLOGY

All students in the Hydrogeology program are expected to have completed a prior degree in a science or engineering discipline including courses in elementary chemistry and physics, fluid mechanics, analytic geometry and calculus, computer science, statistics, and geology.

Course No. and Subject Qtr. and Units
AES 190. Fundamentals of Geostatistics or AES 290. Geostatistics for Spatial Phenomena A 3-4
AES 230. Hydrogeology W 4-5
AES 255. Introduction to Groundwater Solute Transport S 3
Civ. Engr. 160. Water Resources W 4
Civ. Engr. 270. Movement, Fate, and Effects of Contaminants in Natural Waters A 3
Civ. Engr. 361. Soil Moisture and Groundwater W 4

Total................................................................. 28-30

Additional course units may be chosen to further particular interests. For example, students interested in groundwater geochemistry should consider a course sequence in water chemistry (see below).

LOW TEMPERATURE AQUEOUS GEOCHEMISTRY

Courses and research opportunities in low temperature aqueous geochemistry are available in the Departments of Applied Earth Sciences (AES), Civil Engineering (CE), and Geology. The three departments differ in the emphasis placed on applications. AES students usually have a strong interest in exploration or environmental problems and approach them from a geochemical or hydrogeological perspective. The Environmental Engineering Program in CE stresses engineering science in problem solving; the Department of Geology emphasizes fundamental mineral physics, petrology, and geochemistry.

Students who specialize in aqueous geochemistry in AES must adapt either the Hydrogeology or Ore Deposits and Exploration core program, or design an individual Specialization Curriculum, subject to faculty approval. A strong background in chemistry and physical chemistry, or additional course work in these areas, is required. Experimental or analytical experience is recommended. Geochemical research in AES is process-oriented, employing experimental or theoretical methods rather than field methods, in order to examine the problem at the most fundamental level possible. Current research is concerned with adsorption, partitioning, and dissolution reactions at mineral surfaces. Students are investigating the rate controlling mechanisms in weathering of silicates and the atomic-scale structure and composition of both aqueous and adsorption complexes of transition metals.

ORE DEPOSITS AND EXPLORATION

This program is flexible, and students who wish to make substitutions for core requirements may petition the faculty with a statement of justification. Students in the program leading to the M.S. (including coterminal) and Ph.D. degrees are required to complete the following core sequence in addition to the departmental Core Curriculum.

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>AES 220. Geochemistry of Mineral Deposits</td>
<td>W 4</td>
</tr>
<tr>
<td>AES 277. Field Mapping Mineral Deposits</td>
<td>S 3</td>
</tr>
<tr>
<td>Geol. 275. Solution-Mineral Equilibria</td>
<td>W 3</td>
</tr>
<tr>
<td>Geophys. 191. Geophysical Field Techniques</td>
<td>A 3</td>
</tr>
<tr>
<td>Total.................................................................</td>
<td>13</td>
</tr>
</tbody>
</table>

SPECIALIZATION ELECTIVES

Choose at least 3 courses:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
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</thead>
<tbody>
<tr>
<td>AES 224. Low Temperature Aqueous Geochemistry</td>
<td>A 3</td>
</tr>
<tr>
<td>AES 252. Sedimentary Basins</td>
<td>A 3</td>
</tr>
<tr>
<td>AES 258. Role of Fluids in Geologic Processes</td>
<td>alt. S 3</td>
</tr>
<tr>
<td>AES 260. Rock Mechanics and Advanced Structural Geology</td>
<td>alt. A 3-4</td>
</tr>
<tr>
<td>Geol. 185. Volcanology</td>
<td>S 3</td>
</tr>
<tr>
<td>Geol. 216. Geologic Evolution of the Western U.S. Cordillera</td>
<td>alt. W 2-3</td>
</tr>
<tr>
<td>Geol. 260. Physics and Chemistry of Earth Materials</td>
<td>alt. W 4</td>
</tr>
<tr>
<td>Total.................................................................</td>
<td>21-23</td>
</tr>
</tbody>
</table>

In addition to these core courses, the degree candidate is expected to have taken the following courses or their equivalent; core courses assume the student has the knowledge provided by this background and the equivalent of a summer field mapping course:

AES 120. Introduction to Mineral Deposits
AES 180. Analysis of Geologic Structures
Geol. 102, 103A,B. Field Geology
Geol. 152. Stratigraphy and Applied Paleontology
Geol. 161. Mineralogy
Geol. 170. Introduction to Chemistry of the Earth
Geol. 181, 182. Igneous and Metamorphic Petrology

PETROLEUM GEOLOGY

Petroleum Geology is a broad subject embracing aspects of many subdisciplines of the earth sciences. Students entering the Petroleum Geology M.S. program may have diverse backgrounds and career interests, and the program is intended to provide flexibility to accommodate these differences. At the same time, the program includes required courses chosen to equip students with concepts and tools fundamental to petroleum geology and exploration.

In addition to taking required courses from the AES core curriculum, each student must fill the requirements of the following specialization curriculum in Petroleum Geology.

REQUIRED COURSES

<table>
<thead>
<tr>
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<tbody>
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<td>AES 252. Sedimentary Basins</td>
<td>A 3</td>
</tr>
<tr>
<td>AES 253. Petroleum Geology and Exploration</td>
<td>S 3</td>
</tr>
<tr>
<td>Geophysics 180. Geologic Interpretation of Reflection Seismograms</td>
<td>W 2</td>
</tr>
<tr>
<td>Geol. 223. Geological-Geochemical Methods in Petroleum Exploration</td>
<td>A 2</td>
</tr>
<tr>
<td>Pet. Engr. 150A. Well Log Analysis I</td>
<td>A 3</td>
</tr>
</tbody>
</table>
ELECTIVE COURSES

Each student must take three courses for credit from the following:

Geol. 218. Seminar in Sedimentary Geology  S  3
Geol. 250. Sedimentary Mechanics  A  3
Geol. 253. Sedimentary Paleontology  S  2
Geol. 278. Organic Geochemistry  W  3

Total ................................................................. 14

Substitutions in the program may be approved by petition. A thesis is required for the M.S. degree.

SPECIAL APPLIED EARTH SCIENCES PROGRAM

The program requires 45 units of courses and research approved by the department faculty.

ENGINEER DEGREE

A minimum of two years (six quarters) of graduate study is required. At least one year, ordinarily the last, must be spent as a registered student at Stanford. The candidate must complete 90 units of course work, no more than 10 of which may be applied to overcoming deficiencies in undergraduate training. The student must prepare a thesis meeting the approval of the supervising instructor and the University Committee on Graduate Studies.

DOCTOR OF PHILOSOPHY

Entry—Graduate students are admitted with a degree goal: M.S., Engineer, or Ph.D. Students who have not yet earned an M.S. are admitted with the M.S. goal. After initial registration they may petition to change to the Ph.D. goal, bypassing the M.S.

Objectives—The Ph.D. degree is conferred upon candidates who have demonstrated substantial scholarship, high attainment in a particular field of knowledge, and ability to do independent investigation.

Requirements—The University’s requirements are described in the “Advanced Degrees” section in this bulletin. A brief summary of additional departmental requirements follows. A complete statement may be obtained from Applied Earth Sciences.

There are three basic requirements: (1) completion of the M.S. core course curriculum defined for the program with which the student is associated, (2) completion of the department’s qualification procedure outlined below, and (3) completion of a dissertation. The department qualifying procedure involves completion of the core course sequence, faculty review, departmental oral examination, and a research project proposal. All but the research proposal must be completed within the first seven quarters of registration (excluding summers).

Courses—The student must pass the required M.S. core courses with a letter grade indicator (LGI) of "B" or higher, or demonstrate that he or she has done the equivalent elsewhere. In addition, the student must take a series of courses approved by the Program Committee.

Departmental Oral Examination—The student must pass the departmental oral examination, which is a test of mastery of the major option and at least one related area, no later than the end of the seventh quarter of graduate work. Those entering with an M.S. degree must pass the qualifying exam within the first four quarters after enrollment (excluding summers). Mastery is expected at levels of breadth and sophistication sufficient to support Ph.D. work.

Research Proposal Seminar—Before the end of the next two quarters of graduate work following the successful completion of the departmental oral examination, the student must present a short written dissertation research proposal and present a seminar to members of the faculty Research Advisory Group. The seminar is followed by a question period. After completion, the student should file the Ph.D. candidacy application.

University Oral Examination—After a student has been admitted to candidacy, shown special ability in his or her field of study, and proven capacity for independent investigation to the satisfaction of the Research Advisory Group, the student may schedule the University oral examination. The examination is a defense of the dissertation, based on a complete manuscript, and administered by an outside chair and four or more faculty members representing the major and minor departments.

Scheduling—Detailed scheduling of all events is left to the student. A maximum of four years should be targeted. More time is allowed if the department Curriculum Committee is satisfied with a candidate’s progress.

COURSES

UNDERGRADUATE

1. Introduction to Earth Resources—The occurrence, economics, history, and politics of earth resources including oil and gas, coal, water, radioactive fuels, metals, and non-metallic minerals. Topics: resources and reserves, environmental impacts of mining, nuclear waste disposal, metals from the sea, water resources, strategic
100. Management of Earth Resources—Corporate strategies in the mineral and fuel resources sectors. Changes in the competitive position of resource suppliers in industrialized and developing countries and their impact on corporate strategies. Success factors in resource industries. Topics: project evaluation methods, production requirements, operating strategies, financing, and government policies (taxation).

3 units, Spr (Thiers) TTh 3:30

120. Introduction to Mineral Deposits—Survey emphasizing the geological environment of metallic mineral deposits. Topics: processes that lead to cycling and concentration of metals in the earth’s crust, and geological characteristics of different classes of mineral deposits in the context of petro-tectonic settings. Lab consists of hand lens inspection of rock suites from classic mining districts. Prerequisite: Geology 80.

3 units, Aut (Einaudi) TTh 9

123. Environmental Earth Sciences Management—Applications of operations research to environmental problems.

3 units, Spr (Remson) MWF 9

124. Mineral Processing and Metal Extraction—Survey emphasizing the technology involved in producing economically useful minerals and metals from mined ore and recycled solid waste. Offered only in a guided-reading format. Prerequisites: high school chemistry and physics, Geology 80.

2 units, Aut (Parks) by arrangement

120A. Analysis of Geologic Structures—(Same as Geology 180.) Emphasizes the theoretical and experimental background required to practice structural geology and the mechanical principles useful for understanding rock deformation in the earth’s crust. Topics: stress and strain analysis, physical properties of rock, brittle fracture, friction, buckling, flexure, and heat and mass transport. Field, lab, and computer exercises on the techniques of data collection and interpretation of joints, sheet intrusions, faults, rock fabrics, and folds. The roles of these structures in the evolution of the earth’s crust, in natural resource recovery, and in earthquake and volcanic hazards. Prerequisites: Geology 1, calculus, Macintosh skills.

4 units (Pollard) not given 1991-92

125. Mineral Economics—Fundamentals of commodity analysis. The effects of demand and supply imbalances on price formation. Topics: methodologies for projecting demand; technoeconomic factors determining supply and production economics; feasibility studies; pricing mechanisms; and international trade. Course generated commodity reports. (Minimum enrollment necessary for course to be offered)

3 units, Spr (Thiers) TTh 1:15-3:30

130. Environmental Earth Sciences I—First of three-course sequence on the relationship of environmental earth sciences to city and regional planning. Major field project throughout sequence involves preparation of a land-use plan for a selected location. Topics: introduction to city and regional planning, general plan land capability systems, geologic hazards, hydrology, reconnaissance studies, legal basis for planning process, use of topographic and geologic maps, site design. DR:6(8)

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

131. Environmental Earth Sciences II—Topics: environmental impact reports, weather and climate, planning regulations and land use, environmental transport, history of cities, environmental optimization, population projections. Prerequisite: 130 or consent of instructor.

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

132. Environmental Earth Sciences III—Topics: general plan preparation and implementation, urban design, site design, climatic water balance, pollution and wastes, sanitary landfill, land use, and community site selection. Prerequisites: 131 or consent of instructor.

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


3 units, Win (Lyon) TTh 1:15-2:15 lab T or Th 2:30-4:05

136. Environmental Earth Sciences Management—Applications of operations research to environmental problems.

3 units, Spr (Remson) MWF 9

145. Mineral Economics—Fundamentals of commodity analysis. The effects of demand and supply imbalances on price formation. Topics: methodologies for projecting demand; technoeconomic factors determining supply and production economics; feasibility studies; pricing mechanisms; and international trade. Course generated commodity reports. (Minimum enrollment necessary for course to be offered)

3 units, Spr (Thiers) TTh 1:15-3:30

180. Analysis of Geologic Structures—(Same as Geology 180.) Emphasizes the theoretical and experimental background required to practice structural geology and the mechanical principles useful for understanding rock deformation in the earth’s crust. Topics: stress and strain analysis, physical properties of rock, brittle fracture, friction, buckling, flexure, and heat and mass transport. Field, lab, and computer exercises on the techniques of data collection and interpretation of joints, sheet intrusions, faults, rock fabrics, and folds. The roles of these structures in the evolution of the earth’s crust, in natural resource recovery, and in earthquake and volcanic hazards. Prerequisites: Geology 1, calculus, Macintosh skills.

4 units (Pollard) not given 1991-92

184. 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 plan-
waste and procurement policies (use of recycled quality, transportation, energy use, hazardous issue (quality of, waste water, silver disposal), air excluded solid waste (composing, recycling), water supplied facilities, and marine works). Enrollment limited to 20. Prerequisite: 133 from which maps and cross-sections are produced. 


3 units, Spr (Cotton) TTh 1:15-2:30 lab and field trips by arrangement

195. Engineering Geology—The application of geologic fundamentals to planning and design of civil engineering projects. Emphasis 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 geotectonic 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: 180, 184, Geology 1 and 102, or consent of instructor.

3 units, Spr (Cotton) TTh 1:15-2:30 lab and field trips by arrangement

196. Introduction to Photogeology—Lecture/lab dealing with analysis of B & W aerial photography for geologic purposes. Photogrammetry not included. Material covers sedimentary, volcanic, and intrusive igneous and metamorphic rocks in arid and humid climates. Folded and faulted rocks are studied in stereoscopic pairs, from which maps and cross-sections are produced. Enrollment limited to 5. Prerequisite: 133 or equivalent.

2-4 units (Lyon) given 1992-93

198. Environmental Research Seminar—Primarily an independent research project and group discussion. Past research subtopics included solid waste (composing, recycling), water issue (quality of, waste water, silver disposal), air quality, transportation, energy use, hazardous waste and procurement policies (use of recycled paper). Internship positions are available for students with significant experience in a topic area.

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

199. Special Problems in Applied Earth Sciences for Undergraduates—Guided research or reading on special problems. any quarter (Staff) by arrangement

GRADUATE

220. 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, Geology 170. 4 units, Win (Einaudi) MWF 11

224. 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 such as 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: Geology 171 or equivalent experience with thermodynamics.

3 units, Aut (Leckie) TTh 11 F 2:15

225. 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: Geology 161, Chemistry 171 or Materials Science and Engineering 181, or consent of instructor.

3 units, Spr (Parks) MWF 9

227. Workshop in Low Temperature Aqueous Geochemistry—Systematic self-study review of principles and strategies needed for solving quantitative problems in equilibrium aqueous geochemistry under earth-surface conditions. Optional introduction to use of computer programs of the MINEQL family. Prerequisites: 224, Geology 161, and working knowledge of UNIX, DOS, or Apple operating systems.

2-5 units, one quarter annually (Parks) by prior arrangement only

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

5 units, Aut (Remson) MWF 9 seminar M 2:15-4:05, lab by arrangement
233. Measurement of the Environment II: Research in Applications—Advanced studies in environmental measurements to computer-based image display and analysis techniques. Follows concepts and practices introduced in 133. Local field studies encouraged. Project report required. Prerequisite: 133
3-5 units, Spr (Lyon) T 1:15-2:30
lab T or Th 2:30-4:05, plus additional hours by arrangement

251. Oil Field Exploration and Development—Objective is to analyze an actual oil exploration or exploitation venture and prepare a comprehensive analysis and recommendation that includes interpretation of the geology, well engineering specifications, lease acquisitions, and a financial forecast. An actual well may later be drilled based on the recommendation.
3 units, Spr (Harbaugh, Kourt)
W 2:15-4:40

252. 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: Geology 110, 151.
3 units, Aut (Graham) TTh 1:15-3:05

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

255. Introduction to Groundwater Solute Transport—For earth scientists and for engineers interested in water and environmental problems. Processes influencing transport of solutes through porous media; mathematical equations describing transport of reacting solutes and numerical methods for their solution. Prerequisites: 230, introductory computer programming.
3 units, Spr (Corelly) TTh 10:30-12

257. Research Seminar in 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, 255 or equivalent, introductory computer programming.
2-3 units, Aut (Gorelick) Th 3:15

258. Role of Fluids in Geologic Processes—Principles governing geologic processes in which fluids (groundwater) play an important role. Regional flow of groundwater; movement and entrapment of petroleum; development of anomalous fluid pressures; role of fluid in tectonic movements; hydraulic fracturing as a measure of in-situ stress; transport of chemical constituents by groundwater; flow in fractured rock; and transport of heat by groundwater. Prerequisites: elementary calculus, 230.
3 units (Hsieh)
alternate years, given 1992-93

259. Hydraulic and Tracer Tests for Groundwater Resource Evaluation—Theory and application of hydraulic and tracer tests to determine flow and transport properties of aquifers. Analysis of well test in single-layer aquifers and multiple aquifer-aquitard systems; water table conditions; anisotropy; double-porosity; effects due to wellbore storage, wellbore skin, aquifer boundaries, and heterogeneities such as faults and fracture zones; natural and forced gradient tracer tests. Prerequisite: 230.
3 units, Spr (Hsieh) Th 3:15
alternate years, not given 1992-93

276. Seminar: Sedimentary Geology—Discussion of current topics in sedimentary geology.
2 units, Win (Graham)
by arrangement

277. 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: 120.
3 units, Spr vacation (Einaudi)

280. Advanced Structural Geology and Rock Mechanics—(Same as Geology 290.) Advanced concepts and theories of rock deformation with application to rock mechanics, structural geology, and tectonophysics. Methods of stress analysis. The governing equations of elastic plate theory are derived and applied to crustal flexure, multi-layer bending, buckling, and viscoelastic flexure of rock. The governing equations of two-dimensional elastic theory are derived and applied to tectonic loading and mechanisms of stress concentration. Prerequisites: elementary calculus, mechanics, and structural geology.
3-4 units (Pollard)
alternate years, given 1992-93

3-4 units (Pollard)
alternate years, given 1992-93


5 units, Win (Journel) TTh 10-12

291. Practice of Geostatistics on Exhaustive Data Bases—Based on a numerical model of a deposit/reservoir. Teams of students 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: 190 or 290, Fortran programming.

5 units, Spr (Journel) TTh 9-11

292. Computer Simulation in Geology—(Students also participate in 340.) Procedures for developing dynamic geologic process simulation models in geology, stressing numerical solutions of differential equations to represent the processes. Initial applications involve simple two- and three-dimensional flow models. Stochastic procedures are introduced. Emphasis on graphic display, with three-dimensional graphics computers. Prerequisite: elementary computer programming.

3 units, Win (Harbaugh) TTh 10-12

293A,C. Topics in Advanced Geostatistics—Topics from conditional expectations and nonparametric vs. Bayesian geostatistics. The indicator formalism, indicator kriging, conditional distributions for stochastic imaging of deposits and reservoirs. Pooling hard and soft information. May be repeated for credit. Prerequisites: 290, advanced calculus.

5 units, Spr (Journel) MW 2:15-4

295A,B. Research Seminar in Remote Sensing—Discussion of recent advances, covering aspects of remote sensing, especially those applied to mineral exploration. Participants cover a pertinent aspect of the field for review and presentation. Satisfactory/No Credit grading. Sequence (A,B) varies by year.

295A. Geobotany.
1 unit, Aut, Win, Spr (Lyon) F 12-1

295B. Radiometry and Spectroradiometry.
1 unit, Aut, Win, Spr (Lyon) F 12-1

296. Advanced Photogeology and Radar—Advanced mono-scopic interpretation of small-scale satellite and radar images of large-area features for regional reconnaissance. The effect of varying sun angles and radar look- directions of flight altitudes, scales, and seasons. Includes lab analysis of imagery (satellite and aircraft) designed to extract the maximum structural information from an area. Field analysis. Term paper for 4 units. Prerequisites: 133/233, photogeologic course.

3 units, Spr (Lyon) Th 1:15-2:15
lab by arrangement
alternate years, not given 1992-93

297. Minerals in the Infrared—Advanced-level lectures covering the multispectral and multitemporal response of terrain from ultraviolet to infrared and microwave energy, principally for use in mineralogical analyses and as an exploration tool. Spectral and temporal infrared signatures are stressed, along with geobotanical and biogeobotanical aspects. Labs supported by field measurement, and data analysis. Term paper. Prerequisite: 133/233.

3 units (Lyon) alternate years, given 1992-93

298. Risk Analysis in Petroleum Exploration—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 of pc-based problems that incorporate a computerized exploration game with competing teams. Concepts are applicable to resource exploration and development in general.

3 units, Spr (Harbaugh) MTW 11

299. Special Problems in Applied Earth Sciences—Individual research or guided reading on special problems.
any quarter (Staff) by arrangement

320A. 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 the participant interest and timeliness. Field trip planned and guidebook prepared in Winter. Field trip (1-2 weeks) Winter or Spring Quarter. Students prepare papers and make oral presentations. Prerequisite: 220 (may be taken concurrently).

2 units, Win, Spr (Einaudi)

327. Topics in Low Temperature Aqueous Geochemistry—Lectures, student seminars, and an
optional term project on selected topics in aqueous geochemistry under earth-surface conditions. Illustrative topics: non-ideality models; measurement, evaluation, and estimation of thermodynamic data; trends in metal complex stability. Other topics may be requested. Prerequisites: 225, 227, or equivalent.

2-4 units, one quarter annually (Parks)
by prior arrangement only

331A,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

340. Seminar in 3-D Dynamic Geologic Process Simulations—Focuses on newly emerging procedures for simulating the geologic processes that create sedimentary basins.
1 unit, Spr (Harbaugh) Th 3:15-5

386A,B,C. Research Seminar: Geomechanics—Selected topics. May be repeated for credit.
1 unit, Aut, Win, Spr (Pollard)
by arrangement

390A,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


(Staff) units, quarter, time by arrangement

403. Research in Geomechanics.
404. Research in Geostatistics for Natural Resources Management.
405. Research in Hydrogeology
406. Research in Low Temperature Aqueous Geochemistry.
407. Research in Ore Deposits and Exploration.
408. Research in Petroleum Geology.

ENVIRONMENTAL STUDIES

A unified program or major encompassing all environmental subjects does not yet exist at Stanford. However, many environmentally related courses are offered by a number of departments. Integration among the extant programs in the Schools of Engineering, Earth Sciences, and Humanities and Sciences is planned.

The following list, although not comprehensive, has been prepared to assist in selecting courses in the field of environmental studies. Consult departmental listings in this bulletin and the Environmental Advising Directory (available at 101 Mitchell) for further details. There are additional related courses in the School of Law and in VTSS and other departments. New programs and courses are being designed for the proposed Earth Systems interdisciplinary program in the School of Earth Sciences.

COURSES

APPLIED EARTH SCIENCES

1. Introduction to Earth Resources.
100. Management of Earth Resources.
130. Environmental Earth Sciences I.
131. Environmental Earth Sciences II.
132. Environmental Earth Sciences III.
230. Hydrogeology.

BIOLOGICAL SCIENCES

96A,B. Jasper Ridge Biological Preserve Docent Training Program.
115. Evolutionary Ecology.
117. Biology and Global Change.
186. Ecosystems of the Tropics.

CIVIL ENGINEERING

170. Environmental Science and Technology.
171. Environmental Planning.
265. Sustainable Water Resources Development.
266. Environmental Policy Design and Implementation.
270. Movement, Fate, and Effects of Contaminants in Surface and Groundwater.
271A. Physical and Chemical Processes.
271B. Biological Processes.
271C. Water Treatment Process Design.
272. Treatment of Industrial and Hazardous Wastes.
274. Environmental Microbiology.

ECONOMICS
106. The World Food Economy.
155. Environment and Natural Resource Economics.

FOOD RESEARCH INSTITUTE
188. Colloquium on Population Studies

GEOLOGY
1. Interpreting the Earth.
150. The Oceans: An Introduction to the Marine Environment.
170. Introduction to Chemistry of the Earth.

GEOPHYSICS
4. Natural Hazards and Man.

HUMAN BIOLOGY
134. Ecological Anthropology.

PETROLEUM ENGINEERING
103. Energy Resources.

POLITICAL SCIENCE
114K. The Political Economy of Development.

GEOLOGY
Emeriti: (Professors) Robert R. Compton, William R. Evitt, Konrad B. Krauskopf (on active duty), Benjamin M. Page (on active duty), Charles F. Park, Jr., Tjeerd van Andel (on active duty); (Sr. Lecturer) Ernest I. Rich
Chair: Gordon E. Brown, Jr.
Associate Chair: Gail A. Mahood
Associate Professors: Dennis K. Bird, Gail A. Mahood, Elizabeth L. Miller, Jonathan F. Stebbins
Associate Professor (Research): Michael F. Hochella, Jr.
Courtesy Associate Professor: Michael O. McWilliams.
Consulting Professors: Steven R. Bohlen, Brent Dalrymple, Gerard J. Demaison, Timothy Hall, Keith A. Kvenvolden
Consulting Associate Professors: Simon Brassell, Edmund Chang, Joseph W. Ruetz

* Joint appointment with Applied Earth Sciences
† Joint appointment with Geophysics

UNDERGRADUATE PROGRAMS
BACHELOR OF SCIENCE

The program leading to the B.S. degree in Geology provides the background for a wide variety of careers. It prepares students for graduate studies in the earth sciences, law, business administration, land use planning, environmental engineering, public service, and other professions where an understanding of the earth and a background in science can be important. The field of geology is broad in scope and includes the 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 landscapes, the chemistry and physics of earth materials, and sources of economic minerals and fuels. Geology is also concerned with the 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 the depletion of resources).

An important emphasis of the B.S. program in Geology 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.

Originally mostly observational and descriptive, geology has evolved into a quantitative science dealing with the physics and chemistry of the earth and other planets, and with interactions between the biological and physical systems of the earth. The study of geology thus includes significant course work in the basic sciences and mathematics. The diversity of these requirements and experiences results in graduates with an unusual versatility and range of skills. The undergraduate program in Geology is designed to recognize the diversity of the field and to provide a great deal of flexibility. A large proportion of the required courses can be selected by the student in consultation with the undergraduate adviser, allowing the program to be tailored to individual goals and interests. A senior-year project provides additional opportunities for student-directed research and education.

### CORE COURSE SEQUENCE

All undergraduate Geology majors are expected to complete the core course sequence. Letter grades are required.

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Otr. and Units</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geol. 1. Interpreting the Earth</td>
<td>A,W,S,Sum</td>
<td>4-5</td>
</tr>
<tr>
<td>Geol. 2. Earth History</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Geol. 3. Earth History Laboratory</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Geol. 103A,B. Field Geology (or its equivalent)</td>
<td>Sum</td>
<td>12</td>
</tr>
<tr>
<td>Geol. 110. Structural Geology</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Geol. 151. Sedimentary Geology and Petrography</td>
<td>W</td>
<td>4</td>
</tr>
<tr>
<td>Geol. 152. Stratigraphy and Applied Paleontology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geol. 161. Mineralogy and Mineral Optics</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Geol. 162. Petrography</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Geol. 170. Chemistry of the Earth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or Geophys. 190. General Geophysics</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Geol. 181. Igneous Petrology</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>or Geol. 182. Metamorphic Petrology</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

Total: 49-51

### INDEPENDENTLY DESIGNED SPECIALIZED CURRICULUM

In addition to the core course sequence, all majors must complete a series of elective courses totaling a minimum of 20 units, of which at least 3 but no more than 10 units are independent research units (Geol. 199). These elective units afford an opportunity to acquire substantial strength in one of the many subdisciplines of geology and allied earth sciences. Alternatively, elective units can be utilized to complete requirements for a teaching credential or to acquire depth in a discipline outside the earth sciences, such as civil engineering or marine biology. Students interested in the analytical aspects of earth sciences and planning to go on for a graduate degree may want to use the elective units to obtain a strong background in mathematics, chemistry, and/or physics. Appropriate electives in accord with the interests of the student are selected in consultation with the undergraduate faculty adviser. There are no constraints on elective courses; they may be taken in the Department of Geology or any other department of the University.

### REQUIRED COURSES IN THE SUPPORTING SCIENCES

Letter grades are required.

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Otr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 31. Chemistry Principles</td>
<td>A,W</td>
</tr>
<tr>
<td>Chem. 135. Physical Chemistry (Geol. 171, Chem. 33 or Chem. 171 may be substituted.)</td>
<td>W,S</td>
</tr>
<tr>
<td>Math. 41, 42, 43. Calculus and Analytical Geometry (Math. 19, 20, 21 may be substituted but is not recommended for students contemplating graduate work.)</td>
<td>A,W,S</td>
</tr>
<tr>
<td>Phys. 51, 53, 55 (Phys. 21, 22, 23 may be substituted but is not recommended for students contemplating graduate work.)</td>
<td>A,W,S</td>
</tr>
</tbody>
</table>

Total: 34

### SUMMARY OF COURSE REQUIREMENTS

- Core Course Sequence: 49-51
- Independently Designed Specialized Curriculum: 20
- Supporting Sciences: 34
- Total: 103-105

### HONORS PROGRAM

The Department of Geology offers a program leading to the degree of Bachelor of Science in Geology with Honors. The program provides an opportunity for students to undertake independent study and research on a topic of special interest culminating in an honors report. The honors program is open to seniors having a letter grade indicator (LGI) of at least 3.5 in earth science courses and of at least 3.0 in all University course work. Financial support is available to help defray laboratory and field expenses incurred in conjunction with honors research. Students intending to apply for the honors program should register in the departmental office before the start of their senior year and follow these guidelines for the program:
1. Potential honors students should identify a research project, either theoretical or field or experimental.
2. The student shall submit a written research proposal to the departmental honors subcommittee, which decides on the suitability of the proposal as a project.
3. Course credit for the research project is assigned by the project adviser within the framework of Geology 105.
4. A written report must be completed for honors credit.
5. Before the end of the student's senior year, each honors candidate shall present a public seminar on the work proposed for credit.
6. The decision as to whether a given project and report does or does not merit award of honors shall be made jointly by the honors subcommittee and the student's adviser.
7. The work completed for the honors program cannot be used as a substitute for regularly required courses.

COTERMINAL B.S. AND M.S. PROGRAM

A Stanford undergraduate majoring in Geology may be admitted to graduate studies for the purpose of working simultaneously toward bachelor's and master's degrees.

1. Students are encouraged to apply at the beginning of Winter Quarter of the junior year, but applications are accepted in the seventh, eighth, ninth, or tenth quarter of undergraduate work.
2. Admission is recommended by the school or department in which the student seeks a master's degree, that department applying the same standards for admission that it would to other graduate applicants.
3. Graduation requirements are tailored to the student's needs and interests.
4. Courses offered in other departments of the University. Graduate programs in the areas of engineering geology, environmental earth science, mineral deposits, and petroleum exploration are listed in the "Applied Earth Sciences" in this bulletin and involve courses and faculty in both Applied Earth Sciences and Geology. The three broad areas of faculty research include (1) geochemistry, petrology, and mineralogy, (2) sedimentary geology and paleontology, and (3) regional, structural, and tectonic geology. These are summarized as follows:

Geochemistry, Petrology, and Mineralogy—The research and teaching interests of a number of the faculty in the Department of Geology involve geochemistry and its applications, hydrothermal systems, igneous and metamorphic petrology, mineralogy and mineral physics, mineral surface and colloid reactions, ore deposits, and the fundamental structure and properties of earth materials. Techniques include computer prediction and modeling, detailed trace and major element analysis, field-oriented studies, x-ray scattering and spectroscopic studies of earth materials, and lab 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.

GRADUATE PROGRAMS

Graduate studies in the Department of Geology involve academic course work and independent research. 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, groundwater geology, igneous petrology, marine geology, metamorphic petrology, mineralogy, mineral deposits, mineral physics, paleontology and micro-paleontology, palynology, petroleum geology, photogeology, rock mechanics, sedimentology, stratigraphy, structural geology, and volcanology.

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 parts of the University. Graduate programs in the areas of engineering geology, environmental earth science, mineral deposits, and petroleum exploration are listed in the "Applied Earth Sciences" in this bulletin and involve courses and faculty in both Applied Earth Sciences and Geology. The three broad areas of faculty research include (1) geochemistry, petrology, and mineralogy, (2) sedimentary geology and paleontology, and (3) regional, structural, and tectonic geology. These are summarized as follows:
including Professors Bird, Bohlen, Brown, Coleman, Einaudi, Ernst, Hochella, Liou, Mahood, Parks, and Stebbins.

Sedimentary Geology and Paleontology—Sedimentary geology at Stanford emphasizes the relationships between the tectonic, depositional, and paleo-oceanographic development of continental margins and associated basins, including quaternary geology and neotectonics of coastal regions. Current studies include a full array of margin settings in North America, the Caribbean, the Mediterranean, Africa, and the Pacific Rim. Our tools include sedimentary petrology, lithofacies, and biofacies analysis of depositional environments, micropaleontology, surface and subsurface analysis of sedimentary structure, application of organic geochemistry and ground water hydrology, and computer simulation of basin evolution. Faculty with special interests in these topics include Professors Graham, Ingle, Kvenvolden, Lowe, and Remson with a number of overlapping research interests shared with other faculty in the Departments of Applied Earth Sciences and Geophysics.

Tectonic, Structural, and Regional Geology—A wide spectrum of subdisciplines bearing on structural, tectonic, and regional geologic studies are represented among the faculty in the Department of Geology including Professors McWilliams (paleomagnetic reconstruction of terranes, geochronology), Miller (structural geology and regional tectonics), Page (neotectonics), Pollard (structural geology and rock mechanics), Sleep (thermal and mechanical models), Thompson (deep crustal structure), along with Nur (rock physics) in the Department of Geophysics. Ongoing studies range from theoretical and laboratory analysis of stress, strain, and rock fracture to field-based studies of accreted terranes and tectonic evolution of the Cordillera. Integration of geologic and geophysical approaches to regional tectonic questions is encouraged in order to understand both surface and deep deformational processes.

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. Previously admitted students who wish to change their degree objective from an M.S. to a Ph.D. must petition the Admissions and Awards Committee. A coterminal B.S./M.S. program is open to Stanford undergraduates.

MASTER OF SCIENCE

Objectives—It is the purpose of the master's program in Geology to continue a student's training in geology and to prepare the student for a professional geological career.

Procedures—The Graduate Committee of the department appoints a tentative academic adviser during registration with appropriate consideration of the student's background; interests, and professional goals. In consultation with the academic 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 this 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 from the Graduate Committee.

Requirements—The University's requirements for the Master of Science degree are stated in the "Advanced Degrees" section of this bulletin. The student must also be guided by the following departmental requirements:

1. The student must complete a minimum of 36 units of course work.
   a) Not more than 15 units of the 36 shall normally consist of formal lecture courses, the remainder to be seminars or special problem and research units.
   b) Of the 36-unit University minimum, all courses must be at or above the 100 level and 50 percent must be courses designated primarily for graduate students.
   c) The course list is selected by the student with his or her academic adviser and must meet with approval of the latter.

2. The student must complete a thesis describing his or her research. Thesis research should begin during the first year at Stanford and the thesis should be completed before the end of the sixth quarter here.

3. Early during the thesis research period, and after consultation with the student, the thesis adviser appoints a second reader for the thesis, the thesis adviser being the first reader. The two readers determine jointly whether the thesis is acceptable for the M.S. degree in the department.

4. Once the thesis has been approved, the student makes a public presentation of results at an appropriate forum, preferably at a meeting of a national geological society.

Schedule—The calendar of events of a typical M.S. program is as follows:

Quarter Procedure
1  Plan course work for first year with academic adviser and submit Program Proposal.
2-3  Planned course work; selection of thesis adviser and thesis topic; submit short re-
search proposal to thesis adviser; begin thesis research.
3-5 Select second reader.
5-6 Present a complete draft of thesis to thesis adviser and second reader at least three weeks prior to the University deadline for filing M.S. thesis; complete M.S. thesis; file thesis; present results publicly.

Time Limits—Students should note that University rules impose the following time limits: (1) for coterminous students, three calendar years after completion of 180 units; (2) for all other M.S. candidates, three calendar years from the start of the first quarter of enrollment in the M.S. program. Extensions require approval of the department.

DOCTOR OF PHILOSOPHY

Objectives—To develop the skills needed to conduct original geological investigations, to interpret the results, and to present the data and conclusions in a clear and concise manner.

Procedures—During class list sign-up, an adviser is appointed by the Graduate Committee of the department, 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 choose a research adviser within the first year of residence. The research adviser supervises completion of the departmental requirements for the Ph.D. program (as outlined below) until the student passes the research examination, at which time this responsibility passes to the Research Advisory Committee. The student may change advisers with approval from the Graduate Committee.

Requirements—The University’s requirements for the Ph.D. are stated in the “Advanced Degrees” section of this bulletin. The student must also be guided by the following department requirements:

1. The student must successfully complete the courses that form the individualized academic program. The requirements include a minimum of four courses of at least 3 units each from four different faculty members in the School of Earth Sciences.
2. The student must qualify for candidacy for the Ph.D. by the end of the sixth quarter in residence. Department procedures require preparation of a research proposal, approval of the 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: (1) oral presentation of a research proposal, (2) examination on the research proposal, and (3) examination of subject matter relevant to the proposed research. The research examination may be repeated once. For details regarding committee membership, examination requirements, and appeal procedures, see the departmental information sheet.
3. Annually, in the month of March or April, the candidate must organize a meeting with the research committee to present a brief progress report covering the past year. On a form provided by the department, the Research Advisory Committee shall note its impression of progress and, if desired, recommendations for further work. The report shall be signed by all committee members and by the student; a quorum must be present, and individual meetings with members are not an acceptable substitute. The report must be submitted to the department before May 1 of each year following that in which candidacy has been certified.

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 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 base 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.

Schedule—The calendar of the events in the Ph.D. program is normally as follows:

Quarter Procedure
1 Plan course work for the first year with adviser.
2-6 Preparation of research proposal; research examination, certification, and petition for Ph.D. candidacy; admission to candidacy for the Ph.D.
2-12 Ph.D. research; University oral examination; complete dissertation.

COURSES

Courses in the Summer Quarter are offered for a 10-week period unless otherwise noted.

The student is urged to examine the course offerings of other departments. Of particular importance are those in Applied Earth Sciences,

1. **Interpreting the Earth**—For non-majors and prospective geology majors. Introduction to and survey of the physical and chemical processes, past and present, that shape the earth’s land forms, produce the earth’s minerals and rocks, 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. Field studies. Lectures, one weekly three-hour lab and one-two field trips required. Transportation fee for field trips. Recommended: high school chemistry and physics. DR:5(7)

4-5 units, Aut, Sum (Staff) MWF 9
Win (Staff) MWF 8
Spr (Staff) MWF 10
lab and field trips by arrangement

2. **Earth History**—For non-majors and prospective geology majors. The earth is a dynamic planet, its surface continuously remolded by changing patterns of plate movements, climatic variation, the rise and fall of sea level, mountain building, volcanism, erosion, and sedimentation. It has hosted an evolutionary parade of organisms, from self-replicating molecules to man, that have interacted with and often strongly modified surrounding environments. The evolution of the earth and its biosphere, hydrosphere, and atmosphere represent active areas of current research and discussion. Topics: 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 Geology 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) MWF 11

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 Geology 2; required for Geology majors who took 2 in 1985-86 or later. Prerequisite: 2 (may be taken concurrently).

2 units, Aut (Lowe) by arrangement

7A,B,C. **An Introduction to Wilderness Skills**—Introduction to living, traveling, and working in the wilderness for those planning fieldwork in the backcountry. Emphasis is on minimum impact camping, safety, specific skills, group dynamics, and applications to field geology. 7A: navigation and natural science. 7B: winter camping and travel. 7C: mountaining and rock climbing. Weekly discussions and several weekend outings. Food, group, and major personal gear provided. Students provide own clothing. Fee.

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

80. **Rocks and Minerals**—Identification, classification, and interpretation of igneous, sedimentary, and metamorphic rocks, based on their minerals, textures, and primary structures, and on present day observable processes. Rock cycles are related to earth systems. Lab emphasizes use of hand lens in making observations; field trips demonstrate rock structures and genetic associations. Prerequisite: 1. Recommended: introductory chemistry.

5 units, Spr (Coleman, Liou) MWF 8; lab MW or TTh 1:15-4; field trips by arrangement

85. **Introduction to Volcanoes**—For non-majors and prospective earth science or environmental majors. Introduction to volcanic processes, their products, and impact on the biosphere. Topics: introduction to theory of plate tectonics as an explanation of the location of present-day volcanic activity; contrasting morphologies and styles of eruption of volcanoes produced by different magma types; case studies of well-known eruptions; volcanic hazards and their mitigation; relation between volcanoes and geothermal energy and metal resources; effects of volcanic eruptions on climate and the atmosphere; links between huge eruptions, meteorite impacts, and extinction of the dinosaurs. Lectures illustrated with films and slides. For 5 units, lectures, midterm, final examination, one term paper, and attend two 3-hour lab demonstrations prior to a 4-day field trip over Memorial Day weekend. Recommended: high school chemistry.

4-5 units, Spr (Mahood) MWF alternate years, not given 1992-93

102. **Introduction to Field Geology**—Instruction and practice in the basic methods of geologic investigation and recording in the field. Emphasis on techniques of systematic observation on the outcrop and the construction of geologic maps and sections from the data obtained. The field area studied varies each year, but each site displays a variety of rock types and landforms related to clearly defined structures. Conducted from White Mountains Research Station in Bishop, CA
between Labor Day and the beginning of Autumn Quarter. See the Summer at Stanford bulletin for schedule. Prerequisite: 1.

3 units, Sum (Staff)

**103A, B. Advanced Field Geology**—Juniors and seniors become involved in a substantial field investigation of professional scope. Assumes familiarity with elementary techniques used in field mapping, stratigraphic, and structural studies. In-depth exposure to analysis of relatively complex geologic problems in the field. Presentation of research results in a professional report involves coordinated field mapping, descriptions, and interpretation of a relatively unknown field area. Emphasizes observation of lithologic and structural features, measurement of stratigraphic and structural sections, application of various survey methods, and plotting of geologic data on topographic maps and aerial photographs. Prerequisites: 1, 2, 110, and 151; or consent of instructor(s).

103A. Field portion of 103 includes studies described above and short reports on work written in the field. Credit for 103A requires completion of 103B.

8 units, Sum (Miller, Staff)

103B. Lab studies, compilation of maps, cross-sections, stratigraphic columns, and structural data for the preparation of a comprehensive geologic report on field areas studies during 103A; work done in the field or on campus.

4 units, Sum (Miller, Staff)

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

1-10 units, any quarter (Staff) by arrangement

**110. Structural Geology**—Emphasizes the use of structural geology in understanding the deformational history of the earth's crust, the evolution of mountain belts, and formation of ocean basins. General properties, rheology, and mechanisms of deformation of crustal rocks, large scale structures formed by shortening, extension, and strike-slip faulting and description and analysis of small-scale structures in rocks. Techniques of structural analysis: study and interpretation of geologic maps and construction of balanced cross-sections, measurement of strain in deformed rocks, stereonet analysis of folds and multiple folding events, deformational fabrics and preferred crystallographic orientation of minerals in metamorphic rocks. Prerequisites: I, calculus, or consent of instructor.

5 units, Spr (Miller) MWF 9 lab and field trips by arrangement

**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; 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. Marine resources and attendant legal conflicts. Lectures, occasional demonstrations, and a required one-day field trip to measure and analyze waves and currents. DR:5(7)

3 units, Win (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


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

**161. Mineralogy and Mineral Optics**—Basic crystallography and principles of x-ray diffraction. Principles of crystal chemistry. Factors affecting the stability of minerals and the solid contaminants of our environment. Elementary phase equilibria. The principles of optical mineralogy. Examination of the structures, chemistry, physical properties and paragenesis of the major rock-forming minerals emphasizing silicates. Lab
on determinative mineralogy: hand specimen identification and optical and x-ray methods. Field trip. Prerequisites: 1, and Chemistry 31 (may be taken concurrently).

GEOLOGY 43 5 units, Aut (Brown) MWF 10

lab MW 1:15-4:05

162. Petrography—Application of the principles of optics to the identification of minerals and the rocks they comprise. Emphasizes practical experience in the study of thin sections of rocks using a petrographic microscope. Teaches skills needed for rapid mineral and rock identification and introduces the interpretation of rock textures and structures and mineral reactions visible in thin section. Two three-hour lab exercises per week. Prerequisite: 161 2 units, Spr (Coleman, Miller)

by arrangement

170. Introduction to the Chemistry of the Earth—How chemical elements are distributed in the earth, oceans, and atmosphere, processes which cause this distribution, and conceptual and analytical tools needed to explore these questions. Lectures on rudiments of geochemical thermodynamics and discussion of global geochemical cycles and changes over earth history in the geochemistry of the atmosphere and oceans. 4 units, Aut (Stebbins) MWF 11

lab by arrangement

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: 161 3 units, Aut (Bird) MWF 9

180. Analysis of Geologic Structures—(Same as Applied Earth Sciences 180.) Emphasizes the theoretical and experimental background required to practice structural geology and the mechanical principles useful for understanding rock deformation in the earth's crust. Topics: stress and strain analysis, physical properties of rock, brittle fracture, friction, buckling, flexure, and heat and mass transport. Field, lab, and computer exercises emphasize the techniques of data collection and interpretation of joints, sheet intrusions, faults, rock fabrics, and folds. The roles of these structures in the evolution of the earth's crust, in natural resource recovery, and in earthquake and volcanic hazards. Prerequisites: 1, calculus, Macintosh skills.

4 units (Pollard) not given 1991-92

181. Igneous Petrology—For seniors and new graduate students. Origin of igneous rocks, emphasizing magmatic differentiation processes. Topics: the physical properties of magmas, role of volatile components, applications of trace elements and isotopes to petrogenesis, geodynamics, and evolution of the crust-mantle system modeling of crystal fractionation and partial melting, relevant experimental data and phase diagrams, and relation of magma types to tectonic setting. Lab exercises involve hand-specimen and petrographic examination of suites of volcanic and plutonic rocks. Graduate students may take without lab for 3 units. Prerequisite: 161, 162, or equivalent.

5 units, Aut (Mahood) MWF 10

lab TTh 1:15-4:05

182. Metamorphic Petrology—Genesis of metamorphic rocks and the imposed physiochemical conditions for their formation. Topics: metamorphic zones and facies, textures and structures of metamorphic rocks, chemistry, paragenesis and phase relations of metamorphic minerals, metamorphic reactions, role of oxygen fugacity and mixed volatiles in metamorphic recrystallization, metamorphic belts, ocean-floor and subduction zone metamorphism. Lab exercises include petrographic study of common metamorphic minerals and metamorphic rocks. Prerequisite: consent of instructor.

4 units, Spr (Liou) TTh 11

lab T 1:15-4:05

199. Senior Research Project—In-depth research project is required of each major during one quarter of the senior year. The results are presented in a written paper. Projects are chosen in consultation with a faculty member, who serves as a project adviser.

3 units, Aut, Win, Spr (Staff)

by arrangement

215. Topics in Regional Geology and Tectonics—Seminar.

2 units, Win (Miller)

216. 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 are covered and 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 1992-93


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


3 units, any quarter (Remson) by arrangement alternate years, not given 1992-93

241. 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, paleo-oceanographic and paleoclimatic analysis, and correlation of marine sequences. Paleoenvironmental and age analysis of an unknown microfossil sample serves as a term research project. Instruction in lab and field techniques.

5 units, Win (Ingle) MWF 11
labs by arrangement alternate years, not given 1992-93

244. 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 paleo-oceanography. Individual analysis of a series of unknown samples provides lab 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: 241.

3 units, Spr (Ingle) TTh 11
labs by arrangement alternate years, not given 1992-93

250. Sedimentation Mechanics—The mechanics of sediment transport and deposition and the origins of sedimentary structures and textures, particularly 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 1992-93

253. Sedimentary Petrography—Examination and interpretation of sediments and sedimentary rocks in thin section. Lectures/readings stress research in modern sedimentary mineralogy and petrography and the relationship between the composition and texture of sediments and their provenance, depositional settings, and diageneric histories. Class is topical and varies yearly. Prerequisite: 151 or equivalent. Concurrent enrollment in lab 253L may be required.

2 units, Aut (Staff) TTh 9

253L. Sedimentary Petrography and Petrology Laboratory—Lab study of sedimentary rocks. Content varies yearly.

2 units, Aut (Staff)

260. Physics and Chemistry of Earth Materials—The interrelationships among structure, composition, and physical and thermochemical properties of the major rock-forming silicate minerals and of silicate melts and glasses. Topics: the response of minerals and melts to variations in temperature, pressure, and composition; the connections between atomic-scale structure and thermodynamic properties of earth materials; the derivation, interpretation, and use of phase diagrams in mineral-melt-vapor systems; the theory and limitations of geothermometry and geobarometry; and the mechanisms controlling trace element behavior. Characterization of earth materials using x-ray and spectroscopic methods.

4 units, Win (Brown, Stebbins) MWF 11

264. X-Ray Fluorescence Analysis—Geochemical analysis using modern x-ray fluorescence techniques. Introductory x-ray theory, modern x-ray instrumentation, sample preparation, data collection, and data reduction techniques. Emphasizes hands-on experience with instrumenta-
tion and methods available to earth scientists here at Stanford.

3 units, Win (Sparks) TTh 2:15-3:30
lab by arrangement

265. Electron Microprobe and SEM: Theory—The capabilities of the scanning electron microscope and electron microprobe. Topics: theory, design, and function of electron microbeam instrumentation, sample preparation, practical procedures for imaging, qualitative and quantitative analysis, and data reduction.

2 units, Win (Paque) TTh 9

265L. Electron Microprobe and SEM: Laboratory—Instruction in use of the scanning electron microscope and the electron microprobe. A research project allows quantitative analysis of materials of the student's choice. Required for those who wish to independently use the facilities. Lab size limited. Prerequisites: 265 (may be taken concurrently), consent of the instructor.

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


2 units, Win (Bird) MWF 10

278. Organic Geochemistry—Units aspects of geology and chemistry in the study of the origin, occurrence, and fate of organic materials in geological environments. Principles of organic geochemistry are applied to sedimentology, paleontology, petroleum geology, and environmental science. Recommended: introductory courses in geochemistry and organic chemistry.

2 units, Win (Kvenvolden) TTh 4:15

280. 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 (Mahood, Sparks)
alternate years, given 1992-93

281. Isotopes and Trace Elements in Igneous Petrogenesis—Topics: mass spectrometric techniques; fundamentals and geochronology of the Rb-Sr, Sm-Nd, U-Pb, and U-series disequilibrium systems; light stable isotopes (H, He, O, C); formation of meteorites and early history of the earth; continental growth curves; evidence for nature of basalt sources and implications for mantle convection; evolution of mafic magmas in the lower crust; evidence for contributions from subducting slabs to arc magmas; residence times of magmas and magma chamber processes; multiple origins of rhyolitic magmas; granites as imperfect mirrors of their source regions; trace-element modeling of partial melting, fractional crystallization, magma mixing, and combined assimilation-fractional crystallization; pitfalls of the use of trace-element discriminant diagrams in tectonic analysis. Prerequisite: 181 or equivalent.

3 units, Win (Mahood) MWF 9
alternate years, not given 1992-93

282. Advanced Metamorphic Petrogenesis—For those who have had an introduction to metamorphic petrology and phase equilibria. Topics: origin and evolution of metamorphic rocks, emphasizing metamorphic processes and petrogenesis in the mid-to-lower continental crust; evolution and maturation of continental crust from geochemical and geophysical viewpoints 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, Win (Bohlen) by arrangement

283. Petrologic Phase Equilibria—Principles of phase equilibrium determined by lab experimentation and thermochemical calculation, as applied to igneous and metamorphic petrology. Not a comprehensive survey of the diversity of hard rocks. Focuses on the underlying principles of classical thermodynamics which govern mineral equilibria. Introduction of chemical kinetics and order-disorder phenomena in geologic systems.

4 units, Aut (Ernst) alternate years, not given 1992-93

285. Physical Volcanology—For graduate students in all the earth sciences and seniors in Geology. 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 the magma; calderas; volcanic gases;
eruptive histories of volcanic centers; volcanic hazards and their mitigation; volcanic-hosted geothermal energy and mineral resources. One four-day field trip required.

3 units (Mahood)
alternate years, given 1992-93

285L. Physical Volcanology Laboratory—Hand sample and petrographic microscope examination of volcanic rocks. Labs taken concurrently. Prerequisite: some experience with a petrographic microscope.
1 unit (Mahood)
alternate years, given 1992-93

289. Teaching Experience.
0-3 units, Aut, Win, Spr, Sum (Staff) by arrangement

290. Advanced Structural Geology and Rock Mechanics—(Same as Applied Earth Sciences 280.) Advanced concepts and theories of rock deformation with application to rock mechanics, structural geology, and tectonophysics. Prerequisites: elementary calculus, mechanics, and structural geology.
3-4 units (Pollard)
alternate years, given 1992-93

310. Surface Analytic Chemistry—Practical, hands-on approach to surface science and surface analytic techniques including x-ray and ultraviolet photoelectron spectroscopy, Auger electron spectroscopy, scanning electron and Auger microscopy, low energy electron diffraction, scanning tunneling spectroscopy and microscopy, and atomic force microscopy. Instruction on a VG ESCALAB Mk II and Digital Nanoscope II STM and AFM. Lecture topics: aspects of surface physics and chemistry, design and function of surface analytic instrumentation, technique fundamentals and application, sample preparation, and general procedures in ultra-high vacuum equipment. Term project allows students to perform surface analytic experiments on materials of their choice. Required for those who wish to independently use the surface analytic laboratory at Stanford’s Center for Materials Research. Enrollment limited. Prerequisite: Material Science and Engineering 323 or consent of instructor.
3 units, Spr (Hochella) MW 10
lab by arrangement

317. Advanced Field Mapping—10-14 days mapping in a structurally complex region. Emphasis 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

318. Seminar in Structural Geology.
1 unit, Aut, Win, Spr (Staff) by arrangement

358. Seminar in Sedimentary Geology.
1-3 units, Win, Spr (Staff) by arrangement

361. Seminar in Mineralogy.
1 unit, Win (Staff) by arrangement

371. Seminar in Geochemistry.
1 unit, Aut (Staff) by arrangement

381. Seminar in Igneous Petrology-Volcanology.
2 units, Aut, Win, Spr (Mahood) by arrangement

382. Seminar in Metamorphic Petrology—Selected topics in tectonic and metamorphic 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

Problems in Various Fields of Geology.
(Staff) units, quarter, time by arrangement
309. Problems in General Geology.
319. Problems in Structural Geology.
339. Problems in Environmental Earth Sciences and Hydrogeology.
349. Problems in Paleontology, Palynology, and Paleooecology.
355. Problems in Oceanography.
359. Problems in Sedimentary Geology.
369. Problems in Mineralogy.
379. Problems in Geochemistry.
389. Problems in Petrology and Volcanology.
399. Problems in Geomathematics.

Research in Various Fields of Geology.
(Staff) units, quarter, time by arrangement
409. Research in General Geology.
419. Research in Structural Geology.
421. Research in Organic Geochemistry.
439. Research in Environmental Earth Sciences and Hydrogeology.
449. Research in Paleontology, Palynology, and Paleooecology.
455. Research in Oceanography.
469. Research in Mineralogy.
479. Research in Geochemistry.
489. Research in Petrology and Volcanology.
499. Research in Geomathematics.

GEOPHYSICS

Emeritus: George A. Thompson (on active duty)
Chair: Mark D. Zoback
Professors: Jon F. Claerbout, W. Gary Ernst, Robert L. Kovach, Amos M. Nur, Jonathan
Roughgarden*, Norman H. Sleep, Mark D. Zoback

**Associate Professors:** Jerry M. Harris, Simon L. Klemperer, Michael O. McWilliams

**Assistant Professor:** Gregory C. Beroza

**Associate Professor (Research):** Paul Segall

**Research Associates:** Colleen A. Barton, Jack Dvorkin, Daniel Moos, Richard Nolen-Hoeksema, Pierre V. Samec, Lev Vernik

**Courtesy Professors:** Biondo Biondi, Stephan A. Graham, David D. Pollard, Hagai Ron

**Acting Associate Professor:** Gerald M. Mavko

**Consulting Professors:** Cecil Green, Walter Moooney, Francis Muir, William Ostrander, William Savage, Uri tenBrink, George Zandt

* Joint appointment with Biological Sciences

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 Watts 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, 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 tectonics, 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**

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<tr>
<th>Course No. and Subject</th>
<th>App. Ear. Sci. 180. Structural Geology</th>
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<tr>
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<td>Chem. 31. Chemical Principles</td>
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<td></td>
<td>Chem. 135. Physical Chemical Principles, or Physics 170, 171. Thermodynamics</td>
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<td></td>
<td>Elect. Engr. 141. Electromagnetic Fundamentals, or Physics 120. Electricity and Magnetism</td>
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<td>Geol. 1. Interpreting the Earth Geol. 80. Rocks and Minerals</td>
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<td>Geol. 102. Introduction to Field Geology</td>
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<td>Math. 21, 22, 23 and 44, or 41, 42, 43, and 44. Analysis and Calculus</td>
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<td>Math. 130. Ordinary Differential Equations</td>
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<td>Physics 51, 53, 54, 55, and 56. Elementary Physics</td>
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<td>Physics 110, 111. Mechanics</td>
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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. 103A and B, and 181; Physics 57, 58, 64A, 64B, 120, 121, 122, 210, 211, or Elect. Engr. 142; Math. 101, 106, 113, 114, 131, 132, Engr. 44; 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 Geology 103A 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: linear algebra, computer science, complex variables, petrography, and structural geology.

Requirements for the Degree—Geophysics 150, 174, 180, 181, 190, 191, 262, 284; Applied Earth Sciences 180, 190, 251, 252, 253; Electrical Engineering 261, 263; Geology 151; Petroleum Engineering 150A, B, 153; and elective courses in earth sciences, mathematics, physics, and engineering. A minimum of 36 units are 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, F, 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 102W, 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 laboratory 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 reapply 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 Man**—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

**10. Continents Adrift: Plate Tectonics and the Geology of California**—For prospective Earth Science majors or non-majors. Introduction to plate tectonics, applied to the geological history of California where a mosaic of geological terranes have been built, assembled, and modified by the mechanisms of plate tectonics. Topics: plate geometry and the present distribution of faults, earthquakes, and volcanoes; geological history of California and western North America for the past 250 million years; evolution of the San Andreas fault system, causes and consequences of plate motion; the origin of the Sierra Nevada, Great Valley, and Coast Ranges; the geological future for California. Two Saturday field trips. 3 units, Spr (McWilliams) MWF 10

**102. 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: Geology 1 or 2. Recommended: 150, Geology 110, Physics 53.

3 units, Spr (McWilliams) by arrangement

**11. 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, Geology 1 or 2, or consent of instructor.

3 units, Win (Sleep) MWF 11

**174. Seismology**—Introduction to earthquakes and seismic wave propagation. Topics: principles of seismographs, seismicity, earthquake magnitude and energy, construction of travel-time tables, general theory of elastic waves, interpretation of seismograms, determination of earthquake source mechanisms, and seismicity. Lab experience in computer analysis of seismological data.

3 units, Aut (Kovach) MWF 9

**176. Principles of Ecology**—(Same as Biological Sciences 176.) Introduction to ecology emphasizing ecological theory and the population and community scales of organization, using primarily zoological examples. Evolutionary processes of ecology. Prerequisite: first year calculus (Math. 19-21 or higher). Recommended: 33.

3 units (Roughgarden) given 1992-93

**180. Geologic Interpretation of Reflection Seismograms**—Elementary principles of reflection seismology, seismic data processing, and field operations including a field trip to an operating crew (if available). Integration of seismic and other exploration data into exploration programs. Workshops and lectures in stratigraphic and structural interpretation of seismic sections and well logs, utilizing data from various oceans and continents.

3 units, Win (Klemperer, Graham, Ostrander) Th 2-4 F 10, lab T 6-9 p.m.
3 units, Spr (Klemperer) TTh 9-10

185A, D, E, G, H, J, K, L, S, T, U, V. 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)

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, Thompson, Mooney) MW 3-4:15

2 units, Aut, Win, Spr (Sleep)

185J. Research Seminar: Paleomagnetism and Tectonics—Current research in paleomagnetism, rock magnetism, global, and regional tectonics.
2 units, Aut, Win, Spr (McWilliams)

2 units, Aut, Win, Spr (Zoback)

185L. Research Seminar: Seismotectonics—Research using seismic reflection and other geophysical data to understand structure and processes in seismically active areas.
2 units, Aut, Win, Spr (Zoback) by arrangement

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

185S. Research Seminar: Seismic Tomography—Current research in transmission and reflection tomography including topics on forward modeling, inversion, and data acquisition.
2 units, Aut, Win, Spr (Harris) by arrangement

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

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

185V. Research Seminar: Poroelasticity—Few problems in crustal geophysics are independent of pore spaces, pore fluids, and rock-fluid interactions. Current research topics on the mechanical properties of porous rocks discussed: dynamic problems of seismic velocity, dispersion, and attenuation; and quasi-static problems of faulting, fluid transport, crustal deformation, and loss of porosity. Covers published papers and current research. Participants define, investigate, and present an original problem of their own.
2 units, Aut, Win, Spr (Mavko) by arrangement

185Y/385Y. Research Seminar: Theoretical Ecology—(Same as Biological Sciences 286.) 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; remote sensing and population dynamics; dynamics of spatially distrib-
uted populations; niche theory and coevolution of competing species.

2 units, Spr (Roughgarden) 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. Prerequisites: calculus, first-year college physics. Recommended: Geology 110.

4 units, Aut (Sleep) MWF 11

191. Geophysical Field Techniques—Suggested for non-geophysics majors in other earth science disciplines. Geophysical field investigations in a region of geologic and economic interest using seismic refraction, gravity, magnetic, electromagnetic, and electrical field techniques. Introduction to techniques of geophysical prospecting (excluding seismic reflection). Students engage in all phases of the program, interpret the data, and prepare a final report. Recommended: 190.

3 units, Aut (McWilliams) TTh 10-11:30

191A. Geophysical Field Techniques—Suggested for non-geophysics majors in other earth science disciplines. Geophysical field investigations in a region of geologic and economic interest using seismic refraction, gravity, magnetic, electromagnetic, and electrical field techniques. Introduction to techniques of geophysical prospecting (excluding seismic reflection). Students engage in all phases of the program, interpret the data, and prepare a final report. Recommended: 190.

3 units, Aut (McWilliams) TTh 10-11:30

field trip by arrangement

195. Physics of Planetary Interiors—Study of the available data of seismology, volcanology, geodesy, heat flow, high pressure lab work, 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, Spr (Sleep) TTh 10-11:30

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 (Mavko) T 11-1 Th 11-12

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

3 units, Win (Mavko) MW 12:30-2 alternate years, not given 1992-93


3 units (Beroza) alternate years, given 1992-93

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

3 units, Spr (Claerbout) MWF 10

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

3 units, Aut (Claerbout) MWF 10


3 units (Beroza) alternate years, given 1992-93

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.
3 units, Win (Segall) MWF 10

3 units (Zoback)
alternate years, not given 1992-93

380A,B. Seminar: Exploration and Development Geophysics—Opportunity for M.S. candidates to frame and pursue their thesis research. Second-year students in the Exploration Program report on summer jobs and develop independent research projects, culminating in a written report and oral presentation to the department. First-year students register in 380A. Second year in 380B.
380A. 1 unit, Aut (Klemperer) by arrangement
380B. 1 or 3 units, Aut (Klemperer) by arrangement

385A,D,E,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) 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.
12 units, Aut, Win, Spr (Klemperer, Thompson, Mooney) by arrangement

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

385J. Research Seminar: Paleomagnetism and Tectonics—Current research in paleomagnetism, rock magnetism, global, and regional tectonics.
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. Pre-requisite: 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 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 (Mavko) by arrangement

397. Introduction to Contemporary Geophysics—Seminar on current topics of interest in geophysics emphasizing active research within the department and at other institutions. Required of all first-year graduate students.
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) Alvah J. Horn, Frank G. Miller (on active duty), Marshall B. Standing
Chair: Franklin M. Orr, Jr. Associate Chair: Roland N. Horne
Consulting Assistant Professor: Jane Woodward

Petroleum engineers are concerned with the optimization of hydrocarbon recovery from oil and gas reservoirs. This involves drilling of wells, design and operation of production facilities, selection and implementation of schemes for enhancing recovery, monitoring of reservoirs, and transportation of oil and gas to processing facilities and to markets. Because of the complex and changing nature of the problems involved, the Department of Petroleum Engineering curriculum attempts to develop a sound background in relevant basic sciences and their application to practical problems. This includes fundamentals of physics, chemistry, mathematics, geology, geophysics, computer science, and engineering. Applied courses in the department cover virtually all aspects of petroleum engineering and some related fields like geothermal engineering.

Petroleum engineers are distinguished from other engineers by their understanding of the characteristics of reservoir rock and the flow of fluids and heat in such systems. The broad training in this field prepares the graduates for professional areas such as:
Drilling and Production Technology
Enhanced Oil Recovery
Environmental Engineering
Geothermal Energy Production
Natural Gas Engineering
Pipeline Transportation Reservoir Engineering
Reservoir Simulation
Water Production and Reclamation
Well and Property Economic Evaluation
Well Logging and Log Analysis
Well Test Analysis

Faculty and graduate students in the department conduct research in a variety of areas including: enhanced oil recovery by thermal means, by gas injection, and by the use of chemicals; reservoir simulation with computer models; well test analysis; flow of fluids and fluid mixtures in pipes; natural gas engineering; 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, Engineer, Engineer with Management Option, and Doctor of Philosophy.

FACILITIES

The department currently occupies the Lloyd Noble Laboratory of Petroleum Engineering, and portions of the Ruth Wattis Mitchell Earth Sciences Building and the Henry Salvatori Laboratory of Geophysics, 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. The department offices and laboratories will move to the new Green Earth Sciences Research Building when it is completed.

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 this field.

**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. ABET accreditation requires that engineering students have one-half year (22 \( \frac{1}{2} \) units) of engineering design. This requirement is normally met on completion of the engineering fundamentals and petroleum engineering depth courses.

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>19</td>
</tr>
<tr>
<td>Mathematics</td>
<td>20</td>
</tr>
<tr>
<td>Science</td>
<td>24</td>
</tr>
<tr>
<td>Petroleum engineering depth and electives</td>
<td>45</td>
</tr>
<tr>
<td>Distribution, writing, language and electives</td>
<td>72</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, provided the degree requirements for engineering and ABET certification are met. Modified programs must be approved by the student's adviser.

Design units are indicated in parenthesis ( ).

**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>
<tr>
<td>Math. 42. Calculus and Analytical Geometry</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
</tr>
</tbody>
</table>

or

| Math. 19. Calculus and Analytical Geometry  | 3     |
| Math. 20. Calculus and Analytical Geometry  | 3     |
| Math. 21. Calculus and Analytical Geometry  | 4     |
| Total                                       | 10    |

In addition, the following courses are also required:

| Math. 43. Calculus and Analytical Geometry  | 5     |
| Math. 44. Calculus                          | 3     |
| Math. 190. Ordinary Differential Equations  | 3     |
| Total                                       | 11    |

**SCIENCE**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 31 Chemical Principles</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 33. Structure and Reactivity</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 135. Physical Chemical Principles</td>
<td>4</td>
</tr>
<tr>
<td>or Chem. 171. Physical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>Geology 1. Interpreting the Earth</td>
<td>4-5</td>
</tr>
<tr>
<td>Physics 51. Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>Physics 53. Electricity and Magnetism</td>
<td>4</td>
</tr>
<tr>
<td>Physics 54. Electricity and Magnetism Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>24-25</td>
</tr>
</tbody>
</table>

**ENGINEERING FUNDAMENTALS**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engr. 10. Applied Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>Engr. 11. Mechanics of Materials I</td>
<td>4</td>
</tr>
<tr>
<td>Engr. 21. Mechanics of Fluids (1)</td>
<td>3</td>
</tr>
<tr>
<td>or Mech. Engr. 33. Introduction to Fluids Engineering</td>
<td>4</td>
</tr>
<tr>
<td>Engr. 30. Engineering Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>or Chem. Engr. 110. Equilibrium Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 167. Engineering Valuation of Oil and Gas Wells (2)</td>
<td>3</td>
</tr>
<tr>
<td>or Engr. 60. Engineering Economics</td>
<td>3</td>
</tr>
<tr>
<td>Plus one course chosen from:</td>
<td></td>
</tr>
<tr>
<td>Engr. 40. Basic Electronics (2)</td>
<td>5</td>
</tr>
<tr>
<td>Engr. 50. Introductory Science of Materials</td>
<td>3</td>
</tr>
<tr>
<td>Comp. Sci. 106A. Programming Methodology (2)</td>
<td>5</td>
</tr>
<tr>
<td>Comp. Sci. 106X. Programming Methodology and Abstractions (2)</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>19-22</td>
</tr>
</tbody>
</table>

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

**PETROLEUM ENGINEERING DEPTH**

The following courses constitute the core program of 45 required units in Petroleum Engineering:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appl. Ear. Sci. 180. Structural Geology (1)</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 140. Fluid Mechanics (1)</td>
<td>3</td>
</tr>
<tr>
<td>Geol. 151. Sedimentary Geology and Petrography: Depositional Systems (1)</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 150A. Well Log Analysis - I (2)</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 150B. Well Log Analysis - II (1)</td>
<td>2</td>
</tr>
<tr>
<td>Petr. Engr 151D. Reservoir Fluids Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>Pet. Engr. 151E. Core Analysis (1)</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 152A. Drilling (3)</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 152B. Production (3)</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 152C. Drilling Fluids Laboratory (1)</td>
<td>2</td>
</tr>
<tr>
<td>Pet. Engr. 170. Reservoir Engineering (2)</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 171. Reservoir Simulation Fundamentals (3)</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 175. Well Test Analysis (2)</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
</tr>
</tbody>
</table>

Technical Electives: Students must select a minimum of 6 additional units from Applied Earth Sciences, Geology, Geophysics, or Petroleum Engineering. Courses that may be used to satisfy this requirement are listed below.
Other relevant courses may be substituted with the prior approval of the student's adviser.

<table>
<thead>
<tr>
<th>Course No and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>App. Earth Sci. 251. Oil Field Exploration and Development (3)</td>
<td>3</td>
</tr>
<tr>
<td>Geophys. 190. General Geophysics (1)</td>
<td>4</td>
</tr>
<tr>
<td>Petr. Engr. 103. Energy Resources</td>
<td>3</td>
</tr>
<tr>
<td>Petr. Engr. 167. Engineering Valuation, and Appraisal of Oil and Gas Wells, Facilities, and Properties (2)</td>
<td>3</td>
</tr>
<tr>
<td>Petr. Engr. 172. Gas Engineering (2)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

Note: Courses taken to satisfy requirements for engineering fundamentals, petroleum engineering depth, and technical electives must include a total of 22.5 design units (minimum). ABET design requirements are being revised. Consult department for the latest information.

Courses recommended as electives (in addition to technical electives):

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp. Sci. 106A. Programming Methodology (2)</td>
<td>5</td>
</tr>
<tr>
<td>Comp. Sci. 106B. Programming Abstractions (2)</td>
<td>5</td>
</tr>
<tr>
<td>Comp. Sci. 135. Numerical Methods</td>
<td>3</td>
</tr>
<tr>
<td>Engr. 102W. Technical Writing</td>
<td>3</td>
</tr>
<tr>
<td>Engr. 103. Public Speaking/Presentation Development</td>
<td>3</td>
</tr>
<tr>
<td>Geol. 2, 3. Earth History, Earth History Lab</td>
<td>3,2</td>
</tr>
<tr>
<td>Geophys. 180. Geologic Interpretation of Reflection Seismograms</td>
<td>3</td>
</tr>
<tr>
<td>Indust. Engr. 133. Industrial Accounting (1)</td>
<td>3</td>
</tr>
<tr>
<td>Math. 113. Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>Math. 114. Linear Algebra</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>Pet. Engr. 173. Special Topics</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 190. Undergraduate Research</td>
<td>1-3</td>
</tr>
<tr>
<td>Stat. 110. Statistical Methods in Engineering and the Physical Sciences</td>
<td>4</td>
</tr>
</tbody>
</table>

Sample course programs are available in the Department of Petroleum Engineering, room 360, Mitchell Earth Sciences 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.

Engineering fundamentals, petroleum engineering depth courses, and technical electives should be taken for letter grades. ABET accreditation requires engineering students to have one half year (22 1/2 units) of engineering design. The latter requirement is normally met on completion of engineering fundamentals and petroleum engineering depth requirements.

**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. 190).

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 coterminal degrees under terms indicated in the introductory material for the School of Earth Sciences.

The applicant's petition must provide evidence of strong academic performance. The petition is evaluated by the graduate admissions committee of the department. Applicants 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.

The degree of Engineer requires a comprehensive two-year program of graduate study. This degree permits more extensive course work than
the master's degree with an emphasis on professional practice.

The degree of Engineer (Management Option) requires two years of graduate study combining engineering and business administration. This program is conducted in cooperation with the Graduate School of Business.

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 are encouraged to gain experimental research experience in either M.S. or Ph.D. programs.

**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.
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; normally 6 of these units must be independent work on a research problem.
4. 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.

In making up deficiencies, some of the following may be considered as mezzanine courses, i.e., they may receive either undergraduate or graduate credit: Pet. Engr. 150A, 150B, 170, 171, 172, 175 and Chem. Engr. 140. The 10-unit limitation applies to other deficiencies such as geology and petroleum engineering courses.

5. Demonstrate a knowledge of basic principles and research methods by preparing a report, to be submitted to the research adviser.

Usual research subjects include oil and gas recovery, reservoir engineering, 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**

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.

**MATHEMATICS SEQUENCE**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>

**CORE RESERVOIR ENGINEERING 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. 251. Thermodynamics of Phase Equilibria</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>12</strong></td>
</tr>
</tbody>
</table>

**IMPROVED OIL RECOVERY SEQUENCE**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pet. Engr. 280A. Waterflooding</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 280B. Improved Oil Recovery</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 280C. Miscible Flooding</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

**RESEARCH**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total units required for M.S. Degree</strong></td>
<td><strong>45</strong></td>
</tr>
</tbody>
</table>

**TECHNICAL ELECTIVES**

Depending on student's background and interest, and with consent of adviser, technical electives from the following list or advanced-level courses from other departments may be substituted for courses listed above.

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pet. Engr. 267. Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities and Properties</td>
<td>3-4</td>
</tr>
<tr>
<td>Pet. Engr. 269. Geothermal Reservoir Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>
ENGINEER

The objective is to broaden training through additional work in engineering and related sciences and by additional specialization.

A minimum of two years (six full quarters) of graduate study is required. The candidate must complete 90 units of course work including 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. In making up deficiencies, some of the following may be considered as mezzanine courses, i.e., they may apply as either undergraduate or graduate credit: 150A, 150B, 170, 171, 172, 175, and Chem. Engr. 140. The 10-unit limitation applies to the other deficiencies such as geology and petroleum engineering courses.

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 all course work. The candidate 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. It is to have the approval of the adviser, another faculty member, and the University Committee on Graduate Studies.

MANAGEMENT OPTION

The objective is to broaden the student's training in professional engineering and to provide a background in business administration.

A minimum of two years (six full quarters) of graduate study is required. The candidate must complete 90 units of course work, including 15 units of research (Pet. Engr. 360), and including all course requirements of the department's master's degree (39 units, excluding research). If the candidate has received credit for research in the M.S. degree, this credit ordinarily would be transferable to the Engineer degree, in which case a total of 9 additional research units would be required. No more than 10 of the required 90 units may be applied to overcoming deficiencies in undergraduate training. In making up deficiencies, some of the following may be considered as mezzanine courses, i.e., they may apply as either undergraduate or graduate credit: 150A, 150B, 170, 171, 172, 175, and Chem. Engr. 140.

The 10-unit limitation applies to the other deficiencies such as geology and other petroleum engineering courses. The candidate is required to take a minimum combined total of 36 units in Industrial Engineering and the Graduate School of Business. The following are suggested (other courses may be selected with adviser approval):

**Course No. and Subject** | **Units**
--- | ---
Bus. 210-211. Accounting I and II | 4 ea.
Bus. 220. Business Finance I | 4
Bus. 261. Decision Making under Uncertainty | 4
Bus. 270. Organizational Behavior | 4
Bus. 290. Strategic Management | 4
Bus. 351. Negotiation and Intervention | 4
Bus. 352. Small Business Management | 4
Bus. 498. Energy Business Issues | 4
Indust. Engr. 270. Managing Technical Companies | 4

Additional units needed to complete the required 90 may be electives. The student must secure at least "Pass" grades in Graduate School of 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. It is to 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 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 coursework 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.

**Course No. and Subject** | **Units**
--- | ---
Aero. & Astro. 192. Vector and Tensor Analysis | 3
Aero. & Astro. 214A. Numerical Methods in Fluid Mechanics | 3
Aero. & Astro. 214B. Numerical Computation of Compressible Flow | 3
Chem. Engr. 220. Applied Mathematics in Chemical Engineering | 3
Comp. Sci. 106X. Programming Methodology and Abstractions | 5
Comp. Sci. 137. Numerical Analysis | 3
Math. 106. Introduction to Theory of Functions of a Complex Variable | 3
Math. 113. Linear Algebra and its Applications 3
Math. 114. Linear Algebra and Matrix Theory 3
Math. 115. Fundamental Concepts of Analysis 3
Math. 131. Partial Differential Equations—I 3
Math. 132. Partial Differential Equations—II 3
Mech. Engr. 201. Applications of Complex Variables 3
Stat. 110. Statistical Methods in Engineering and Physical Sciences 4

SCIENCE
App. Earth Sci. 225. Surfaces and Interfaces 3
App. Earth Sci. 251. Oil Field Exploration and Development 3
App. Earth Sci. 255. Introduction to Solute Transport 2
Geol. 232. Numerical Methods in Hydrology 3
Geol. 275. Organic Geochemistry 2
Geophys. 180. Geologic Interpretation of Reflection Seismograms 3
Geophys. 190. General Geophysics 4
Geophys. 262. Rock Physics 3

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

The Ph.D. program is normally a four-year program. Except in unusual circumstances, the first year is spent in fulfilling the requirements for the M.S. degree. During the second and the third years, the student acquires a minimum of 45 units of credit in courses approved by the departmental faculty. Teaching experience (Pet. Engr. 369) is a requirement for the Ph.D. degree. During the second and third years, the student also completes a minimum of 27 units of research. The student begins the research work by making a literature survey and by formalizing research objectives. In the fourth year, the student works full time on completing research and writing the dissertation.

The department's qualifying examination usually is taken at the beginning of the second year of graduate study. Students are required to take the qualifying examination at the first opportunity after the completion of the requirements for the master's degree. Students who enter the program after obtaining the master's degree in another university take the qualifying examination in the second year of graduate study at Stanford. Students are also required to present a seminar on their master's research during their first year.

The qualifying examination consists of a written part and an oral part. The written part consists of three or four two-hour examinations on different subjects. The oral part is a two-hour examination in which the student is questioned by members of the departmental faculty. Students are required to apply for candidacy for the Ph.D. degree after passing the department's qualifying examination.

The student's record must indicate outstanding scholarship. The student must pass the department's qualifying examination; fulfill the requirements of the minor department, if a minor is elected; and pass the University oral examination, which is 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 must include 270A and 270B. The remaining courses should be selected from 170, 171, 271, 275, 250A, 280B, 280C, and 280D.

COURSES

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

3 units, Aut (Staff) MWF 11
Spr (Staff) MWF 9

110. Fundamentals of Petroleum Engineering—Basic engineering topics involved in petroleum recovery. Chemical, physical, and thermodynamic properties of earth fluids. Use of computers for design problems. Gas laws, physical behavior of fluids, mechanics of flow through
porous media, capillary pressure, relative permeability. A summer internship program in the oil industry is available on a limited basis (see department for application details).

3 units, Aut (Horne) MWF 10

111. 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 (Staff) by arrangement

150A. 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-part course concentrating on the fundamentals of all types of logs including electric and nonelectric logs.

3 units, Aut (Lindblom)

150B. Well Log Analysis II—Second part of 150 series. Concentrates on quantitative, interpretative techniques of all types of logs.

2 units, Win (Lindblom) W 7-10 p.m.

151D. Reservoir Fluids Laboratory—Physical properties of petroleum and its products: gravity, viscosity, surface tension, distillation, etc.; literature search and computer prepared reports. Prerequisite: 110 (may be taken concurrently).

2 units, Aut, Win, Spr (Marsden)

151E. Core Analysis—Lab and related lectures on porosity, permeability, capillary pressure, irreducible saturations, and the formation resistivity factor of porous media. Prerequisites: 110, 151D.

2 units, Aut, Win, Spr (Marsden)

152A. Drilling Technology—Comprehensive picture of modern drilling operations, practices, and equipment onshore and offshore. Lectures, field trips, problems.

3 units, Win (Staff) by arrangement

152B. Production Technology—Inflow performance relationships for undersaturated and saturated hydrocarbon reservoirs. Single phase and multiphase flow through vertical, horizontal, and inclined pipes. Flow through restrictions. Separator design and separation flash calculations.

3 units, Spr (Staff) by arrangement

152C. Drilling Fluids Laboratory—Lecture: clay mineralogy, rheology of drilling fluids. Mainly standard measurements of well drilling muds.

2 units, Aut, Win, Spr (Marsden)

by arrangement


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.

3-4 units, Win (Kourt, Voss) S 9-12

170. Elements of Reservoir Engineering—Lectures, problems. Underground oil and gas reservoir reserve estimates using volumetric calculations, material balance equations and decline curves. Fluid flow in underground reservoirs, flow in wells for oil, gas, and oil/gas mixtures. Design and prediction of production system behavior as a function of pressure and time. Oil displacement by water and gas. Natural water influx calculations. Prerequisites: 110 and Chemical Engineering 140 or consent of instructor.

3 units, Spr (Hewett) MWF 1:15


3 units Aut (Aziz) TTh 9:30-10:50


3 units Aut (Staff) MWF 1:15


1-3 units, any quarter (Staff)

by arrangement

175. Well Test Analysis—Lectures, problems. Application of solutions of unsteady flow in porous media to transient pressure analysis. Design of well tests. Computer-aided interpreta-
tion. Use of type curves. Pressure buildup analysis. Prerequisites: 110 and consent of instructor.
3 units, Spr (Ramey) MWF 10

180. Undergraduate Teaching Experience—Leading field trips, preparing lecture notes, quizzes under supervision of the instructor.
1-3 units, any quarter (Staff)

190. Undergraduate Research Problems—Original and guided research problems with comprehensive report.
1-3 units, any quarter (Staff)

3 units, Aut (Orr) TTh 8-9:20

267. Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities, and Properties—Seminar, problems. Appraisal of development and remedial work on oil and gas wells; appraisal of producing properties; estimation of productive capacity, reserves; operating costs, depletion and depreciation; value of future profits, taxation, fair market value; original or guided research problems on economic topics with report. Prerequisite: consent of instructor.
3-4 units, Win (Kourt, Voss) S 9-12

1 unit, any quarter (Staff)

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 (Ramey) alternate years, given 1992-93

Prerequisites: 170, Chemical Engineering 140, and Math. 130, or consent of instructor.
3 units, Aut (Hewett) MWF 9

3 units, Win (Brigham, Ramey) MWF 10

3-4 units, Win (Aziz) MWF 11

3 units, Aut (Staff) MWF 1:15

1-3 units, any quarter (Staff)

3 units, Aut (Marsden) MWF 10

3 units, Aut (Marsden) MWF 10

3 units, Aut (Marsden) MWF 10


3 units, Win (Fayers) TTh 10-11:30


3 units, Spr (Fayers) TTh 10-11:20


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


3 units (Staff) alternate years, given 1992-93


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


3 units, Spr (Schechter) MWF 2:15

284. Non-Newtonian Fluids in Petroleum Engineering—Properties and applications of non-Newtonian fluids in drilling, completing, cementing, fracturing, improving production of wells; transportation and enhanced oil recovery. Prerequisite: graduate standing.

3 units, Spr (Marsden) MWF 11

285A,B,C,E,F. Research Seminars—Special, focused study in areas of research within the department. Graduate degree program 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) by arrangement

285E. Research Seminar: Reservoir Simulation—Current research in SUPRI-B (Reservoir Simulation) program.

1 unit, Win (Aziz) by arrangement

285F. Research Seminar: Well-Test Analysis.

1 unit, any quarter (Ramey) by arrangement

359. Teaching Experience in Petroleum Engineering—On the job training in teaching petroleum engineering. Student prepares and presents several lectures, problem sets, and grades problems, and prepares lab experiments under the supervision of regular instructor. Performance is evaluated by students and the regular instructor.

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


any quarter (Staff) by arrangement

Dean: Marshall S. Smith
Associate Deans: Nel Noddings (Academic Affairs), Anne Gaddy (Administration), Renda Johnson (External Relations)
Assistant Dean: Ralph Keller (Alumni Relations)


Associate Professors: Rafael M. Diaz, Martin Ford, Edward Haertel, Jane Hannaway, David Rogosa
Assistant Professors: Patricia J. Gumport, Teresa D. LaFromboise, Melanie Sperling


Lecturers: Margaret Azevedo, Raymond F. Bachetti, Jean Fetter, David Fetterman, John W. Gardner, Grace Grant, Ronald B. Herring, Louise Spindler, Lee Swenson

Acting Associate Professor: Dolores Gallagher-Thompson

Acting Assistant Professors: Sandra L. Foster, Ronald D. Glass

Consulting Professors: Roy D. Pea, Michael Scriven

Consulting Associate Professors: Michael Carter, Donald M. Hill III, Rosemarie Moore, Peter Pearson

Visiting Professor: Peter Posch

The School of Education is organized into seven 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)
- Research and Evaluation Methods (REM)
- 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 indisciplinary 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 School of Education Admissions Brochure.

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 bulletin Summer at Stanford issued each year in February. 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 coterminal 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 coterminal A.B. and A.M. program. Students in such a program receive the bachelor’s degree in their undergraduate major and the A.M. in Education. Approval of the student’s undergraduate department and of the School of Education is required. Undergraduates may apply 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 coterminal degree application materials from the School of Education Admissions Office. Coterminal applicants must also consult with the University’s Graduate Degrees 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 School of Education Admissions Brochure, which outlines degrees, programs, admissions and graduation requirements, and interests of the faculty of the school; a reprint of the School of Education section of the bulletin Courses and Degrees, which describes courses and degrees offered; and application materials. Scores from the Graduate Record Examination General Test (verbal, quantitative, and analytical areas) must be submitted as well as TOEFL scores for 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 area does require a written project.) Additional detailed information regarding entrance requirements and degree requirements is available in the School of Education Admissions Brochure. Upon admission, each student is assigned an adviser from the appropriate area committee to begin early planning of a coherent program.

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

- Administration and Policy Analysis
- Elementary/Secondary Administration
- Higher Education Administration
- Policy Analysis
- Joint Program with Graduate School of Business
- Prospective Principal’s Program
- Curriculum and Teacher Education
- Curriculum Areas (Art, Dance, English, Math, Science, Social Studies)
- Design and Evaluation of Educational Programs (General Curriculum, Curriculum Evaluation, Elementary Education, Secondary Education, 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
- Research and Evaluation Methods
- Social Sciences in Education (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 School of Education Admissions Brochure.

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, 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 them-
selves, 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 a secondary school 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. Further information regarding admission requirements, course work, and credential requirements is available in the School of Education Admissions Brochure.

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. It is offered jointly by the School of Education and many academic departments such as Art, Biology, Chemistry, English, German, History, Latin American Studies, Mathematics, Physics, Political Science, Slavic Languages and Literatures, and Sociology. In addition to these fields, it is possible for candidates to work out special programs in other areas.

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. (This program is administratively located in the Research and Evaluation Methods Program Committee, REM.) 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 information about admission and program requirements is available in the School of Education Admissions Brochure.

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 School of Education Admissions Brochure. Complete guidelines may be obtained from the specific area committees.

The program areas for doctoral study are as follows:

Administration and Policy Analysis
- Elementary/Secondary Administration
- Higher Education Administration
- Policy Analysis
- Joint Program with Graduate School of Business

Curriculum and Teacher Education:
- Curriculum Areas (Art, Dance, English, Math, Science, Social Studies)
- Design and Evaluation of Educational Programs (General Curriculum, Curriculum Evaluation, Elementary Education, Secondary Education, Teacher Education)
- International Development Education
Language, Literacy, and Culture
  Bilingual Education
  Language Policy
  Second Language Education
  Writing, Reading, and Language—English
Research and Evaluation Methods
Psychological Studies in Education
  Child and Adolescent Development
  Counseling and Health Psychology
  Educational Psychology
Social Sciences in Education
  Anthropology of Education
  Economics of Education
  History of Education
  Philosophy of Education
  Sociology of Education
  Social Science in Education

Ph.D. MINOR

Candidates for the Ph.D. degree in other departments or schools of the University may elect to minor in Education.

Requirements include a minimum of 30 quarter units of graduate course work in Education and a clear field of concentration. Students choosing to minor in education should meet with the Associate Dean for Academic and Student 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.

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.) (CTE)

100A. Skills Training for Elementary Level Tutors—(Same as Psychology 168A.)
2-3 units, Aut, Win (Staff) W 4:15-5:45

100B. Skills Training for Secondary Tutors—
(Same as Psychology 168B.)
2-3 units, Aut, Win, Spr (Staff)
T 7-8:30 p.m.

104. Psychosocial Aspects of Aging—(Same as Human Biology 104.) Survey on 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., nutrition) by guest lectures. 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 kinds of stressors do not. Field work optional. (PSE)
4 units, Spr (Callagher-Thompson) MWF 9 and by arrangement

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

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. Exam-
amples for contemporary social science research literature. (SSE, REM)

3 units, Win (Phillips) T 7-10 p.m.
next given 1993-94

116X. Anthropological Perspectives on American Culture—(Same as Anthropology 15/116.) 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. Schooling in the U.S. as a process of cultural transmission, including the problems of cultural minorities in mainstream institutions. Field studies of relevant phenomena are encouraged. (SSE) DR:3 or DR:9(5)

3-5 units, Spr (G. Spindler, L. Spindler)
TTh 2:15-3:45

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 (Greene) MWThF 1:15

131. Economics of Women’s Education and Work—(Same as Feminist Studies 129.) 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, and comparable worth. (SSE)

4 units (Strober) given 1992-93

155. Development of Measuring Instruments—For persons 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. (REM, PSE)

3 units, Win (Haertel) MW 3:15-4:35
alternate years, not given 1992-93

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 the economic development of information technology. The impact of 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)

2-5 units (Carnoy)
alternate years, given 1992-93

170. Gender and Education—(Same as Sociology 112, Feminist Studies 130.) Gender as a critical variable in educational institutions and labor markets. Interdisciplinary approach to the distribution of power in schools, the relative pay-off 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, Aut (Strober, Cohen) MW 1:15-3:05
alternate years, not given 1992-93

173X. Peace Studies—(Same as History 154, Political Science 133, Sociology 108, Psychology 142, VTSS 143.) 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. (All Areas)

5 units, Spr (Dreikmeier, Bernstein, Ross, Moses, Bland, Dornbusch, Noddings) TTh 2:15-4:05 and by arrangement

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

any quarter (Staff) by arrangement

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

any quarter (Staff) by arrangement

195X. Studying Classroom Uses of Information Technology—Enables teachers to design, carry out, and interpret studies of the use of information technology (computers, video, telecommunications, and robotics) in their own classrooms. Use of simple research designs (case studies and classroom experiments), and familiar methods (observations, interviews, ratings, and test-like tasks), to design studies, perhaps with the assistance of their students and in collaboration with
colleagues. Answers questions about the educative value of different uses of information technology for their students. (CTE)

3-6 units, Sum (Walker) by arrangement

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

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

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

2 units, Spr (McDermott) T 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, immigration, and urbanization. (SSE)

3 units (Tyack) not given 1991-92

202. Teachers, Schools, and the U.S. Constitution—Designed for the beginning secondary school teacher. Readings, lectures, and class activities involve the application of concepts and analytical techniques from the social sciences to problems of the beginning teacher. Emphasis on constitutional and legal features of these issues. Interdisciplinary approach involves a team of three faculty members with differing social sciences specialties. (STEP)

4 units, Spr (Cohen, Kirst, Padilla)

MW 3:15-5:05

203. Models of the Child in Contemporary Educational Thought—Introductory focus on a number of influential views of the child formulated by psychologists, political theorists, and philosophers, and placing them in historical and philosophical perspective. (SSE)

4 units, Sum (Phillips) TTh 10-11:50

alternate years, not given 1992-93

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. Introductory philosophical material is presented in the context of issues concerning the curriculum. (SSE)

4 units (Glass)

alternate years, given 1992-93

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

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

alternate years, not given 1992-93

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

1 unit, Aut (Carnoy) M 12-1:05

and by arrangement

206B. Project Workshop in International Development Education—The conclusion of the four-quarter A.M. program in SIDE; 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 (Carnoy) M 2:15-4:05

207. Seminar: The Politics of International Cooperation in Education—(Same as Political Science 248.) Analysis of policies and practices in international cooperation, assistance, and exchange. Emphasis on the role of international organizations (World Bank, UNESCO, OECD) and the politics of multilateral and bilateral assistance programs. (IDE)

5 units, Sum (Weiler) TTh 2:15-4:05

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

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

208B. Introduction to Curriculum—The practice of curriculum improvement including planning, policy-making, development, implementation, and evaluation. Extensive, in-depth treatment of methods and approaches to curriculum improvement and their strengths and limitations. (CTE)

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

209X. Anthropology of Modern Institutions—(Same as Anthropology 260.) (SSE)

4 units (Rohlen) not given 1991-92

210. Problems in Sociology of Education—(Same as Sociology 210.) Introduction to soci-
ological approaches to educational phenomena. Topics: school organization and environment, 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. 210/310 meet together. (SSE)

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

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 1992-93

214S. Theoretical Foundations of Action Research—Concentrates on theory. Factors behind the action research movement researchers who paved the way for this tradition in educational theory and in the theory of science. Central concepts. Controversial issues in the discussion of action research. Elements of a preliminary action research program.

2-4 units, Spr (Posch) MW 1:15-3:05

217. Intellectual Development and Instructional Design—Provides a basic understanding of the manner in which children's thought processes develop during the preschool, elementary school, and high school years; also develops skills for utilizing this understanding to improve design of classroom and remedial learning activities during each period. (PSE, CTE)

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

218. Society, Education, and Dance—(Same as Dance 268.) The field of dance and related dance literature/film/video from a variety of perspectives: historical, philosophical, ethnographic, dance in education, contemporary problems, and current trends. Lectures amplified by readings, films, and discussion. (CTE) DR:7(2*)

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

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 10-11:50

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

3 units, Sum (Kirst) MW 9-10:30

220C. Education and Society—(Same as Sociology 143.) 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—Limited 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. Focus is 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. (APA, SSE)

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

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) F 10-11:50

221. Issues in Policy Analysis—(Same as Public Policy 221.) 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—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)

5 units, Spr (Levin) MW 10-11:50

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

3-4 units, Sum (Cuban) TTh 10-11:50

224X. Information Technology in the Classroom—Basic computer operations and terminology. Includes networking, instructional packages, teacher utility programs; use in particular subject fields; economic, social, and ethical issues emphasizing equity. Meets fifth year teacher credential requirement. (STEP)

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

2275. 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, Spr (Foster) W 1:15-4:05

228. Psychology of Literacy—Focuses on psychological principles in understanding the reading and writing process, and the acquisition of literacy. Appropriate for doctoral and masters students in LLC and PSE. (LLC)

3 units, Spr (Calfee) TTh 8:20-9:50

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, Aut (Ford) TTh 12:15-2:05

230. Education and Values—Focuses on normative aspects of educational research and policy formation. Issues, often in a case study format: how values influence the research process, ethical treatment of the subjects involved in research, the ethical dimension of policies concerning minority groups and special populations, the values and aims of education. (All Areas)

4 units, Spr (Phillips, Noddings) TTh 12:15-2:05


4 units, Win (Thoresen) TTh 12:15-2:05 alternate years, not given 1992-93

233. Seminar in Cross-Cultural Counseling—How the New World experience has affected the adaptive strategies, acculturation patterns, family structure, and support systems of Afro-Americans, American Indians, Asian/Pacific Islanders, and Hispanic Americans. Intensive analyses conducted on: 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 1992-93

234. Career and Personal Counseling in Culturally Diverse Settings—(Same as Psychology 237.) Enrollment limited to graduate students. 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. (PSE)

3 units (Krubloltz)

alternate years, given 1992-93

236. The Social Context of Cognitive Development—Offers a broad perspective of developmental psychology by reading representative samples of original research in current areas of cognitive, social, and applied developmental research geared to instructor and student interests. Instructor provides "researcher's map" describing major issues and questions, theoretical frameworks and methodological approaches, and the significance of each area of understanding child development. Topics: infant perception, temperament, attachment, play, children's friendships, language acquisition, bilingualism, attention deficit disorder, and child abuse. (PSE)

4 units, Spr (Diaz) TTh 2:15-4:05

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, Win (Foster) T 4:15-6:05 bi-weekly

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. Consent of instructor required. (PSE)

6 units, Aut (Thoresen, Gallagher-Thompson, Foster) M 1:15-4:05

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. Consent of instructor required. (PSE)

3 units, Win (Foster) 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. Consent of instructor required. (PSE)

6 units, Spr (Thoresen, Gallagher-Thompson, Foster) M 1:15-4:05

239X. 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, Spr (Padilla) MW 1:15-3:05

240. Adolescent 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 and administrator credential requirements. (STEP)

1 unit, Aut (Brown) Th 6:15-8:15 p.m.

242X. 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) TTh 2:15-4:05

Win (McDermott) TTh 7-9 p.m.

Spr (Calfee) TTh 2:15-4:05

245X. Sociology of Mass Schooling— (Same as Sociology 147.) Introduction to issues regarding the rise, organization, and expansion of mass education throughout the world. Interdisciplinary readings with a comparative/historical and cross-national research focus. Evaluation of functionalist, conflict, incorporation, and other theories of mass education. (IDE, SSE)

4 units (Ramirez) not given 1991-92


246A. 1-13 units, Sum (Grant) F 9-12

and by arrangement

246B. 1-13 units, Aut (Grant) W 7-9 p.m.

and by arrangement

246C. 1-13 units, Win (Grant) W 7-9 p.m.

and by arrangement

246D. 1-13 units, Spr (Grant) 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 concerns with the response of
moral education to racism and other repressions. (SSE)

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

250A. Statistical Analysis in Educational Research—(Same as Statistics 206.) For graduate students with little empirical research experience. Analysis of variance and covariance; correlation and regression; analysis of categorical data. Proficiency with statistical computer packages. Prerequisite: Statistics 60/160. (REM)

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


4 units, Spr (Olkin) MWF 11-12:30

251. Basic Methods in Educational Research—For graduate students (particularly PSE, CTE, and SIDE) with little experience in research and analysis. Introduction to methods of research and design and analysis. Topics: philosophy and logic of design, reliability and validity of measures, alternative use of qualitative and quantitative methods. Enrollment limited to 12. (REM)

4 units, Aut (Calfee) TTh 8:20-9:50

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 60 or Psychology 60, or equivalent. (PSE, REM)

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

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; examples relating to social institutions. Cognitive analysis of verbal reasoning and spatial abilities. Individual differences in relation to motivation, personality, gender, and ethnic differences. Prerequisites: Psychology 1 and 60 or equivalent. (PSE)

3 units (Snow) not given 1991-92

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. Prerequisite: concurrent registration in 255 or Psychology 155, and consent of instructor. (PSE)

1-2 units (Snow) not given 1991-92

257X. 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 and 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. Prerequisite: Statistics 60/160. (REM)

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

plus section by arrangement

258. Organizations: Principles and Emerging Ideas—(Same as Sociology 164.) Analyzes basic ideas about the hows and the whys of the ways organizations and the people in them function. Multiple perspectives are drawn from psychology, sociology, political science, and economics to address questions about what holds organizations together (and in place) and what influences how (and when) they change. The commonalities, differences, and implications of various theoretical approaches and the applicability to different types of organizations, particularly educational organizations, is emphasized. (APA, SSE)

4 units, Spr (Hannaway) TTh 2:15-4:05

260X. Investing in the Education of the Disadvantaged—Open to A.M. students and undergraduates. The educationally disadvantaged represent a large rising portion of students in the U.S. public schools. Failing their needs has wide repercussions for the future of the U.S. economy, society, and polity. The issue is addressed from a policy analytic perspective by exploring the nature of the problem, the inadequacy of past and present policies, and the formulation of approaches that promise greater success. (APA, SSE)

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

261S. The Process of Action Research—Practical introduction to action research by involving students in the process and a systemic discussion of basic concepts and methods. Analyzes studies with attention to quality criteria; examines feasibility of action research and the effects of different infrastructural and cultural contexts. The international project "Environment and School Initiatives" illustrated. (CTE)

3 units, Win (Posch) TTh 2:35-4:05

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. (STEP)  
262A. 3 units, Sum (Staff) MW 3:15-5:05  
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. (STEP)  
263A. 3 units, Sum (Staff) TTh 3:15-5:05  
263B. 2 units, Aut (Kelley) W 4:15-6:05

264A,B. Curriculum and Instruction in Foreign Languages—Methods, techniques of foreign language teaching, testing. Materials of foreign language teaching. (STEP)  
264A. 3 units, Sum (Staff) MW 5:15-7:05  
264B. 2 units, Aut (Azcedo) Th 4:15-6:05

265X. Curriculum and Instruction in Economics—Introduction to major concepts in economics. Approaches to teaching economics in secondary schools: survey of teaching materials; opportunity to develop techniques for newly emerging topics. (STEP)  
 3 units (Strober) not given 1991-92

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; laboratory and demonstration techniques; evaluation, tests; curricular changes; ties with other subject areas. Enrollment limited to STEP students, or consent of instructor. (STEP)  
267A. 3 units, Sum (Atkin) MW 3:15-5:05  
267B. 2 units, Win (Atkin, Rowe) T 4:15-6:05

268A,B. Curriculum and Instruction in Social Studies—Enrollment limited to STEP students. Emphasis on the methodology of social studies instruction: review of curriculum trends; survey of teaching materials; opportunities to develop teaching and resource units. (STEP)  
268A. 3 units, Sum (Cuban)  
TTh 3:15-5:05  
268B. 2 units, Aut (Cuban, Swenson)  
T 4:15-6:05

269. Foundations of Learning for Teaching—Enrollment limited to STEP students. 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. (STEP)  
4 units, Win (Shulman) MW 3:15-5:05

270X. African-American English in Educational Context—Enrollment limited to graduate students. Examines linguistic and cultural conflicts that confront the majority of African-American students. Interdisciplinary research is reviewed with attention to cross-generational educational needs. Ethnographic studies of schools and their students are central as is the evolution of educational and linguistic research among African Americans. (LLC)  
3 units, Win (Baugh) T 7-10 p.m  
alternate years, not given 1992-93

273. Education as a Social Science—Enrollment limited to and required of all 1st year A.M. and Ph.D. students in SSE. Students meet with faculty of the area committee, are oriented to the range of intellectual and research strategies represented by the social science faculty, and interview faculty and plan with them the topic of discussion of their course session. Assists students in course planning. Opportunity to develop sessions to meet orientation and adjustment needs, as they arise. (SSE)  
1 unit, Aut (Cohen) T 4:15-6:05

276. Women and Moral Theory—(Same as Feminist Studies 127) Ethical problems in education. After reading and discussing background material in ethics and feminism, concentrates on ethical problems in education of interest to feminists. Emphasis on the ethics of caring. (SSE)  
4 units (Noddings) not given 1991-92

278. Introduction to Issues in Evaluation—Focuses on basic literature and major theoretical and practical issues facing the emerging evaluation profession. Topics: evaluation as a branch of experimental science; models of evaluation; quantitative and qualitative approaches to evaluation; evaluation as related to decision-making and the political process; and professional standards of evaluation. (REM)  
4 units, Win (Phillips) TTh 12:15-2:05

279X. Women's Choices: Economic Theories and Literary Representations—(Same as English 306) Economic and feminist analysis of literary representations of women's choices under a variety of historical conditions. Readings provide perspectives across life stages, race, class, and cultures, and include choices relating to education, marriage, work, self-expression, and ethical conduct. Texts studied: J. E. Neal, Elizabeth I; Janet Lewis, The Wife of Martin Guerre; Jane Austin, Persuasion; Ann Lane, The Life of Charlotte Perkins Gilman; Colette, Cheri, and The End of Cheri; Tillye Olsen, Silences; Toni Morrison, Beloved; readings in economic and feminist theory. (SSE)  
4-5 units, Spr (Strober, Middlebrook)  
TTh 1:15-3:05

280. Training Seminar: Ethnography of Schooling—(Same as Anthropology 280) How to learn about culture and to analyze education-relevant
situations such as the multicultural 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, Sum (G. Spindler, L. Spindler) W 1:15-4:05

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. By focusing on the teaching of English, 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

283X. Attitudes Toward Languages and Language Study.

4 units, Win (Padilla) MW 10-11:50

285X. Modeling of Knowledge and Cognitive Processes—(Same as Psychology 285.) Introduction of concepts and methods of constructing models of human cognition, and evaluating models with empirical data. Emphasis on computational models, including production systems, schemata, and semantic networks. Evaluation methods include thinking-aloud protocols, latencies, patterns of performance, and correlations with psychometric scores. To enroll, students should be conducting research in which construction of a model plays a significant role. Prerequisite: consent of instructor. (PSE)

3 units, Spr (Greeno) MW 3:15-4:40 alternate years, not given 1992-93


4 units (Hakuta) alternate years, given 1992-93

288. Social Diversity and Educational Reform—Introduces key normative issues facing educators. The relation of social diversity (race, ethnicity, gender, and class) to equality in school-

ing. Alternative conceptions of the purposes of education in reform movements. (STEP)

3 units, Sum (Staff) MW 1:15-3:05

290. Leadership in Education: Research and Practice—A conception of leadership that includes the classroom, school, district office, and state capitol. 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) given 1992-93

291. Methods of Teaching German—(Same as German Studies 302.) (CTE)

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. (CTE)

3-5 units, Spr (Haro) W 3:15-5:05

293. Methods of Teaching French—(Same as French 293.) Approaches, methods, and procedures in relation to foreign language acquisition theory; teaching practice regularly observed in a demonstration class. (CTE)

4 units, Spr (Kinginger) TTh 10

294. Language and Cognitive Development: Implications for Schooling—Language use and development as they relate to general issues in teaching and learning. Ways in which linguistics, philosophy, and psychology approach a shared problem-area are examined through a study of major works in a variety of disciplines. (LLC)

4 units (Padilla) alternate years, given 1992-93

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. (PSE)

3 units (Greeno) alternate years, given 1992-93

296X. Substance Dependence: Assessment, Treatment and Prevention—Experimental course, open to graduate students. Survey of prevalence, etiology, and treatment of alcohol and drug-related disorders. Focuses on a developmental perspective and how substance abuse disorders manifest themselves at different ages from childhood through late adulthood. Discussion of various treatment approaches that have been beneficial. (PSE)

3 units, Win (Gallagher-Thompson, Moffett) W 3:15-5:05
297. Language and Literacy in Secondary Schools—Intended for STEP interns, but open to graduate and advanced undergraduate students. Methods for fostering comprehension and composition skills by middle and high school students. Introduction to theory of critical literacy, with application to subject matter areas. Techniques for text analysis, classroom discussion, and teacher assessment of student achievement. (STEP)

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

303. Qualitative Inquiry in Education—Examines 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. (REM, CTE)

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


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

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

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

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, examined from an anthropological perspective using Japan and Indonesia as case studies. 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 (Rohlen) MW 1:15-3:05

306D. Sociology of Development and Education—(Same as Sociology 306.) 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) MW 1:15-3:05

307. Knowledge and Legitimation: The Politics of Educational Research—(Same as Political Science 328.) For doctoral students. Theoretical core of the relationship between knowledge and power, construed as a relationship of reciprocal legitimation. Readings, seminar discussions, and student research projects focus on the politics of research support, cooperation, and dissemination. Consent of instructor required. (IDE, SSE)

5 units (Weiler)

alternate years, given 1992-93

310. Problems in Sociology of Education—(Same as Sociology 310.) 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, Win (Cohen) MW 3:15-5:05

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. Spindler, L. Spindler) T 7-10 p.m.

317. Psychological Research on Teaching—Introduction to theory, methodology, and substantive findings of research on teaching and teacher education. (PSE)

4 units (Shulman)

alternate years, given 1992-93

318X. Understanding Cultural Diversity—(Same as Anthropology 280.) How to learn about culture and apply this to education relevant situations. Culture as a process. Techniques of obser-
uation and explanations of culture in context, and how our own culture influences perception and interpretation of other cultures. Techniques and broad interpretation emphasized. Students participate in various simulations. (APA)

3-4 units, Sun (G. Spindler, L. Spindler)
W 1:15-4:05

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, Aut (Diaz) T 2:15-5:05


321A. 4-5 units, Win (Rohlen)
TTh 4:15-6:05

321B. 4-5 units, Spr (McDermott)
TTh 2:15-4:05

322S. Educational System and Educational Reform Movements in Austria—(Same as German Studies 179E/279E.) Centers on description and analysis of Austrian educational system in the framework of social, cultural, and economic developments. Historical review, present situation; emphasis on main issues of the educational reform debate. Comparisons with the situation in other European countries and the U.S. where appropriate. (CTE)

3 units, Spr (Posch) MWF 9

325A,B,C. Administration and Policy Analysis Research Seminar—Faculty and dissertation students present their research and proposals for research to other faculty and students in the APA program. Emphasis on presenting research ideas at an early stage of their formulation to conceptu-
duces various studies of language in society and their educational relevance. Theoretical perspectives: quantitative sociolinguistics, alternative approaches to studies of discourse and conversation, examinations of literacy and language attitudes in multilingual and multicultural contexts, and ethnographic foundations of linguistic inquiry. Content technical in nature, but emphasizes educational application. Relevant aspects of public (language) policies considered. (L.L.C)

3 units, Win (Baugh) 7-10 p.m.

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, Win (Ford) TTh 12:15-2:05

346. Research Seminar in Higher Education—(Same as Sociology 307.) Required for Higher Education students. Overview of 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 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) Th 2:15-5:05

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 1992-93

350A. Psychological Studies in Education—Introduction to psychological studies in education. Required of first-year doctoral students in Psychological Studies. Others by consent of instructor. (PSE)

1 unit, Aut (Greeno, Case) 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 (Diaz, Hakuta) Th 10-11:30 and by arrangement
350C. 3 units, Spr (Hakuta) Th 10-11:50 and by arrangement
350D. 1 unit, Aut, Win, Spr (Ford, Staff) Th 10-11:50 and by arrangement

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: 250B and 252 or Psychology 152 and 248, or equivalent. (REM, PSE)

3 units (Haertel) alternate years, given 1992-93

353B. Problems in Measurement: Factor Analysis—(Same as Psychology 249B.) Models, methods, and applications of factor analysis. Models for factor analysis; estimation procedures; factor rotation; factor scores; using factor analysis in research; confirmatory factor analysis; methods for dichotomous variables. Prerequisites: Psychology 152 and 248, or equivalent. (REM, PSE)

3 units, Aut (Haertel) MW 9-10:30 alternate years, not given 1992-93

355. Policy and Research in Science Education—(Same as Human Biology 117.) Science education from pre-school through undergraduate years, outside and inside established educational institutions, emphasizing public primary and secondary schools. Oriented toward questions of science education policy: What science should be taught at different education levels? For what purpose? To whom? By whom? Where? By what methods? How is the effectiveness of science programs to be assessed? Overview of issue in 355A. Emphasis on school-based research on these topics in 355B. (CTE)

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

359A,B,C,D. Research in Science and Mathematics Education I, II, III, IV—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 contempo-
rary 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 1992-93

359B. Instruction.
2 units, Spr (Rowe) M 3:15-5:05 alternate years, not given 1992-93

359C. Curriculum.
2 units (Atkin, Rowe) alternate years, given 1992-93

359D. Teacher Education.
2 units (Rowe) alternate years, given 1992-93

368. Student Affairs, Administration Practices, and Issues—Discussion of cases, issues, and principles of student affairs administration in institutions of higher education. (APA)
3 units, Aut (Lyons) T1:15-4:05

369. Personnel Administration—Topics: selection, supervision, evaluation, and staff development. Considers legal, social science, and educational aspects of these topics. Connects theory and practice through use of problem-based learning. (APA)
4 units, Spr (Bridges) MW 1:15-3:05 alternate years, not given 1992-93

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, Spr (Porras) TTh

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 discussed. (IDE, SSE)
4 units (Carnoy) given 1993-94

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, Win, Spr (Wald) W 4:15-6:05

387A,B,C. Research Practicum: Cross-National Studies of Educational and Political Organization—(Same as Sociology 371A,B,C.) Analysis of quantitative and longitudinal data on national educational systems and political structures. Prerequisite: consent of instructor. (IDE)
2-5 units, Aut, Win, Spr (Meyer, Ramírez) 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, Aut (Hakuta) MW 10-11:50

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) T 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). 2-3 units, Win (Ramirez) W 3:15-5:30

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. Prerequisite: 306A-D or equivalent. (IDE, SSE)
2-5 units, Win (Weiler) M 3:15-6:05

415. Seminar in Educational Psychology—Topics seminar for advanced students. Admission by consent of instructor. (PSE)
not given 1991-92

416. Seminar on Aptitude—Limited to advanced doctoral students in education and psychology. Study of individual differences in learning, cognitive, and motivational processes related to education. Prerequisites: 250A,B, 255, or equivalent, and consent of instructor. (PSE)
3 units (Snow) alternate years, given 1992-93

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.

420A. Feminist Theory.
1-3 units, Aut (Noddings)
by arrangement

420B. Philosophical and Educational Thought of John Dewey.
1-3 units, Win (Noddings)
by arrangement

421. Internship in Educational Administration—Field experience for students in the educational administration program. Supervised by staff; project centered. (APA)
3-5 units, Aut, Win, Spr, Sum (Bridges)
by arrangement

422A,B,C. Practicum for 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) TTh 1:15-4:05
422B,C. 6 units, Sum (Bridges) MW 1:15-4:05

423A. Introduction to Research Design: Educational Administration and Policy Analysis—Limited to APA students. Focuses on the key issues in conceptualizing and designing research in the social sciences. (APA)
3-5 units, Win (Hannaway) Th 2:15-5:05

426. Theory and Practice in Criterion-Referenced Test Interpretations—Definitions of criterion-referenced tests, objective methods of domain definition and test construction, problems and methods of standard setting, statistical analysis of criterion-referenced test data, and applications to minimum competency testing. Prerequisite: 252 or equivalent course work, or consent of instructor. (PSE, REM)
3 units (Haertel)
alternate years, given 1992-93

431. Doctoral Seminar: Counseling and Health Psychology—Limited to doctoral candidates in counseling psychology. Analysis of professional problems. May be repeated for credit. Prerequisite: consent of instructor. (PSE)
1 unit, Aut, Win, Spr (Thoresen, Foster, Gallagher-Thompson) T 4:15-6:05, biweekly

437X. Recent Theoretical Advances in Intellectual Development—Focuses on contemporary theories of intellectual development. Theories of particular developmental processes (e.g., sensorimotor development, development of quantitative skills) and a general theory of development. Relevance of contemporary developmental theory for instruction. (PSE)
3 units, Spr (Case) F 2:15-5:05

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

460. Advanced Seminar in Evaluation Design—Major traditions in the design of evaluation research. Strengths and weaknesses of standard evaluation models in view of the different objectives for evaluation, emphasizing the constraints inherent in studying educational processes and institutions. Focuses on dilemmas central to the design and conduct of educational evaluations and pursues alternative, "state-of-the-art" approaches. (REM)
3 units, Spr (Staff) by arrangement

466. Doctoral Seminar in the Design and Evaluation of Educational Programs (DEEP)—Required of all doctoral students in DEEP 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 DEEP program at Stanford. All DEEP 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 (Eisner) T 7-9:30 p.m.

470. Practicum—For advanced graduate students. (All Areas)
any quarter (Staff) by arrangement

470E. Practicum in Evaluation—Restricted to student members of the Evaluation Consortium. Topics of current interest in the area of educational evaluation. (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. Seminar on Methodological Problems in Educational Research: Statistical Methods for Meta-Analysis—(Same as Statistics 211.) Discussion of topics of current methodological interest including papers presented by visiting researchers. Practicum in consulting on actual projects being carried out by faculty and students. Consent of instructor required. (REM)
1-3 units, Win (Olkin) MWF 12:15-3:30

ADMINISTRATION AND POLICY ANALYSIS (APA)

105. American Education and Public Policy—(Same as History 158B, Political Science 188K.)

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

222. Resource Allocation in Education

223. Effective Schools: Research, Policy, and Practice

258. Organizations: Principles and Emerging Ideas

260X. Investing in Education of the Disadvantaged

290. Leadership in Research and Practice

318X. Understanding Cultural Diversity

325A,B,C. Administration and Policy Analysis Research Seminar

328A. Topics in Higher Education: Economics

328B. Topics in Higher Education: Administration and Planning

346X. Research Seminar in Higher Education—(Same as Sociology 307.)

368. Student Affairs: Administration, Practices, and Issues

369. Personnel Administration

375X. Organizational Development: Theory and Practice

379X. Public Policy Toward Abused and Neglected Children

421. Internship in Educational Administration

422A,B,C. Practicum for Principals


CURRICULUM AND TEACHER EDUCATION (CTE)

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

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

195X. Studying Classroom Uses of Informational Technology

200A. Introduction to Curriculum

213. Aesthetic Foundations of Education

214S. Theoretical Foundations of Action Research

217. Intellectual Development and Instructional Design

218. Society, Education, and Dance

219. Artistic Development of the Child

223. Effective Schools: Research, Policy, and Practice

261S. The Process of Action Research

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 293.)

303. Qualitative Inquiry in Education

322S. Educational System and Educational Reform Movements in Austria

347. Problems of Teacher Education

355. Policy and Research in Science Education—(Same as Human Biology 117.)

359. Research Seminar in Science and Mathematics Education

359A. Assessment and Evaluation

359B. Instruction

359C. Curriculum

359D. Teacher Education

397. Controversies in Classroom Research

466. Doctoral Seminar in the Design and Evaluation of Educational Programs (DEEP)

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: An International Perspective—(Same as Sociology 117.)

206A. Introduction to the Study of International Development Education

206B. Project Workshop in International Development Education

207. International Cooperation in Educational Development

245X. Sociology of Mass Schooling—(Same as Sociology 147.)

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 239.)

306D. Sociology of Development and Education—(Same as Sociology 306.)


376. Education and Theories of the State

387A,B,C. Research Practicum: Cross National Studies of Educational and Political Organization

406X. Topics in Comparative Educational Research

408. Research Workshop in International Development Education

LANGUAGE, LITERACY, AND CULTURE (LLC)

228. Psychology of Literacy

241X. Research in Writing and Writing Instruction: The Social, Cognitive, and Linguistic Dimensions of Written Language

242X. First Year Proseminar in Language, Literacy, and Culture

248X. Theory and Issues in Writing and Literacy

270X. African American English in Educational Context
PSYCHOLOGICAL STUDIES
IN EDUCATION (PSE)

104. Psychological Aspects of Aging
120. Problems of Intelligence, Information, and Learning—(Same as Symbolic Systems 20.)
155. Development of Measuring Instruments
217X. Intellectual Development and Instructional Design
227S. Individual Counseling Psychology Methods—(Same as Psychology 250.)
229. The Development of Human Competence: Theory, Research, and Practice
232. Science and Research in Counseling and Health Psychology—(Same as Psychology 253.)
233. Seminar in Cross-Cultural Counseling
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 252.)
238A. Orientation to Counseling Psychology
238B, C. Counseling and Health Psychology: Supervised Applications
239X. Contemporary Social Issues in Child and Adolescent Development
252. Introduction to Test Theory—(Same as Psychology 248.)
255. Human Abilities—(Same as Psychology 155.)
255A. Human Abilities Research Topics
255X. Modeling of Knowledge and Cognitive Processes
295. Psychology of Problem Solving and Reasoning
296X. 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
343. Motivational Processes in Education
350A. Psychological Studies in Education
350B, C, D. Research Practicum in Psychological Studies in Education
353A. Problems in Measurement: Item Response Theory—(Same as Psychology 249A.)
353B. Problems in Measurement: Factor Analysis—(Same as Psychology 249B.)
415. Seminar in Educational Psychology
416. Seminar on Aptitude
426. Theory and Practice in Criterion-Referenced Test Interpretations
431. Doctoral Seminar: Counseling and Health Psychology
437X. Recent Theoretical Advances in Intellectual Development

RESEARCH AND EVALUATION METHODS (REM)

111. Introduction to Philosophy of Social Science—(Same as Philosophy 61.)
155. Development of Measuring Instruments
250A. Statistical Analysis in Education Research
250C. Statistical Analysis in Educational Research: Advanced Regression and Multivariate Analysis
251. Basic Methods in Educational Research
252. Introduction to Test Theory—(Same as Psychology 248.)
257X. Statistical Methods for Behavioral and Social Sciences—(Same as Psychology 152.)
278. Introduction to Issues in Evaluation
303. Qualitative Inquiry in Education
321A, B. Qualitative Methods of Educational Research: Issues in Design and Data Collection
353A. Problems in Measurement: Item Response Theory—(Same as Psychology 249A.)
353B. Problems in Measurement: Factor Analysis—(Same as Psychology 249B.)
426. Theory and Practice in Criterion-Referenced Test Interpretations
460. Advanced Seminar in Evaluation Design
493B. Seminar on Methodological Problems in Educational Research: Statistical Methods for Meta-Analysis—(Same as Statistics 211.)

SOCIAL SCIENCES IN EDUCATION (SSE)

105. American Education and Public Policy—(Same as History 158B, Political Science 188K.)
111. Introduction to Philosophy of Social Science—(Same as Philosophy 61.)
116X. Anthropological Perspectives on American Culture—(Same as Anthropology 15/116.)
131. Economics of Women's Education and Work—(Same as Feminist Studies 129.)
170. Gender and Education—(Same as Feminist Studies 130, Sociology 112.)
197. Education and the Status of Women: An International Perspective—(Same as Sociology 117.)
201. History of Education in the United States—(Same as History 158, African and Afro-American Studies 201.)
203. Models of the Child in Contemporary Educational Thought
204. Introduction to the Philosophy of Education
205. Ideology and Education
SCHOOL OF EDUCATION 83

207. International Cooperation in Educational Development

209X. Anthropology of Modern Institutions—(Same as Anthropology 258.)

210. Sociology of Education—(Same as Sociology 210.)

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

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

245X. Sociology of Mass Schooling—(Same as Sociology 147.)

247. Moral Education

258. Organizations: Principles and Emerging Ideas

260X. Investing in the Education of the Disadvantaged

273. Education as a Social Science

276. Women and Moral Theory

279X. Women's Choices: Economic Theories and Literary Representations

280. Training Seminar: The Ethnography of Schooling—(Same as Anthropology 280.)

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 239.)

306D. Sociology of Development and Education—(Same as Sociology 306.)


310. Sociology of Education—(Same as Sociology 310.)

315. Cultural Transmission: Education in Cross-Cultural Perspective—(Same as Anthropology 266.)

376. Education and Theories of the State

408. Research Workshop in International Development Education

420X. Advanced Seminar in Philosophy of Education

STANFORD TEACHER EDUCATION PROGRAM (STEP)

202. Teachers, Schools, and the U.S. Constitution

224X. Information Technology in the Classroom

240. Adolescent Health and Special Needs

246A,B,C,D. Secondary School Teaching Practicum

262A,B. Curriculum and Instruction in English

263A,B. Curriculum and Instruction in Mathematics

264A,B. Curriculum and Instruction in Foreign Languages

265X. Curriculum and Instruction in Economics

267A,B. Curriculum and Instruction in Science

268A,B. Curriculum and Instruction in Social Studies

269. Foundations of Learning for Teaching

258. Social Diversity and Educational Reform

297. Language and Literacy in Secondary Schools

DIRECTED READING AND RESEARCH, DISSERTATION, AND PRACTICA (ALL AREA COURSES)

173. Peace Studies—(Same as History 154, Political Science 133, Sociology 108, Psychology 142, VTSS 143.)

180. Directed Reading in Education—Master's degree students.

190. Directed Research in Education—Master's degree students.

199X. Undergraduate Honors Seminar

230X. Education and Values

453. Doctoral Dissertation

470. Practicum—For advanced graduate students. Not for STEP students.

470E. Practicum in Evaluation—For Evaluation Consortium members.

480. Directed Reading—For advanced graduate students.

490. Directed Research—For advanced graduate students.
Dean: James F. Gibbons
Senior Associate Dean: Charles H. Kruger
Associate Deans: Kenneth S. Down (Business Affairs), David L. Freyberg (Undergraduate Education), Dwain N. Fullerton (External Relations), Gordon Kino (Space Planning), Elliott Levinthal (Special Projects), Noé P. Lozano (Minority and Affirmative Action Programs)
Assistant Deans: Kathy Davis (Human Resources), Cheryll Hawthorne-Searight (Undergraduate Minority Programs)

Faculty Teaching General Engineering Courses
Associate Professors: John C. Bravman, David L. Freyberg, Peter W. Glynn, Lambertus Hesselink, Bruce B. Lusignan, Reginold E. Mitchell, M. Godfrey Mungal, M. Elisabeth Paté-Cornell, Stephen Rock
Lecturer: David Lougee
Consulting Professor: Emery I. Reeves

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 Macoski, Channing R. Robertson (Chemical Engineering), Gio Wiederhold (Computer Science, Medicine), Felix Zajac (Mechanical Engineering)

The School of Engineering offers four-year undergraduate programs leading to the degree of Bachelor of Science (B.S.); five-year programs leading to both B.S. and Master of Science (M.S.) degrees; other programs leading to a B.S. with a Bachelor of Arts (A.B.) in a field of the humanities or social sciences; dual degree programs with certain other colleges; and graduate curricula leading to the degrees of M.S., Engineer, and Ph.D.

The school has 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 one interdisciplinary program, Scientific Computing and Computational Mathematics, are responsible for graduate curricula, research activities, and the departmental components of the undergraduate curricula. In research, where faculty interest and competence embrace both engineering and the supporting sciences, there are not only numerous programs within the school but also several interschool activities, including: Center for Integrated Systems, Center for Materials Research, Center for Space Science and Astrophysics, Institute for Electronics in Medicine, Joint Institute for Aeronautics, Microwave Laboratory, 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 procedures, course requirements, or examinations for admission to the School.

PREPARATION RECOMMENDED FOR FRESHMEN

Students who plan to enter 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 English 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 distribution requirements as possible before transferring. Some transfer students may require more than four years to obtain the B.S. degree. However, Stanford affords great flexibility in planning and scheduling individual programs, which makes it possible for transfer students, who have wide variations in preparation, to plan full programs for each quarter and to progress toward graduation without undue delay.

Transfer credit is given for courses taken elsewhere whenever the courses are equivalent or substantially similar to Stanford courses. The policy of the School of Engineering is to study each transfer student's preparation and make reasonable evaluation of the courses taken prior to transfer. Inquiries may be addressed to the Associate Dean for Undergraduate Education 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 opportunity 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 Undergraduate Education 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. 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 an Individually Designed Major leading to the B.S. in Engineering.

ACCREDITATION

The Accreditation Board for Engineering and Technology (ABET) accredits college engineer-
ing programs on a nationwide basis using criteria and standards developed and accepted by U.S. engineering communities. At Stanford, the following undergraduate curricula are accredited: Chemical Engineering, Civil Engineering, Electrical Engineering, Industrial Engineering, 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 Undergraduate Education, 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; Values, Technology, Science, and 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: mathematics (21 units minimum, see Note 1); science (20 units minimum, see Note 2); engineering fundamentals (five course minimum, see Note 3); Values, Technology, Science, and Society (VTSS) (one course minimum, see Note 4); engineering depth (45 units minimum, see course listings below). Included within the courses taken to fulfill the preceding curriculum components is a requirement for a minimum of 8 units of experimentation (see below).

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: 21 units minimum | (see Note 1) |
| Science: 20 units minimum | (see Note 2) |
| Engineering Fundamentals: 5 courses | (see Note 3) |
| Val., Tech., Sci., & Soc.: 1 course | (see Note 4) |

**Engineering Depth:**

- Chem. 36. Chemical Separations: 3
- Chem. 130. Theory and Practice of Identification: 4
- Chem. 131. Organic Polyfunctional Compounds: 3
- Chem. 151. Inorganic Chemistry I: 3
- Chem. 173. Physical Chemistry: 3
- Chem. 175. Physical Chemistry: 3
- Chem. Engr. 100. Mathematical Methods in Chemical Engineering: 3
- Chem. Engr. 110. Equilibrium Thermodynamics: 3
- Chem. Engr. 120. Separations Processes: 3
- Chem. Engr. 140. Fluid Mechanics: 3
- Chem. Engr. 160. Chemical Engineering Plant Design: 3
- Chem. Engr. 180. Chemical Engineering Laboratory: 5

* Science courses should include Chem. 31, 33, and 35
** Chem. 171 may be substituted for Engr. 30 in Engineering Fundamentals.

**CIVIL ENGINEERING (CE)**

| Mathematics: 21 units minimum | (see Note 1) |
| Science: 20 units minimum | (see Note 2) |
| Engineering Fundamentals: 5 courses | (see Note 3) |
| Val., Tech., Sci., & Soc.: 1 course | (see Note 4) |

**Engineering Depth:**

- CE 100. Engineering the Built Environment: 3
- 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
Specialty courses in Environmental and Water Studies† or Structures and Construction‡‡ 25

* Mathematics must include Math. 130 and either linear algebra or statistics.
† Environmental and Water Studies: CE 160N, 161, 172, 173, plus at least one course from three of the following areas: Hydrology and Transport Phenomena (CE 162, 261, 270; Geol. 230), Environmental Planning (CE 171, 266), Biology (CE 274, 274A, 276; Bio. 117, 176), Chemistry (CE 273, 273A; Chem. 135), Energy (CE 176, 177.)
** Science must include Physics 51 or equivalent, Chem. 31, and Geol. 1.
†† Structures and Construction: CE 180A and 190 plus at least one course in Structural Design (CE 181, 182), one course in Construction (CE 145, 146), and at least 12 units from the following (Engr. 12; CE 130, 145, 146, 176, 180B, 181, 182).
*** Fundamentals must include: Engr. 10A 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.

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 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 or CS 106H and 106B 5
Engr. 40. Electronics 5
Val., Tech., Sci., & Soc.: 1 course** (see Note 4)

Computer Science Courses: (48 units)
CS 107. Programming Paradigms 5
CS 108A.B. Introduction to Computer Science 8
CS 110. Introduction to Computer Systems and Assembly Language Programming 4
CS 140. Concurrent Programming 3
CS 143. Compilers 4
CS 134. Introduction to Automata and Complexity Theory 4
CS 160. 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, 108. Physics 61 and 62 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 (4 units), 194A.B (6 units), 225A,B (6 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)
Val., Tech., Sci., & Soc.: 1 course (See Note 4)

EE 101, 102. Circuits 6
EE 105A. Controls 3
EE 111, 112, 113. Electronics 9
EE 121, 122. Digital and Analog Laboratory 6
EE 141. Electromagnetic Fundamentals 3
Engr. 102E. Writing for Electrical Engineering 1
Specialty courses†† 9
One course in Design† 3
Electrical Engineering electives 5

* Mathematics should include 130.
† The design course may, but need not, be part of the specialty sequence. The following courses satisfy this requirement: EE 104, 139, 183, 214, 246, 252, 264, 281; Engr. 105B, 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, 298
Controls: Engr. 105B, 206, 207AB
Electronics: EE 139, 212, 214, 216
Fields and Waves: EE 142, 241, 242, 252
Microwaves and Fiber Optics: 142, 245, 246, 247
Signal Processing: EE 104, 261, 264

INDUSTRIAL ENGINEERING (IE)

Mathematics: 21 units minimum* (See Note 1)
Science: 20 units minimum** (See Note 2)
Engineering Fundamentals: 5 courses*** (See Note 3)
Val., Tech., Sci., & Soc.: 1 course (See Note 4)

Comp. Sci. 106B or 106X. Software Engineering 5
IE 100. Organizations: Theory and Management 4
IE 121. Statistics and Quality 4
IE 125. Work Design 5
IE 133. Industrial Accounting 3
IE 150 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

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

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)
Val., Tech., Sci., & Soc.: 1 course (See Note 4)
Engineering Depth:
AA 100. Introduction to Aero and Astro 3
AA 131. Experimentation in Aero/Astro 3
AA 192. Vector and Tensor Analysis 3
AA 200A. Applied Aerodynamics 3
AA 210A. Fundamentals of Compressive Flow 3
Engr. 10. Applied Mechanics: Statics 3
Engr. 11. Mechanics of Materials I 3
Engr. 104. Dynamic Response 3
Math. 130. Differential Equations 3
Mech. Engr. 33. Introduction to Fluids Engineering 4
Mech. Engr. 131B. Fluid Mechanics 3
Restricted Electives* 6

* Restricted electives are taken from the following list:

COMPUTER SYSTEMS ENGINEERING (C.S.E.)
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
- Engr. 70X. Programming Methodology and Abstractions (or Comp. Sci. 106A and B)

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

Technical Electives: 15 units minimum**

** Senior projects can be either course-based or independent study or a combination of both. Elect. Engr. 272A (4 units) along with 2 units of independent study will satisfy the requirement, as will Comp. Sci. 194A,B (6 units). Independent study projects require faculty sponsorship and must be approved in advance by the adviser, faculty sponsor, and the C.S.E. 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** (See Note 4)

Val., Tech., Sci., & Soc.: 1 course (See Note 4)

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: (proposed title).

Students must submit written proposals to the Undergraduate Council, Terman 208, detailing their programs. Programs must comply with the following requirements: Mathematics (21 units minimum, see Note 1 below), Science (17 units minimum, see Note 2), Engineering courses (40 units minimum), and additional courses to bring the total to at least 90 and not more than 107 units. (Students may take additional courses beyond the 107 units, but the IDM proposal must be limited to a maximum of 107 units.) Each proposal should begin with a statement that describes the major, articulates the motivation for and the justification and ultimate goal of the major, and shows how the courses listed relate to and fulfill the major’s goal. A proposed title for the major, to be included on the official University transcript, should be included.

The proposal statement should be followed by a list of courses to be counted toward the major, normally the courses selected should represent a well-coordinated sequence that provides mastery of the important principles and techniques in a well-defined field. In some circumstances, especially if the proposal indicates that the goal of the major is to prepare the student for graduate work outside of engineering, a more general engineering program may be appropriate. The proposal must be signed by two faculty members whose signatures certify that they endorse the major as described in the proposal and agree to serve as the student’s permanent advisers. One of the faculty members, who must be from the School of Engineering, acts as primary adviser, and the proposal must be accompanied by a statement from that person giving his or her appraisal of the academic viability of the proposed major.

Students proposing IDMs must have at least three quarters of undergraduate work remaining at Stanford after their proposals are submitted. Any changes in a previously approved major must be endorsed by the faculty advisers and reapproved by the Undergraduate Council. Proposals are reviewed and acted upon once per quarter. Proposals should be submitted to the Associate Dean for Undergraduate Education, Terman 208.

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* 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.

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Note 1 (Mathematics)—Engineering students need a solid foundation in the calculus of continuous functions.
including differential equations, an introduction to discrete mathematics, and an understanding of statistics or probability theory. The minimum preparation should normally include calculus to the level of Math. 43. Knowledge of ordinary differential equations and matrices is important in many areas of engineering, and students are encouraged to select additional courses in these topics. To meet ABET accreditation criteria, a student’s program must include study of differential equations.

Courses which satisfy the mathematics requirement are listed in the Handbook for Undergraduate Engineering Programs.

Note 2 (Science)—A strong background in the basic concepts and principles of natural science in such fields as physics, chemistry, geology, and biology is essential for engineering. Most students include study of physics and chemistry in their programs. To meet ABET accreditation criteria, a student’s program must include study of both chemistry and physics, with at least 3 courses in one of them.

Courses which satisfy the science requirement are listed in the Handbook for Undergraduate Engineering Programs.

Note 3 (Engineering Fundamentals)—The Engineering Fundamentals requirement is satisfied by a nucleus of technically rigorous, introductory courses chosen from the various engineering disciplines. It is intended to serve several purposes. First, it provides students with a breadth of knowledge concerning the major fields of endeavor within engineering. Second, it allows the incoming engineering student an opportunity to explore a number of courses before embarking on a specific academic major. Third, the individual classes each offer a reasonably deep insight into a contemporary technological subject for the interested non-engineer.

The requirement is met by taking five courses from the following list:

Engr. 10. Applied Mechanics: Statics, or Engr. 12. Intermediate Dynamics
Engr. 20. Introduction to Chemical Engineering
Engr. 30. Engineering Thermodynamics
Engr. 40. Electronics
Engr. 50. Introductory Science of Materials
Engr. 60. Engineering Economics
or Engr. 62. Introduction to Operations Research
Engr. 70A or 70X. Introduction to Software Engineering

Note 4 (Val., Tech., Sci., & Soc.)—It is important to obtain a broad understanding of engineering in its human, social, and cultural contexts. To introduce this aspect of professional development, most engineering majors require one course on the interaction of technology with values and beliefs, social institutions, or behavior.

Courses pre-approved for this requirement are taught by the faculty of the Values, Technology, Science, and Society program and are listed in the Handbook for Undergraduate Engineering Programs.

PROGRAMS IN MANUFACTURING

Programs in manufacturing are available at the undergraduate, M.S., and Ph.D. levels. The undergraduate program of the Department of Industrial Engineering and Engineering Management provides general preparation for any student interested in manufacturing. More specific interests can be accommodated through Individually Designed Majors (IDMs).

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

This degree is available to students who complete both the requirements for a B.S. degree in engineering and the requirements for a major or program ordinarily leading to the A.B. degree. More information is included in the “Degrees” section of this bulletin.

DUAL AND COTERMINAL DEGREE PROGRAMS

A Stanford undergraduate may work simultaneously toward two bachelor’s degrees or toward a bachelor’s and a master’s degree, 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 3 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/Master 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 3 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 coter-
minal application form) for admission to the co-
terminal bachelor/master 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 stand-
ing in the school should be made to the depart-
mental 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 labo-
ratories, and other organizations participate in
the Honors Cooperative Program (HCP), a pro-
gram which permits qualified professional em-
ployees 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 Engi-
neering on campus or through the Stanford In-
structional 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 pro-
gram 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 Vide-
otape Instruction (TVI) Program. SITN offers
additional programs to member companies such
as Non-Credit Option (NCO), Audit Option, sev-
eral 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 proce-
dures 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 pro-
grams, see the department sections in this bulle-
tin.

Related aspects of particular areas of graduate
study are commonly covered in the offerings of
several departments and divisions. Graduate stu-
dents are encouraged, with the approval of their
department advisers, to select courses in depart-
ments 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 engi-
neering 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
Biomedical Solid and Fluid Mechanics
Composite Materials
Computational Fluid Mechanics
Flight Mechanics
Gaskinetics
Guidance and Control
Hypersonic and Physical Gas Dynamics
Modern Optical Diagnostics in Fluid Mechanics
Physical Gasdynamics
Propulsion
Robotics
Waves and Vibrations

CHEMICAL ENGINEERING

Applied Statistical Mechanics
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
Water Resources
Structural Engineering and Geomechanics
Geomechanics
Structural Engineering
COMPUTER SCIENCE

Automated Deduction
Autonomous Agents
Complexity Theory
Computational Geometry
Computer Architecture
Database Systems
Declarative Programming
Design and Analysis of Algorithms
Digital Design, VLSI, and CAD
Distributed and Parallel Computation
Graphics and User Interfaces
Knowledge-Based and Expert Systems
Knowledge Representation and Logic
Networks, Distributed Systems, and Operating Systems
Programming Languages and Systems
Robot Control and Planning
Scientific Computing
Theory of Programming Languages

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
Transmission Systems and Telephony
VLSI Design

ENGINEERING

Interdisciplinary Programs
Interdepartmental 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

Electrical and Optical Behavior of Solids
Electron Microscopy
Energy Storage
Fracture
Imperfections in Crystals
Kinetics
Magnetic Behavior of Solids
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**

Though Stanford does not have a formal department of bioengineering, there are approximately 10 faculty in the School of Engineering whose primary research activities are in the general area of bioengineering. 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/polymer interfaces, and factors which influence growth and product formation in genetically engineered mammalian cells is pursued in the Department of Chemical Engineering. Faculty in Mechanical Engineering are doing research on neuromuscular dynamics, the mechanics of hearing, rehabilitation engineering, bone mechanics, orthopedic biomechanics, and aids for the disabled. Cardiovascular dynamics and haemodynamics are being studied in Computer Science. In Electrical Engineering, advanced analysis techniques are applied to signal processing EKG, EEG, and X-ray image. Most research projects are carried out in collaboration with faculty of the Medical School or members of the local medical community.

Both the master's and the Ph.D. degree are ordinarily awarded by a particular department, and the candidate must meet the degree requirements of that department. The student's adviser assists in constructing a program of study incorporating appropriate courses in biology and medicine which also satisfies the degree requirements of the department in which the student is registered.

A student wishing to earn the M.S. in Engineering while pursuing the M.D. degree must apply separately for admission to the M.D. program and an engineering department. If the student is admitted to both, each school will encourage his or her pursuit of the other degree.

In addition to the financial support available through the departments in the form of fellowships, research assistantships, and teaching assistantships, there are externally administered fellowship programs for the support of graduate study in health-related fields. In particular, both the National Institute of Health and the National Science Foundation offer such fellowships on a national competition basis.

**MANUFACTURING**

Programs in manufacturing are available at the undergraduate, master’s, and Ph.D. level. Master’s-level programs are offered by the Department of Industrial Engineering and Engineering Management (IE-EM) and as joint programs by IE-EM and Mechanical Engineering. The graduate program in Computer-Aided Civil Engineering (CE) includes an option for manufacturing/construction automation. The CE program in Construction is also a “manufacturing” program.
for students interested in facility and public works manufacturing. All of these programs take advantage of modern computer technology.

Doctoral programs related to manufacturing are available in a number of departments and involve research projects ranging from machine tool design to the integration of data bases into production software.

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 Division 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 "Values, Technology, Science, and Society" section of this bulletin.

**PRIMARILY FOR UNDERGRADUATES**

1. The Nature of Engineering—The engineering process and the people and organizations involved in it. Topics: history; nature and source of engineering problems; interaction between engineering, science, mathematics, and business; and specific aspects of engineering, e.g., design, development and test, production, and research.

4 units, Aut (Adams) MW 2:15-4:05
6. Engineering at Stanford—Weekly seminar for freshman and undeclared sophomores interested in engineering. Provides information on engineering as a career and profession, the various engineering majors, and the resources available for engineering undergraduates. Speakers include department representatives, faculty and industry researchers, and representatives from Overseas Studies, Career Planning and Placement, and the Undergraduate Advising Center.

1 unit, Aut (Freyberg) M 3:15-4:45

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.

10. Applied Mechanics: Statics—Equilibrium of particles; moments, couples; equilibrium of rigid bodies; analysis of trusses, frames, machines, dry friction; hydrostatic forces. Vectors and vector algebra are introduced and used. Prerequisite: Physics 51. DR:6(8)

3 units, Aut (Barnett) MWF 9
Win (Bershader) MWF 9
Spr (Ashley) MWF 9

problem sessions by arrangement

10A. 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.

4 units, Win (Shah) MWF 9

11. Mechanics of Materials I—Introduction to the mechanics of deformable structures under tension, compression, shear, torsion, and bending. Analysis of stresses, strains, and deformations. Also, Mohr's circle, pressure vessels, and columns. Prerequisite: 10.

4 units, Win (Ashley) MWF 9
Spr (Staff) MWF 9

problem sessions by arrangement

12. Intermediate Dynamics—Review of first and second order linear dynamic systems; damping, resonance, instability, characteristic equations. Rigid body dynamics; gyroscopes; balancing rotating machinery; vibrations, and dynamic response of simple mechanical systems. Writing dynamic system equations of motion, their solution, and interpretation. Prerequisites: Math. 23 or 43, and Physics 51. DR:6(8)

4 units, Aut (Bryson) MWF 9
Spr (Baganoff) 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 (Robertson, Homsy) MWF 10

25. Engineering Thermodynamics—Introduction to the concepts of energy and entropy from elementary considerations of the microscopic nature of matter. Use of basic thermodynamics concepts in the solution of engineering problems. Methods and problems in the socially responsible economic generation and utilization of energy in central power stations, solar systems, gas turbine engines, refrigeration devices, automobile engines, etc. Prerequisites: freshman calculus and physics. DR:6(8)

3 units, Aut (Mungal) MWF 10
Win (Mitchett) MWF 10

35. Automobile Technology—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. Aimed at non-scientists. DR:6(8)

3 units, Aut (DeBra) 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. Prereq-
uisites: Physics 53 or equivalent, one course of calculus, and elementary competence on personal computers. DR:6(8)

5 units, Aut (Pease) MWF 11-12:15
Win (Masters) MWF 11-12:15
Spr (Khuri-Yakub) MWF 11-12:15
3-hour lab weekly by arrangement


3 units, Win (Brauman) MWF 11
Spr (Sinclair) MWF 11

60. Engineering Economics—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 (Paté-Cornell)
sec 1 MWF 11,
sec 2 MWF 2:15
Win (Staff). MWF 1:15

62. Introduction to Operations Research I—(Same as Operations Research 152.) Theory and computation of optimal selection of decisions under certainty. Linear programming, network optimization models, dynamic programming, non-linear programming, and integer programming. Applications drawn 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 (Manne) MWF 1-2:05
Spr (Hillier) 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. Prerequisite/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)

103W. 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) TTTh 11

103. Public Speaking/Presentation Development—Priority given to Engineering students. Introduction to the full range of speaking activities, from impromptu talks to carefully rehearsed formal professional presentations. How to: organize and write speeches for a variety of occasions, analyze audiences, create and use appropriate visual aids, combat nervousness, deliver informative and persuasive speeches effectively. Students become confident speakers through weekly practice in class, rehearsals in one-on-one tutorials, and videotaped feedback. Enrollment limited.

3 units, Aut, Win, Spr (Staff)
T, W, or Th 7:30-10 p.m.

from partial fraction expansion. Prerequisite: Physics 53 or equivalent.

3 units, Aut (Reeves) MW 11-12:15

**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. Prerequisite: 104 or Electrical Engineering 102.

3 units, Aut (Franklin) MWF 9

Win (Powell) MW 11-12:15

**105B. State-Space Control Design**—Design of linear feedback control systems using state space techniques. Design using pole placement and introduction to LQR. Design examples using classical and state space design methodology. Brief introduction to digital control for systems with fast sampling. Prerequisites: 105A, Math. 103.

3 units, Spr (Emami-Naeni) MWF 9

110. Statistical Issues in Manufacturing—(Same as Operations Research 180.) 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, Win (Glynn) TWTh 2:15-3:30

120. Fundamentals of Petroleum Engineering—(Same as Petroleum Engineering 110.) Basic engineering topics involved in petroleum recovery. Chemical, physical, and thermodynamic properties of earth fluids. Use of computers for design problems. Gas laws, physical behavior of fluids, mechanics of flow through porous media, capillary pressure, relative permeability. Summer internship program in the oil industry is available on a limited basis (see department for application details).

3 units, Aut (Home) MWF 10

190. Creative Problem Solving—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.

4 units, Spr (Adams) MW 2:15-4:05

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**


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 11-12:15

Spr (Powell) TTh 11-12:15

207B. State-Space Digital Control Design—Design of digital control systems using the state-space approach. Pole placement and introduction to LQR design methods for the single-input single-output case. Least squares identification of an unknown system. Lab experiments on a personal computer with an interface to an analog system. Prerequisites: 207A, Math. 103 or Electrical Engineering 363 or Mechanical Engineering 200A.

3 units, Win (Franklin) MWF 9


3 units, Spr (Bryson) TTh 2:45-4

but also from business, form a team to prepare a work. The basis of cooperation in groups. Limited better basis for cooperative interdisciplinary preliminary design study of a space system. Sys-

235A, B. Space Systems Engineering—40-50 students, mostly from engineering and science, but also from business, form a team to prepare a preliminary design study of a space system. Systems designed in previous years include a Mars Exploration System, International Weather Systems, and Shuttle-Launched Science Platform System. 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 in 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

270A. Introduction to Modern Optics—Recent developments in modern optics. Two-term sequence. Emphasis is on understanding of physi-
cal principles. Topics: geometrical optics, ray matrices, Maxwell's equations, interferometry, optical instruments, polarization.

270B. Advanced Modern Optics—Sequel to 270A, emphasizing recent developments in modern optics with applications in signal processing and imaging. Topics: Gaussian beams, holography, optical signal properties of materials, polarization, photorefraction, optical signal processing, and optical computing. Prerequisites: 270A, Electrical Engineering 366, or equivalent.

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

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 they relate to diversity, affirmative action, and minority services, resources, policies, and procedures.

297A, B, C. Ethics of Development in a Global Environment (EDGE)—(Same as Political Science 140A, B, C.) A series of speakers on current development issues emphasizing problems of poorer nations. Autumn Quarter: basic world resources (energy, food, housing, population, and environment) and the political development and dependencies of developing regions. Winter Quarter: the international institutions and their roles—international banking, international business, U.S. and foreign universities, East-West political policies, and organizations of developing countries. Spring Quarter: the roles of individuals in national and international institutions dealing with the problems of developing countries. The speakers represent a range of political, professional, and national backgrounds and present candid and differing points of view. Gives students who plan to work in developing countries, or in institutions dealing with developing countries, a better knowledge of the challenges and issues with which they must deal. One unit credit for attendance of the speaker series; 3 units additional credit for optional workshops treating selected issues in more depth. (Sequential registration not required.)

1 or 4 units, Aut, Win, Spr (Lusignan) lecture W 7:30-10 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

AERONAUTICS AND ASTRONAUTICS

Emeriti (Professors): Holt Ashley (on active duty), Chi-Chang Chao, Nicholas J. Hoff, Krishnamurty Karmacheti, Erastus H. Lee, Jean Mayers, Richard S. Shevell (on active duty), Walter G. Vincenti
Chair: George S. Springer
Associate Chair: J. David Powell


Professors (Research): Dean R. Chapman, Leonard Roberts, Steven W. Tsai
Associate Professor: Fu-Kuo Chang, Ian Kroo, Stephen Rock

Assistant Professor: Sanjiva Lele

Consulting Professors: David Altman, Robert T. Jones, Harvard Lomax, Emery Reeves, Vincent Salmon, Fredric H. Schmitz

Visiting Professor: Nicholas Rott

Lecturers: Penina Axelrad, Jack Franklin, Terry Holst, John Howe, Victor Lebacqz, Chul Park, Bernard Ross, Michael Tauber, Robert Warming, Yung H. Yu

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
- Aerocentrism
- Aerodynamics 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
- Caskinet
- 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
- Bio-Fluid Mechanics and Physiological Acoustics
- Computational Fluid Dynamics
- Control of Flexible Spacecraft
- Control of Robots, including Space Robots
- Conventional and Composite Structures/ Materials Systems Optimization
- Differential Games
- 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 (10⁻⁴ to 10⁻¹⁰g); spacecraft thrustor 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 spinning-spacecraft attitude control to a few arc-secs, 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 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 allows work in space manipulator system dynamics.

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, tomography, optical data processing, and related problems involving Fourier optics. Several student instructional laboratories include facilities to study supersonic jets, flame temperature by line reversal, supersonic flow fields with schlieren techniques, refractive index of gases and free-correction flow fields with interferometer equipment, shock-wave interaction by use of a shock tube, gyrosopic behavior, vibration modes of a simulated wing, blunt-body flow with ballistic freeflight range equipment, and hot-wire application with a small low-turbulence air-flow apparatus. 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, interferometry, and Fourier optics. 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 (AIR). 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, was originated in 1973 to provide long-term cooperative research in conjunction with graduate education. Specializations encompassed by the institute include aerodynamics, fluid mechanics, flight dynamics, systems analysis, guidance, and navigation. 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 blowdown 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 mini-computers. 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 con-
ducts 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 fall into the categories of colloquia and seminars (e.g., AA 129, 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 ensure 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: 283A or 280
   e. Experimentation: 131

2. Two courses, one each from two of the areas below:
   a. Fluids: 200A or 210A
   b. Structures: 240B, 246, 247, 256
   c. Guidance and Control: 271A, 279A

3. 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 either (1) formally, through a minimum of 6 units in applied mathematics taken from: linear algebra, partial differential equations, complex variables, probability, Comp. Sci. 137, AA 192, or AA 214A; or (2) informally, through matriculation in those 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. When the mathematics requirement is satisfied informally, 6 units of additional course work must appear in Category C, technical electives.

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, and by two courses if the mathematics requirement is satisfied informally.

D. Other Electives—It is recommended that all candidates enroll in at least one humanities or social science course. Practicing courses in, for example, art, music, and physical education, do not qualify in this category.

ENGINEERING
(45 Quarter Units)

Students whose career objectives require a more interdisciplinary program than is possible in the M.S. program in Aeronautics and Astronautics (AA) may pursue a program for an M.S. degree in Engineering. This program is described in the School of Engineering "Graduate Programs of Study" section of this bulletin.

Sponsorship by the Department of Aeronautics and Astronautics in this more general program requires that the student file a proposal before completing 18 units of the proposed graduate program. The proposed program must include at least 12 units of graduate-level work in the department and meet rigorous standards of technical breadth and depth comparable to the regular AA master of science program. The proposal must be accompanied by a statement explaining the objectives of the program, 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 Aeronautical and Astronautical Engineering.

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 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) aeroelasticity, (c) aerophysics, (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’s 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. Normally, continuous registration is expected 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 chairman 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 adviser. A minor in Aeronautics and Astronautics may be obtained by completing 20 units of graduate-level courses in the Department of Aeronautics and Astronautics, following a program (and performance) approved by the department's Candidacy Chair.

The student's Ph.D. reading committee and University Oral Committee must each include at least one faculty member from Aeronautics and Astronautics.

**FELLOWSHIPS AND ASSISTANTSHIPS**

Fellowships and course or research assistantships are available to qualified graduate students. Fellowships sponsored by Gift Funds, Stanford University, and Industrial Affiliates of Stanford University in Aeronautics and Astronautics, provide grants 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 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. DR:6(8)
3 units, Aut (Kroo) 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, Win (I. Chang, Staff) TTh 3:15-4:30

131. Experimentation in Aeronautics and Astronautics—Principles and importance of experimental methods used in aeronautics and astronautics; experimental design, performance, evaluation, and reporting of results. Requirements formally satisfied by lab experiments from the major areas (fluid dynamics, structural mechanics, guidance and control, and propulsion), or informally through an individual experimental project with a faculty supervisor and approved by the instructor.

3 units, Spr (Cantwell) lec. first week
T 1:15-4:05; lab T or Th 1:15-4:05

132. Introduction to Modern Optics—(Enroll in Engineering 270A.)


3 units, Win (Staff) TTh 2:30-4:05


3 units, Aut (Staff) TTh 2:30-4:05

nonsteady flow. Nonlinear solutions for non-
relation to physical acoustics and wave motion in
applications to wings and bodies in steady flow;
ods for the linearized potential equation with
similarity parameters. Review of solution meth-
explore the hypersonic limit. Identification of
general flow geometry. Use of exact solutions to
Continuation of 210A with emphasis on more
210B. Fundamentals of Compressible Flow—
(Enroll in Mechanical Engineering 261A.)
207. Introduction to Turbulence—(Enroll in
208. Aerodynamics of Aircraft Dynamic Re-
sponse and Stability—Companion to 200A for
those interested in control and guidance. Descrip-
tion of typical vehicles and technical trade-
ofs affecting their design. Equations of motion,
stressing applications to dynamic performance,
stability, and forced response. Forms and sources
for the required aerodynamic data. Response to
small disturbances and stability derivatives.
Static stability and trim. Review of aerodynamic
fundamentals, leading to airload predictions for
wings, bodies, and complete aircraft. Paneling
and other methods for derivative estimation.
Natural motions of the aircraft, along with the
influence on them of various configuration para-
ters. Vehicle behavior in maneuvers of small
and large amplitudes. Prerequisites: 200A, 210A,
or equivalents (may be taken concurrently).

3 units, Win (Baganoff) MWF 9
209. Dynamics of Viscous Fluids and Suspen-
sions.

not given 1991-92

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 super-
sonic flow, quasi-one-dimensional flow, conical
flow, Prandtl-Meyer flow. Prerequisites: 192
(may be taken concurrently) and Mechanical En-
gineering 131B or equivalents.

3 units, Aut (Baganoff) MWF 1:15
Spr (Bershader) MWF 1:15

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 meth-
ods 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 non-
steady constant area flow and introduction to
Riemann invariants. Elements of the theory of
characteristics; nozzle design; extension to non-
sentropic flow. Real gas effects in compressible
flow. Flows in various gas dynamic testing facili-
ties. Prerequisite: 210A.

3 units, Win (Baganoff) MWF 1:15

211. Physical Gas Dynamics—(Enroll in
Mechanical Engineering 262A.)

212. Introductory Hypersonic Aerophysics—
Hypervelocity vehicle flight and energy ex-
change over a wide range of velocities and alti-
tudes. Effects of internal excitation, dissociation,
and ionization. Introduction to finite chemical
rate processes, e.g., vibrational relaxation. Com-
bined effects of viscosity, heat conductivity and
dissociation on surface heat transfer and drag.
Black-body radiation and introduction to radia-
tive vs. convective heating of hypervelocity vehi-
cles. Field trip(s) to nearby aerospace facilities.
Recommended: familiarity with the elementary
concepts of compressible flow.

3 units (Bershader) given 1992-93

213. Atmospheric Entry—High-speed atmos-
pheric entry subjects vehicles to intense heating,
decelerations, and structural loads. These are for-
mulated and their intensity determined for a va-
riety of flight paths. Trajectories range from non-
lifting (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 empha-
sized. Recommended: understanding of com-
pressible, equilibrium, and real gas flows (210A
and/or 212).

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

214A. Numerical Methods in Fluid Mechani-
ces—The basic principles underlying the Navier-
Stokes equations. Relations between time-accur-
ate and relaxation methods. Implicit and explicit
methods combined with flux splitting and space
factorization. Considerations of accuracy, stabil-
ity of numerical methods, and programming com-
plicity. Prerequisites: a knowledge of linear alge-ra and Mechanical Engineering 200A, 200B, or
equivalent approved by instructor.

3 units, Aut (Lomax) MWF 8

214B. Numerical Computation of Compressible
Flow—Numerical methods for solving hyper-
boic sets of partial differential equations. Ex-
plicit, implicit, flux-split, finite difference, and
finite volume procedures for approximating the
governing equations and boundary conditions.
Numerical solution by direct approximate factori-
zation and iterative Gauss-Seidel line relaxation.
Application to the Euler equations in two and
three dimensions. Computational problems are assigned. Prerequisite: 214A.

3 units, Win (MacCormack) MWF 11


3 units, Spr (MacCormack) MWF 11


3 units (Warning)
alternate years, given 1992-93

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 (Holst)
alternate years, given 1992-93

217. Geophysical Fluid Dynamics—(Enroll in Mechanical Engineering 260.)

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


220. 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: Engineering 270, or Electrical Engineering 366, or equivalent.

3 units, Spr (Hesselink) WF 11-12:15
alternate years, not given 1992-93

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, Aut (Howe) MWF 2:15

222. Modern Developments in Reacting Flows—Advanced treatise on the principles of chemical kinetics at high temperatures and low densities and their effects on the flows around the hypersonic vehicles. Collision processes leading to rotational, vibrational, and electronic excitation; master equation; vibration-dissociation coupling; conservation equations; CFD techniques for reacting flows; effects of chemical reactions on aerodynamic forces and heat transfer rates; and comparison between the calculations and the experimental data from lab measurements and flights. Prerequisite: 212 or equivalent.

3 units, Win (Park) MW 2:15-3:30

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 (Baganoff)
alternate years, given 1992-93

226. Modern Photodiagnostic in Gasdynamic Research.

3 units, not given 1991-92

227. Atmospheric and Space Physics—(Same as Mechanical Engineering 246.) 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, Aut (Spreiter) TTh 2:45-4


3 units (I. Chang) not given 1991-92

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 1992-93

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 (Schnitz, Lebacqz) MWF 3:15 alternate years, not given 1992-93

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, Spr (Staff) MWF 3:15 alternate years, not given 1992-93

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) alternate years, given 1992-93

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

236. Spacecraft Design—Design of unmanned spacecraft and spacecraft subsystems with concentration on identification of design drivers and current design methods. Topics: spacecraft configuration design, mechanical design, structure and thermal subsystem design, attitude control, electric power, command and telemetry, and design integration and operations.

3 units, Win (Reeves) WF 11-12:15

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; Dynamics of structures. 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 (takeoff, 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

242. Classical Dynamics—Accelerating and rotating reference frames. Kinematics of rigid body motion; Euler angles, direction cosines. D'Alembert's principle, equations of motion. Inertia properties of rigid bodies. Dynamics of coupled rigid bodies. Lagrange's equations and their use. Dynamic behavior, stability, and small departures from equilibrium. Prerequisite: Engineering 12 or equivalent. 3 units, Aut (Powell) MWF 2:15

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

244A. Free and Forced Motion of Structures— Vibrations and forced response of linear systems with a finite number of degrees of freedom. Vibrations and forced response of continuous structures, developed in a framework of analytical dynamics; rods, beams, membranes, and other elastic systems. Approximate methods for analyzing nonuniform and built-up structures. Finite-element methods in a dynamic context. Introduction to random responses and to nonlinear systems, emphasizing stability. Prerequisites: 240A, 242. 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-dimensional and two-dimensional systems. Prerequisite: 244A or equivalent. 3 units (Ashley) alternate years, given 1992-93

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 aeroelastic phenomena and automatic controls systems, and problems of power machinery, windmills, etc. Prerequisite: 244B. 3 units (Ashley) alternate years, given 1992-93

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 of Shells—(Enroll in Mechanical Engineering 241C.)

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

250. Collapse Analysis of Structures—Stability analysis of structures; prediction of buckling load of bars, frames, plates, and shells. Effect of imperfection on structural stability. Analysis of postbuckling behavior and nonlinear collapse of structures. Basic criteria and approaches for stability analysis; energy methods and finite element methods. Numerical techniques for solving governing nonlinear equations. Design and analysis of stability of structures using developed computer codes. Prerequisite: consent of instructor. 3 units, Aut (F. Chang) TTh 1:15-2:30

252. Techniques of Failure Analysis—Introduction to the field of failure analysis, including fire
and explosion analysis, large scale catastrophe projects, traffic accident reconstruction, aircraft accident investigation, human factors, biomechanics and accidents, design defect cases, materials failures and metallurgical procedures, and structural failures. Product liability, failure modes and effects analysis, failure prevention, engineering ethics, and the engineer as expert witness.

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

253. Wave Propagation—(Enroll in Mechanical Engineering 236B.)


3 units, Win (Springer) MWF 9


3 units, Spr (Chang) MWF 8

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

268. 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 system; unitary transforms; image enhancement and restoration; scene matching and recognition, and applications. Demonstrations. Students write image processing algorithms. Prerequisites: Electrical Engineering 261 or equivalent, Math. 113 or Electrical Engineering 363.

3 units (Hesselink) not given 1991-92

270. Linear System Theory—(Enroll in Electrical Engineering 363.)

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 105, or equivalents.

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


3 units (Bryson) not given 1991-92


3 units, Win (Debro) MWF 9

alternate years, not given 1992-93


3 units, Spr (Axelrad) TTh 4:15-5:30

alternate years, not given 1992-93

273A. Digital Control Design—(Enroll in Engineering 207A.)

273B. State-Space Digital Control Design—(Enroll in Engineering 207B.)

273C. Optimal Control and Estimation—(Enroll in Engineering 207C.)

275. Fluid Power Control—(Enroll in Mechanical Engineering 229.)

276. Control System Design and Simulation—(Enroll in Engineering 206.)

277. Nonlinear Control—(Enroll in Engineering 209.)

278A. Optimal Control of Dynamic Systems—Optimization problems for dynamic systems with terminal and path constraints (calculus of varia-
AERONAUTICS AND ASTRONAUTICS 111


3 units, Win (Bryson) TTh 2:45-4:27


3 units (Staff) not given 1991-92

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.

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

279B. Advanced Space Mechanics—Effects of several centers of attractions; restricted three-body problem; libration points; Encke's method for accurate orbit computation; expansion matching for lunar and interplanetary orbits. Hamilton's principle and elements of the calculus of variations; canonical perturbation theory; application to nonlinear oscillations and orbital analysis; nonlinear resonances. Prerequisite: 279A.

3 units (Staff) not given 1991-92

279C. Optimal Space Trajectories—Optimal interception and rendezvous in free space; optimal transfer in a central field, for either high-thrust or low-thrust propulsion; the power-limited case, optimal orbit corrections, interplanetary guidance. Prerequisites: 278A, 279A, or equivalent.

3 units (Staff) not given 1991-92

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 (I. Chang) MWF 3:15

283A. Aircraft Propulsion I—Design and performance of airbreathing engines. Topics: introduction to 1-D gas dynamics; physical parameters and cycle analysis of ramjets, turbojets, turboprops and turboprops; design of supersonic inlets and nozzles, compressor maps, component matching, fuel injection, ignition and combustion systems; equilibrium combustion calculations.

3 units, Aut (Cantwell) TTh 11-12:15

283B. Aircraft Propulsion II—The off design and dynamic behavior of airbreathing engines. Topics: compressor and turbine aerodynamics, boundary layer flows, models for cascade efficiency, transonic compressors, turbine cooling and turbine materials, multiple jet exhausts, nonequilibrium combustion, detonations and deflagrations, dynamic models and transfer function relations for ramjets and turbojets. Application to the design of a small aircraft gas turbine engine. Prerequisite: 283A or consent of instructor.

3 units, Win (Cantwell) TTh 1:15-2:30 alternate years, not given 1992-93

286. Advanced Space Propulsion—Topics from recent developments in rocket propulsion, solid-fueled ramjet, ducted rocket, hybrid rockets, dual-fuel and mixed-mode rockets, composite engine and trans-atmospheric space propulsion systems, advanced space propulsion concepts, combustion, electric propulsion and applications to satellite control and station-keeping.

3 units, Spr (I. Chang, Altman) TTh 11-12:15 alternate years, not given 1992-93

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, Win, Spr (DeBra) W 4:15

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

299. Seminar in Composites and Structures.

1 unit, Aut, Win, Spr (F. Chang) M12


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 351 A, B, C.)
370. Advanced Modern Optics—(Enroll in Engineering 270B.)

CHEMICAL ENGINEERING*

Emeriti: (Professor) Andreas Acrivos
Chair: Channing R. Robertson
Professors: Michel Boudart, Curtis W. Frank, Gerald G. Fuller, George M. Homsy, Robert J. Madix, Franklin M. Orr, Jr. (by courtesy), Channing R. Robertson, John Ross (by courtesy)
Associate Professors: Alice P. Cast, Charles F. Gooche
Assistant Professors: Chaitan Khosla, Eric S. G. Shaqfeh
Senior Lecturers: James C. Schlatter, Robert H. Schwaar
Lecturer: Conrad Schadt
Consulting Professors: Daniel J. Auerbach, Enrique Iglesia, Ralph Landau, Helmut Poppa, John F. Rabolt

UNDERGRADUATE PROGRAM
BACHELOR OF SCIENCE

The 45-unit engineering depth sequence required for the B.S. degree (see the “School of Engineering” section of this bulletin) provides a background in the fundamentals of chemistry and basic training in separation processes, engineering thermodynamics, transport phenomena, process analysis and control, plant design, and applied chemical kinetics. The B.S. program in Chemical Engineering additionally requires basic courses in physics, mathematics, chemistry, and engineering.

Otherwise, there is no set B.S. program for Chemical Engineering students to follow. A sample program is available from the department’s advisers or the Dean’s Office, School of Engineering. It is recommended that the student discuss the prospective program with his or her adviser, especially if transferring from chemistry, physics, or another field in engineering. With some advanced planning, the student can usually arrange to attend one of the overseas campuses.

* The curriculum leading to the B.S. degree in Chemistry is described in the “School of Humanities and Sciences” section of this bulletin.

GRADUATE PROGRAMS
MASTER OF SCIENCE

A Master of Science program comprising an academic year of appropriate course work is available to accommodate students wishing to pursue professional chemical engineering work after receiving the M.S. degree, including foreign students who plan on returning to their homeland. The M.S. degree is awarded, without requiring a formal thesis, after a minimum of three quarters of broad study subject to the specifications stated below.

Unit and Course Requirements—For students terminating their graduate work with the M.S. degree in Chemical Engineering, a program consisting of 45 units of academic work is required, including at least four lecture courses selected from the Chemical Engineering 200-lecture series. The remaining courses may be chosen from departmentally approved graduate or advanced undergraduate courses in basic or applied sciences and engineering according to the following guidelines. (1) Approved courses include (a) all graduate courses offered in the Departments of Aeronautics and Astronautics, Chemical Engineering, Civil Engineering, Computer Science, Electrical Engineering, Materials Science and Engineering, Mechanical Engineering, Operations Research, Applied Physics, Biological Sciences, Chemistry, Mathematics, Physics, Statistics, and the School of Earth Sciences, and (b) all upper-division undergraduate courses in Biological Sciences, Computer Science (108 and above), Mathematics, Physics, and Statistics. (2) Undergraduate courses in chemical engineering excluding 100, 110, 120, 130, 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 Research 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 pro-
posal 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 taken to satisfy the 45-unit M.S. degree requirements must be taken for letter grades, if offered, with the minimum average letter grade indicator 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 total of 45 units of course work (excluding chemical engineering courses numbered 270-300) including 220, 221, 222, 230, and 231, and a minimum of 27 units of research are required. The remaining electives must be advanced technical courses chosen with the consent of the departmental adviser according to the guidelines noted for the M.S. in Chemical Engineering. All courses must be taken for a letter grade, if offered, and a minimum average letter grade indicator 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 81 total units (including research) and 48 units of course work is required for the Ph.D. degree, including 220, 221, 222, 230, and 231. 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 48 units, may be chosen from the basic sciences and engineering and must include at least one additional graduate chemical engineering course. 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 48-unit course requirement for the Ph.D. degree. No credit is given for Chemical Engineering 300, undergraduate chemical engineering courses, or courses usually required for the B.S. degree. All courses taken to satisfy the degree requirements must be taken for letter grades, if offered, and an average letter grade indicator 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 adviser, to the Reading Committee. No sooner than four weeks after this date, the student's University oral examination is scheduled. This exam, based on the candidate's dissertation research, is in the form of a public seminar followed by private questioning by an examining faculty committee. After satisfactory performance in the examination and submission of the dissertation to the Graduate Degrees Support
Section of the Registrar’s Office, the Ph.D. degree is awarded.

RESEARCH ACTIVITIES

Research investigations are currently being carried out in the following fields: Newtonian and non-Newtonian fluid mechanics, applied statistical mechanics, equilibrium and transport properties of colloidal dispersions, polymer adsorption, rheo-optics of polymeric liquids and colloidal suspensions, hydrodynamic stability, polymer science, surface and interface science, kinetics and catalysis, biocatalysis, and bioengineering. 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

PRIMARILY FOR UNDERGRADUATE STUDENTS

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

   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 9

120. Separation Processes—Application of the equilibrium-stage concept to design of mass-transfer devices; phase relationships; counter-current multistage extraction and distillation processes, simplified graphical and computer design methods; chromato-graphic separations, electrophoresis. Prerequisite: 110 or equivalent.
   3 units, Spr (Khosla) MWF 9

130. Principles of Design of Chemical Reactions and Reactors—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 (Madix) MWF 11-12:15

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.
   3 units, Win (Homsy) MWF 9

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.
   3 units, Spr (Shaqfeh) MWF 9

160. Chemical Engineering Plant Design—Open to seniors in chemical engineering or by advance consent of instructor. Application of chemical engineering principles to design of practical plants for manufacture of chemicals and related materials. Topics: flow-sheet 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

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.
   TTh 12-1 plus lab by arrangement
180A. 3 units, Win (Fuller)
180B. 2 units, Spr (Frank)
190. Undergraduate Research in Chemical Engineering—Laboratory or theoretical work for undergraduate students under the direct supervision of a faculty member. Research in one of the graduate research groups or other special projects in the undergraduate chemical engineering lab. Students should consult advisers for information on available projects.  
(Staff) by arrangement

PRIMARILY FOR GRADUATE STUDENTS

In addition to the courses listed below, graduate students in chemical engineering are normally expected to enroll in relevant graduate courses offered by the other engineering departments, as well as the Departments of Mathematics, Physics, and Chemistry.


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


3 units, Win (Shaqfeh) TTh 9:30-10:45

222. Transport Phenomena II—Continuation of 221 emphasizing boundary layer phenomena, heat and mass transport, transport with chemical reaction, and reaction-diffusion systems. High Reynolds number flows; boundary layers, vorticity layers. Transport for low and high Pecl containing flows; transport in tubes, Leveque approximations; applications in membrane transport; transport in flows with closed streamlines, drops, bubbles, and interphase transport. Prerequisite: 221.

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

223. Microrheology—Flow phenomena of polymeric and colloidal liquids; fundamental concepts of rheology; measurement techniques in rheometry; molecular models of dilute and concentrated polymer solution dynamics (both flexible and rigid macromolecules); prediction of rheo-optical properties from molecular models; dynamics of colloidal suspensions.

3 units (Fuller) given 1992-93


3 units, Spr (Fuller) TTh 10:45-12

230. Molecular Thermodynamics—Review of classical thermodynamics. Introduction to statistical thermodynamics; ensembles and partition function. Application to phase equilibria of polymer solutions; liquid lattice theory; phase diagrams; molecular dynamics simulation. Intermolecular forces and introduction to distribution functions; liquid state theory; integral equations; and perturbation theory.

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


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


3 units, Aut (Goochee) TTh 1:15-2:30


3 units, Spr (Frank)
234. Polymer Chemistry—Emphasizes the statistical and kinetic aspects of polymer synthesis. Condensation, addition, anionic, cationic and heterogeneous polymerization processes examined, with attention to 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 (Frank) given 1992-93

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

Aut, Win, Spr (Staff) by arrangement

270A,B,C. Biocatalysis. (Khosla)

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. (Cast)

279A,B,C. Transport Mechanics. (Shaqfeh)

290. Graduate Research in Chemical Engineering—Laboratory 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, Dunja Grbić-Galić, Jeffrey R. Koseff (on leave Autumn), Kincho H. Law, Peter M. Pinski

Assistant Professors: Ronaldo I. Borja, Lynn M. Hildemann, H. Craig Howard, Stephen G. Monismith, H. Allison Smith

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

Professor (Teaching): Gilbert M. Masters

Courtesy Professors: Thomas J. Hughes, George S. Springer


Consulting Associate Professors: Robert E. Clark, Weimin Dong, Angelos N. Findikakis, Mike London, Martin W. McCann, Alvaro F. Umana, Michael W. Walton

Consulting Assistant Professors: M. Fouad Bendi-merad, Viorica Lopez-Avila

Visiting Associate Professor: Nabil Qaddumi

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.

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
- Water Resources
- 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 addition to these departmental centers and laboratories, a new center has been formed in collaboration with the Department of Computer Science. The major thrust of the Center for Integrated Facilities Engineering (CIFE) is to employ advanced CAD database, artificial intelligence, and communications concepts to integrate the presently fragmented participants in the facility development process and to facilitate construction automation. CIFE is stimulating significant new research and educational activities in the two departments.

**PROGRAMS OF STUDY**

**CONSTRUCTION**

The Construction Engineering and Management program prepares technically qualified students for responsible management roles in all phases of the development of major constructed facilities. It emphasizes management techniques useful in planning, coordinating, and controlling the activities of diverse specialists (designers, contractors, subcontractors, and client representatives) within the unique project environment of the construction industry. In addition, the program offers subjects which focus on engineering aspects of heavy construction as well as building and industrial 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 administration, 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 of the Stanford Construction Research Laboratory.

The Construction Program faculty and students are active participants in the new Center for Integrated Facilities Engineering (CIFE), launched in 1987. 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 very 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, water resources, 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 water resources.

Within the Environmental Engineering and Science Program a major focus is on water, but much broader aspects of environmental concerns and planning activities are covered as well. Thus, the chemical, biological, and engineering aspects of water supply, water pollution and hazardous substance control and the fate and effects of pollutants in surface and ground waters can be covered in depth through the environmental engineering and science courses. Additional courses are available in air pollution and in environmental planning and impact assessment. 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 substance in the environment, with an emphasis on groundwater contamination.

The Water Resources 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 Water Resources Program offerings. Some examples include: Environmental Engineering and Science (chemical and microbiological processes), Mechanical Engineering (applied math, fluid mechanics, heat transfer, experimental methods), Applied Earth Sciences (hydrogeology, geostatistics), Computer Science (numerical methods), Petroleum Engineering (reservoir engineering, well-test analysis), 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 VAX8350 computer facility and the microcomputer clusters at the center 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 structural engineering, earth sciences, water resources, and construction engineering.

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, two letters of recommendation, results of the General Section of the Graduate Record Examination, and transcripts of courses taken at colleges and universities. Policies for each of the department's programs are available from the Department of Civil Engineering. Successful applicants will be advised as to the degree and program for which they are admitted. If students wish to shift from one program to another after being accepted, an application for transfer must be filed with the department, and they will be advised if the transfer is possible. If, after enrollment at Stanford, students wish to continue toward a degree beyond the one for which they were originally admitted, a written application must be made to the Department of Civil Engineering.

MASTER OF SCIENCE

The University requirements governing the M.S., the Engineer, and Ph.D. are described in the "Degrees" section of this bulletin.

Programs are available leading to the M.S. degree in Civil Engineering with the following special field designation on the diploma: Computer-Aided Civil Engineering, Construction Engineering and Management, Environmental Engineering and Science, Geomechanics, Structural Engineering, and Water Resources. Detailed statements of the requirements for all master's degrees and the specific designation may be secured from the Department of Civil Engineering.

Students admitted to graduate study with a B.S. in Civil Engineering (or its equivalent) from an accredited curriculum can satisfy the requirements for the M.S. degree in Civil Engineering by completing a minimum of three quarters of full tuition registration and a minimum of 45 units of study beyond the B.S. At least 36 of the units must be taken at Stanford. A minimum 2.75 letter grade indicator (LGI) is required for candidates to be...
recommended for the M.S. degree. No thesis is required.

The program of study must be approved by the faculty of the department and should include at least 45 units of courses in engineering, mathematics, science, and related fields unless it can be shown that other work is pertinent to the student's objectives.

Candidates for the M.S. in Civil Engineering who do not have a B.S. in Civil Engineering may, in addition to the above, be required to complete those undergraduate courses 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

100. Engineering the Built Environment—Roles of project proponents, architects, engineers, contractors, and regulators in conceiving and building projects of various types. Introduction to all stages of project development including planning, finance, design, construction, and operations. Case studies (e.g., high-rise commercial buildings, toxic waste site clean-ups) demonstrate the importance of integrating various stages of project development to enhance efficiency and avoid adverse economic, social, and environmental effects. Commonly used engineering and economic analysis methods. Group exercises use the concept of integration of project stages to explain project outcomes viewed as triumphs or tragedies from an engineering, social, or environmental perspective. Corequisite: Math. 19 or 41.

3 units, Aut (Levitt, Ortolano) TTh 1:15-2:30 plus 1 hour by arrangement

102. Legal Context of Civil Engineering—Introduction to U.S. legal system at state and federal levels. Fundamental concepts of contract and tort law; environmental law and land use law.

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

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, Spr (Howard) MW 11-12:15

106. Water Resources—The role and movement of water in the environment. Introduction to hydrologic processes, including precipitation, infiltration, water use by vegetation, water movement in soils, and runoff. Water resources analysis and development. Flood and drought hazard analysis. Water supply and use. Water law and institutions. Prerequisite: Physics 51

4 units, Win (Freyberg) MWF 9

T 4:15-5:30

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 or 11.

4 units, Spr (Pinsky) TTh 10, W 2:15-4:05


4 units, Aut (Iacofano) MW 3:15-5:30 alternate years, not given 1992-93

140. Construction Surveying—Care and use of level and transit, construction layout, horizontal and vertical curves. Lab exercises in the field.

2 units, Spr (Parker) six Saturdays by arrangement

145. Construction Equipment and Methods—Construction engineering fundamentals; equipment economics; selection and efficient application of equipment; analysis of production output and costs. Prerequisites: Engineering 10A, 60.

3 units, Win (Paulson) MWF 11

one or more field trips by arrangement

146. Building Systems—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 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 9-10:50

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: Physics 51, Math. 23 or 43. Recommended: Engineering 30.

5 units, Aut (Monismith) MWF 10, M 2:15 plus 2 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 2 hours by arrangement

162. Transport and Mixing Processes in Surface Water Flows—(Graduate students enroll in 262.) Application of fluid mechanics to problems of pollutant transport and mixing in the water environment. Mathematical and numerical models of advection, diffusion, dispersion, dilution, and attenuation. Prerequisite: 160N or equivalent.
3 units, Win (Koseff) MWF 11

170. Environmental Science and Technology—For science and nonscience majors. Introduction to the causes, effects, and methods of controlling environmental degradation. Global warming, stratospheric ozone depletion, urban and indoor air quality, and hazardous waste management. DR:6(8)
3 units, Aut (Masters) MWF 8

171. Environmental Planning—Alternative strategies for air and water quality management; environmental impact assessment requirements; interactions between land use, physical infrastructure, and environmental quality; forecasting and evaluating environmental effects; survey of techniques for assessing visual, biological, noise, traffic, air, and water quality impacts. Prerequisites: 170 and Math. 20.
4 units (Ortolano) alternate years, given 1992-93

172. Air Quality Management—Quantitative introduction to engineering methods used to study and seek solutions to current air quality problems. Topics: global atmospheric changes, formation of acid rain, indoor air pollutants, urban sources of air pollution, and approaches to improving air quality. Prerequisites: Math. 42, Chemistry 31. Recommended: 170.
3 units, Win (Hildemann) TTh 11-12:15

173. Water Quality Control Processes—Development of conceptual basis for water quality control processes. Applications include engineered and natural systems. Prerequisites: 170, Chemistry 31, Math. 42.
3 units, Spr (Staff) MWF 10

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

177. Building Energy Laboratory—Measurement of small-building heat losses, infiltration, indoor air quality, use of thermal mass. Efficiency measurements of solar thermal and photovoltaic energy systems. Use of the microcomputer as a lab instrument. Prerequisite: concurrent or previous enrollment in 176.
2 units, Spr (Masters) F 11-12:15
3-hour lab weekly by arrangement

180A. Mechanics of Materials—(Formerly 114; continuation of Engineering 10A or 11.) Analysis of indeterminate beams; strain and complementary energy; columns; shear and bending moment diagrams; 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. Prerequisites: Engineering 10A or 11, Math. 43.
3 units, Spr (Smith) MWF 10

180B. Elementary Structural Analysis—(Formerly 180.) Analysis of beams, trusses, frames; influence lines for beams, girders, trusses; 3-dimensional trusses; deflections by virtual work, moment area, elastic loads; indeterminate analysis by superposition equations, slope-deflection, moment distribution. Introduction to matrix methods and computer methods of structural analysis. Prerequisites: Engineering 10A or 11, year of calculus. Recommended: 180A.
4 units, Aut (Kiremidjian) TTh 10-11:50

182. Design of Reinforced Concrete 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; design of trusses, and moment resisting frames. Prerequisites: 180B or equivalent, and Engineering 10A or 11.
3 units, Win (Lau) TTh 2:15-4:05

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 or 11.

4 units, Aut (Borja) 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 Civil Engineering—Applications of probability and statistical analysis to civil engineering; model construction from probability theory; descriptive statistics; estimation with small samples; recognition of variation including professional elements; models for reliability studies of civil engineering designs; construction of complex models. Prerequisites: graduate standing, Math. 43.

4 units, Aut (Winterstein) TTh 1:15-3:05

204. Structural Reliability—Probability models for loads and resistance; definition of failure events of structural components and systems; statistical 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 1992-93

212. Advanced Topics in Computer-Aided Civil Engineering—Focuses on 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) Th 1:15-2:30

214. Expert Systems in Civil Engineering—Introduction to applications of Artificial Intelligence (AI) to civil engineering problems: relevant concepts from AI and Expert Systems; illustrations of these concepts through discussion of previous development efforts. Projects involve development of microcomputer-based expert systems that capture knowledge in civil engineering. Instructor guidance and critique of applications at all stages of development. Limited enrollment and consent of instructor. Prerequisite: 210 or equivalent.

4 units (Levitt)
alternate years, not given 1991-92

215. 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, Spr (Levitt) MWF 11-12:15

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 student teams) illustrates each aspect of the course. Enrollment limited to 25.

3 units, Aut (Teicholz, Staff) MW 9 lab F 1:15-4:05

240. Analysis and Design of Construction Operations—Understanding, analyzing, designing, and improving work at the site. Data acquisition, analysis, simulation, modeling, and design. Emphasis on work methods development, productivity, and safety.

4 units, Aut (Paulson) TTh 8-10

241. Techniques of Project Planning and Control—Analytical techniques for planning and controlling the design and construction of projects. Concepts of networking techniques including treatment of uncertainty, resource allocation and leveling, time/cost tradeoffs and specification requirements.

3 units, Win (Staff) TTh 10-12

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—Priority given to students in graduate construction program. Analysis, design, development, and implementation of computer-based systems for construction engineering and management. Supporting topics cover computer hardware and software technology. Seminar-lab requires individual and group projects, building on construction knowledge and experience. Enrollment limited to 20. Prerequisites: 240, and a computer course equivalent to Engineering 70A.

5 units, Spr (Paulson) MWF 9-11

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) by arrangement


2 units, Spr (Fondahl, London) Th 6:30-8:30 p.m.

248. Construction Financing in Real Estate and Land Development Problems—Priority given to graduate Construction Program students. The interrelationships between all of the variables that make up a successful real estate project. Emphasis is on financial aspects involved in land acquisition, land development, construction, permanent lending, and project management. Also, aspects of joint venturing, including the control of functions and equity financing. Enrollment limited to 20; Prerequisites: Engineering 60, Industrial Engineering 133 or equivalent.

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. Organization and Management of Human Resources in Construction—A theoretical framework, and group problem solving exercises, to understand the behavior of people in the workplace: individually, in small groups, and in organizational units. A systematic approach for the analysis of a project or company’s coordination requirements, and for the design of a system of market, hierarchical, and social coordination devices to facilitate the work of interdependent teams of specialists in project-oriented activities. Students work in small groups to develop solutions to case study problems assigned weekly.

4 units, Aut (Levitt) MW 2:15-3:30


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

255. Concrete Construction—Technical aspects of the methods and operations involved in concrete construction. Includes concrete production, formwork, field operations for transporting, placing, finishing, and curing, and special techniques.

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

257. Building Systems and Industrial Construction—Analyzes basic design concepts, components and standard materials, and construction operations for major building systems. Topics: heating, ventilating, and air conditioning (HVAC) systems; piping systems; and electrical systems. Student groups analyze actual building or process systems and prepare oral and written reports describing the design, materials, and construction for a selected system, and the results of a technical and managerial analysis of selected topics.

4 units, Win (Tatum) MWF 9:40-10:40

258A, B, C. Donald E. Watson Seminar in Construction Engineering and Management—Weekly evening discussions of special topics with speakers from industry and government. Normally taken by construction graduate students each quarter for three quarters. Lecture builds on required construction graduate courses; credit registration restricted to students in the graduate construction program.

258A. 1 unit, Aut (Staff) M, T, W, or Th 4-6 p.m.

258B. 1 unit, Win (Staff) M, T, W, or Th 4-6 p.m.

258C. 1 unit, Spr (Staff) M, T, W, or Th 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 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

260. Water Studies program students. Analysis of water resource management, with emphasis on Environmental and Natural Resource Management. Prerequisite: Introductory course in Environmental or Natural Resource Management. 2 units, Aut (Monismith) MWF 3 1:15-2:05


262. Transport and Mixing in Surface Water Flows—Same as 162 with additional assignments for students who desire graduate credit.

263. Modeling Environmental Flows—Introduction to turbulence concepts and models, and to basic concepts of computer modeling of turbulence. Application of models to open channel, estuary, lake, and reservoir simulations. Use of computer models for flood wave routing in dendritic river systems, for reservoir dynamics and for stream water quality. Prerequisite: 264 or equivalent. Recommended: 262.

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.

265. Sustainable Water Resources Development—Priority given to Environmental and Water Studies program students. Analysis of alternative definitions of sustainable development and "eco-development," and delineation of criteria for judging sustainability of projects. Application of criteria to evaluate the sustainability of water resources development projects in the U.S. and in several developing countries. Cases illustrate the role of political, social, economic, and environmental factors in decision making. Evaluation of benefit-cost analysis, multi-objective project evaluation, and environmental impact assessment as policy instruments for enhancing the sustainability of future projects. Additional class meetings arranged to plan and present term projects. Enrollment limited. Prerequisite: graduate standing or consent of instructor.

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

266. Environmental Policy Design and Implementation—Analysis of markets, administered systems, the courts, and negotiation as bases for environmental quality management programs. Case examples involving hazardous substance management, and air and water quality management, demonstrate how existing management programs combine various "social choice" mechanisms. Cases provide a basis for examining the political process of environmental policy formulation in the U.S. and help analyze theories that attempt to explain environmental policy implementation.

4 units, Win (Ortolano) MW 1:15-3:05 alternate years, not given 1992-93


3-4 units, Spr (Kitanidis) MWF 10

the linear advection-dispersion equation with constant coefficients and first-order reactions. Prerequisites: Math. 41-43 or equivalent, 160N or equivalent, Applied Earth Sciences 230.

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

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 (Roberts) MWF 9

271B. Biological Processes—Biological processes for transformation of environmental contaminants. Unit processes for biological treatment including dispersed growth and fixed-film systems. Aerobic and anaerobic process microbial ecology and kinetics, with applications to the treatment of municipal and industrial wastewaters, hazardous chemicals, and groundwater. Prerequisites: 270 and 274.

3 units, Win (McCarty) MWF 8

271C. Water Treatment Process Design—Analysis of specialized wastewater treatment processes, such as adsorption 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, and preliminary process design. Design-oriented class project and field trips. Prerequisites: 270 and 271A, or consent of instructor.

3 units (Roberts) alternate years, given 1992-93

272. Treatment of Industrial and Hazardous Wastes—Critical review of process design issues associated with physical, chemical, biological, and thermal processes used to treat liquid or solid industrial and hazardous wastes, and to remediate hazardous waste sites. Topics: federal regulatory basis for hazardous and industrial waste management, sources and characteristics of industrial and hazardous waste, inplant environmental surveys, management options for control of wastes, especially waste reduction and minimization, and assessment of emerging technologies to provide permanent solutions to disposal of hazardous wastes.

2 units, Spr (Kavanaugh) T 10-12 alternate years, not given 1992-93

273. Aquatic Chemistry—(Same as Applied Earth Sciences 224.) 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 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) TTh 11 F 2:15

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 (Grbic-Calic) TTh 10 M 5:15

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

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

275A. Water Quality Control Processes I—Laboratory and pilot plant studies of physical and chemical processes for the treatment of water and wastewaters. Prerequisites: 271A, 273, and 273A.

3 units (Leckie) alternate years, given 1992-93

275B. Water Quality Control Processes II—Laboratory 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, Spr (McCarty) M 1:15-5:05, Th 2:15-5:05
alternate years, not given 1992-93

3 units, Spr (Gribic-Galic') MWF 9
alternate years, not given 1992-93

3 units (Findikakis)
alternate years, given 1992-93

278A. Air Pollution Physics and Chemistry—Sources and health effects of pollutants. Influence of meteorology on pollution: atmospheric energy balance, temperature profiles, stability classes, inversion layers, turbulence. Atmospheric diffusion equations, downwind dispersion of emissions from point and line sources. Tropospheric chemistry: mechanisms for ozone formation, photochemical reactions, radical chain mechanisms, heterogeneous chemical reactions. Prerequisites: Math. 43, Chemistry 31, or equivalents. Recommended: 30 and 160N, or equivalents.
3 units, Aut (Pimsky) MWF 10
computer lab F 1-2

3 units, Spr (Hildemann) TWF 1:15

1 unit, Spr (Staff) W 4:15

281A. Finite Element Structural Analysis I—Introduction to finite element method for solids and structures. Model problems in one dimension including axial, flexural, torsional, and shear deformations in structural elements; strong and weak forms; variational equation and relation to a principle of virtual work; Galerkin form; finite element approximation based on local interpolation; element stiffness matrices and load vectors; properties of element arrays; direct assembly procedure. Application to analysis of complex two- and three-dimensional truss and frame structures; thermal loads, modeling issues; substructure techniques for large systems. Element flexibility matrices for non-prismatic and curved members. Stability analysis of elastic structures; geometric stiffness. Extension to the analysis of continuous problems in two dimensions. Model problems include quasi-harmonic equation (deflection of a membrane, heat conduction, etc.) and two-dimensional elasticity (plane stress, plane strain and axisymmetry). Triangular, Lagrange, and serendipity element families; isoparametric mapping; numerical integration; optimal sampling for stresses. Practical modeling techniques. Data processing and computer programming procedures. Prerequisites: elementary structural analysis and matrix algebra.
4 units, Aut (Pimsky) MWF 10

281B. Finite Element Structural Analysis II—Finite element methods for analysis of solids in two and three dimensions, plates, and shells. Two- and three-dimensional elasticity; strong and weak forms; variational equation; general expressions for element stiffness matrices and load vectors. Element shape functions for two- and three-dimensional elements; triangular, serendipity, and Lagrange families; transition elements; tetrahedral and brick shape functions; hierarchical shape functions. Isoparametric mapping, numerical integration in two and three dimensions. Conditions for convergence, error analysis, optimal sampling and smoothing for stresses, the patch test, reduced integration, incompatible elements for elasticity. Finite element method for Kirchhoff plate theory; triangular and rectangular elements, Reissner-Mindlin plate theory; Lagrange C^0 elements; shear locking, selective-reduced integration; spurious modes and stabilization. Introduction to C^0 finite element formulations for axisymmetric and
general thin shells. Data processing and programming procedures. Prerequisite: 281A.
4 units, Win (Pinsky) TTh 11-12:15
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, structural dynamics, analysis and design of structures, building codes, current research in earthquake engineering. Recommended: 296A.
3 units, Win (Kiremidjian) MWF 10

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) MWF 11

4 units (Kelkar)
alternate years, given 1992-93

285. Design of Structures I—Steel design, inelastic behavior of structures, strength of structural elements, collapse loads for frames. Reinforced concrete design, design of two-way slab systems, yield line analysis of slabs. Prerequisites: basic courses in design of steel and reinforced concrete structures.
4 units, Aut (Krawinkler) TTh 11
W 2:15-4:05

286. Design of Structures II-General aspects of design; serviceability and failure criteria; types of loading; methods of design; structural systems for buildings; analysis and design of buildings for gravity loads and lateral loads, earthquake resistant design; effects of dynamic loading on strength and ductility of structural elements. Prerequisites: basic courses in design of steel and reinforced concrete structures.
4 units, Spr (Krawinkler) TTh 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, Win (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, Spr (Law) MW 1:15-2:30

289. Theoretical and Computational Soil Mechanics—Steady-state and transient fluid conduction problems in soil mechanics; elliptic, parabolic and hyperbolic systems; variational inequality and free-boundary problems; three-dimensional consolidation theory; soil-structure interaction; wave propagation and radiation damping; coupled finite element-boundary element solutions in elastodynamics; computational techniques for solving systems of nonlinear equations; computing assignments. Prerequisites: 190, 281B, or equivalents.
3 units (Borja)
alternate years, given 1992-93

3 units, Spr (Borja) TTh 11-12:15
alternate years, not given 1992-93

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.
3 units, Win (Borja) MWF 11

293. Experimental Soil Mechanics—Laboratory determination of stress-strain-strength parameters for soils under drained and undrained load-

2 units, Win (Leckie) TTh 9


2 units, Spr (Leckie) TTh 9

alternate years, not given 1992-93


4 units (Monismith)

alternate years, given 1992-93

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 and 363.

4 units (Monismith)

alternate years, given 1993-94


2 units, Win (Reinhard) TTh 10

alternate years, not given 1992-93

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 and 271A.

2 units, Spr (Roberts) Th 10-12

alternate years, not given 1992-93

373. Hydrogeochemical Cycles—Processes and mechanisms responsible for the natural circulation of major, minor, and trace elements through the hydrosphere, atmosphere, lithosphere, and biosphere. Emphasis on a mechanistic interpretation of global cycling of elements and perturbations intercepting the normal processes. Chemical weathering processes, biotransformations of elements, residence times in various environmental compartments. Prerequisites: 273 and 274.

2 units, Spr (Leckie) TTh 9

alternate years, not given 1992-93

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, chemical structure, and concentration of substrates. Evolutionary and genetic explanations for existing metabolic pathways. The phenomena of substrate utilization and cometabolism, biodegradability and recalcitrance, detoxification, activation and biomagnification.

3 units (Grbic-Galic')
alternate years, given 1992-93

376. Instrumental Analysis in Environmental Sciences—Theory and practice of instrumental methods used in environmental engineering and sciences, emphasizing determination of organic substances by gas chromatography, mass spectrometry, and high pressure liquid chromatography, and high pressure liquid chromatography techniques. Interpretation of mass spectra, adaptation of procedures to specific environmental matrices. Consideration of case studies.

3 units (Reinhard, Lopez-Avila)
alternate years, given 1992-93

397. Random Vibrations—Concept of random vibrations; description of the vibratory motion of probabilistic summary; concept of stationarity, ergodicity; correlation and autocorrelation; Fourier Analysis; spectral density function; input/output relationship for linear systems; transmission of random vibrations. Prerequisite: post-M.S. standing.
2 units (Staff) not given 1991-92

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; (Professor, Research) Arthur Samuel
Chair: Jeffrey D. Ullman
Associate Chair: George S. Wheaton
Assistant Chair for Education: Eric S. Roberts
Assistant Chair for External Relations and Graduate Studies: Carolyn E. Tajnai
Associate Professors: David Cheriton, Michael Genesereth, Oussama Khatib, Jean-Claude Latombe, John Mitchell
Assistant Professors: David Dill, Andrew Goldberg, Anoop Gupta, Monica Lam, Marc Levoy, Rajeev Motwani, Serge A. Plotkin, Yoav Shoham
Professors (Research): Thomas Binford, Gio Wiederhold
Associate Professors (Teaching): Charles A. Bigelow, Eric S. Roberts
Courtesy Professors: Michael J. Flynn (Electrical Engineering), David E. Rumelhart (Psychology), Edward A. Shortliffe (Medicine), Fouad A. Tobagi (Electrical Engineering)
Courtesy Associate Professors: Giovanni De Micheli (Electrical Engineering), John T. Gill, III (Electrical Engineering), Mark A. Horowitz (Electrical Engineering), Bernard M. Mont-Reynaud (Music-Research)
Courtesy Assistant Professors: Teresa Meng (Electrical Engineering), Mark A. Musen (Medicine), David M. Ungar (Electrical Engineering), Daniel Weise (Electrical Engineering)
Affiliated Professor (Research): David Luckham (Electrical Engineering)
Lecturers: Margaret L. Johnson, Nicholas J. Parlante
Consulting Associate Professors: Robert B. Hagemann, Joseph Y. Halpern, John Koza, Susan Owicki, Moshe Vardi
Consulting Assistant Professors: Robert E. Cypher, Martha E. Pollack
Visiting Professor: Stefano Ceri
Industrial Lectureship: Marc H. Brown

Five large computer systems at the Department of Computer Science (CS) play a major role in providing the computing environment for research and administration. Most course work and instruction is done on the systems available at AIR (Academic 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 five large systems are:
NEON, a DECsystem 5400 running ULTRIX V3.1. 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.

SUMEX-AIM, a SUN 4/490 that supports research on knowledge-based systems and applications of artificial intelligence to biomedicine and engineering. Students doing research in the Knowledge Systems Laboratory may be granted access to the SUMEX system.

SAIL, a DECserver 5000, 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 70 SUN workstations, 20 HP workstations, 25 AT&T 386WGS, 40 DEC Microvaxs, 30 DECstation 3100's, 10 NeXT machines, 100 Mac II's, 10 Symbolics workstations, 35 TI Explorers, and 20 laser printers of various types, all of which are connected by ethernet.

At present, students who are supported by research can receive an account on their sponsored machine. All CS students receive an account on NEON.

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 computer 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 philosophy, linguistics, 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 January 1. Exceptions are made for applicants who are either Honors Co-op applicants or who are already students at Stanford (including co-terminal applicants). Information on these deadlines is available from the department.

REQUIREMENTS

A candidate is required to complete a program of 45 units. At least 36 of these must be graded units, passed with an average 3.0 (B) letter grade indicator (LGI) or better. The 45 units may include no more than 21 units of courses from those listed in Requirements 1 and 2. Thus, students needing to take more than seven of the courses listed in Requirements 1 and 2 actually complete more than 45 units of course work in this program. Only extremely well-prepared students may expect to finish the program in one year; most complete the program in six quarters. It is expected that an adequately prepared student admitted to the M.S. program will have taken a number of the “core” courses as an undergraduate. Students hoping to complete the program with 45 units should already have a good background in computer science, including course work or experience equivalent to all of Requirement 1 and some of the courses in Requirement 2.

Requirement 1 —The following courses may be needed as prerequisites for other courses in the program: CS 22 (for specialization 5 only), 107, 109A, 109B, 110, 112, 140, 145 (for specialization 6 only), 160; 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 specializa-
tion 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, 244, 245, 312; Elect. Engr. 271.

3. Software Theory
   a) CS 242, 243, 260, 262.
   b) At least one of: CS 244, 245, 342, 343, 345, 441.
   c) At least one course from the following: CS 254, 360, 363, 367A, 367B.
   d) At least one additional course from (3b) or (3c).

4. Theoretical Computer Science
   a) At least three of: CS 257, 260, 262, 264.

5. Symbolic and Heuristic Computation
   a) CS 222 or 323, 225 or 226 or 227, 257.

6. Database (23 units)
   a) CS 245, 345, 395.
   b) At least two of: CS 225A, 225B, 244, 262, 347.

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 January 1. 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 5 of the 7 "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 the following requirements:
   a) Two units (a unit is equal to 10 hours per week for one quarter) as a teaching assistant in a Computer Science course numbered above 106 which is organized and taught by a department faculty member.
   b) Two units as a teaching assistant in a Computer Science course numbered above 106 for which the teaching assistant will prepare and present at least 10 hours of new material in lecture or discussion sections, not including problem set reviews or discussion of material prepared centrally for distribution in the section.

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 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, CS 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 experience but should be prepared for some mathematical problem solving. Students interested in a more rigorous and mathematical introduction to programming should take 106H in place of 106A, but must have a good working knowledge of calculus. 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 some cases, it may be more appropriate for students with a strong background in basic Pascal programming to enroll directly in 106B, so as to concentrate on the material developed in the second half of the sequence. In all cases, students are encouraged to discuss their background with the instructors responsible for these courses.

For each of the courses in the 106 series, the medium of instruction has traditionally been the Pascal programming languages. In 1991-92, experimental versions of 106A and 106B are offered which use C as the instructional language. Although it has some drawbacks from a pedagogical point of view, C (along with extensions such as C++) is used much more widely than Pascal both in industry and in academic research.

After the introductory sequence, Computer Science majors and those who need a significant background in computer science for related majors in engineering, should take (in any order) 107, 109A, 109B, and 110. CS 107 exposes students to a variety of programming languages which illustrate different programming paradigms. The 109A,B sequence constitutes a broad introduction to the underlying theory and conceptual structures used in computer science. CS 110 extends the computer science fundamental sequence by exposing students to issues in systems programming and computer architecture.

In summary:

For exposure—1C or 1U.
For non-technical use—105A.
For scientific use—106A or 106H.
For significant use—106A,B or 106H,B or 106X, followed by 107, 109A,B, and 110.
NUMBERING SYSTEM
The first digit of a C.S 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 (Roberts)

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) F 12-1

22. Programming in LISP—Introduction to problem solving in the LISP language and the functional programming paradigm. Progressive exercises develop skills in recursion, list manipulation, and functional arguments. Also, macros, environments, packages, I/O, and LISP implementation. Term project. Prerequisite: 106B or 106X, or equivalent.

3 units, Win (Staff) MWF 11

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 solve interactively numerical and symbolic problems, plot functions and data in two or three dimensions, manipulate expressions, and write functions using procedural and rule-based techniques.

2 units, Spr (Blachman) F 12-1

UNDERGRADUATE

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 2:15
Spr (Staff) MWF 10

106A. Programming Methodology—For students in technical disciplines but 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. Ordinarily taught using Pascal as the implementation language. In Winter Quarter an experimental, limited-enrollment section is taught using the C programming language. Alternatives: 105A, 106H, 106X. DR:6(8)

*5 units, Aut (Staff) MWF 10
Win (Staff) sec 1, MWF 1:15
(Roberts) sec 2, MWF 1:15
Spr (Staff) MWF 10

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. In Spring Quarter, a special section uses C rather than Pascal as its implementation language; enrollment is dependent on successful completion

* May be taken for 3 units by graduate students
of the parallel Winter Quarter section of 106A.  
Prerequisite: 106A or 106H.  

*5 units, Aut (Parlante) MWF 11  
Win (Staff) MWF 2:15  
Spr (Staff)  
sec 1, MWF 1:15 (Roberts)  
sec 2, MWF 1:15  

106H. Introduction to Computer Programming (Honors)—Programming as an intellectual discipline. Systematic design, verification, and testing of programs. Common paradigms of programming. Recursion, dynamic programming, iterative improvement, divide-and-conquer methods. Numerical convergence and precision. No prior programming experience is assumed; knowledge of calculus and tolerance for abstraction are essential. See also: 106A, 106X. Prerequisite: Math. 21 or 42.  

*5 units, not given 1991-92  

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. Prerequisite: Math. 3 or equivalent. DR:6(8)  

*5 units, Aut (Johnson) MWF 3:15  
Spr (Floyd) 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 (Parlante) 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 (Johnson) MWF 10  
Win (Ullman) MWF 2:15  

109B. 4 units, Win (Staff) MWF 10  
Spr (Ullman) MWF 2:15  

110. Introduction to Computer Systems and Assembly Language Programming—Organization of digital computers, buses, registers, processors, I/O, memory systems, and paged memory. Data representation, data structures, and computer arithmetic. Instruction sets and execution; addressing modes. Assembly language programming, including subroutines, co-routines, interrupts and traps. Surveys operating systems issues and principles of storage management; combines general principles and practice in implementations. Prerequisite: 106B or 106X.  

4 units, Aut, Spr (Chow) MW 12:50-2:05  
Win (Staff) TTh 11-12:15  

112. Computer Organization—(Enroll in Electrical Engineering 182.) 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: 110 and Electrical Engineering 121.  

3 units, Aut, Win (Staff)  

121. Artificial Intelligence: Concepts and Applications—Artificial Intelligence (AI) is the science and technology of building computer programs that reason about problems using knowledge, interact with people in natural language, and perceive images and speech. Survey of work in AI, addressing economic, social, and scientific importance: knowledge representation; problem solving methods; expert systems; natural language and speech understanding; computer vision; machine learning, software tools, and other current research areas. No programming. Prerequisite: 105A, or equivalent computer exposure and consent of instructor.  

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

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 115 or equivalents.  

4 units, Win (Oliger) MWF 10  
Spr (Kreiss) MW 11-12:15  
Sum (Staff)  

* May be taken for 3 units by graduate students
140. Concurrent Programming—Principles of concurrent programming, including processes, mutual exclusion and synchronization, message-passing and monitors. Emphasis on principles and algorithms, rather than on implementation. Prerequisites: 107 and 110.
*3 units, Aut (Staff) MWF 10
Spr (Staff) MWF 9

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 (Ditt) MWF 10

145. Introduction to Databases—Data models, relational database concepts, relational algebra and SQL, Boyce-Codd normal form, interactive database interfaces, programmed interfaces to database systems, transaction management, and the role of databases and computers in application environments. Involves a substantial database system project. Prerequisites: 107 and 110.
*4 units, Aut (Keller) MWF 9

154. Introduction to Automata and Complexity Theory—Regular sets: finite automata, regular expressions, equivalences among notations, methods of proving a language not to be regular; context free languages: grammars, pushdown automata, normal forms for grammars, proving languages non-context free; Turing machines; equivalent forms, undecidability. Nondeterministic Turing machines: properties, the class NP, complete problems for NP. Alternate: 254. Prerequisite: 109B.
*4 units, Win (Mitchell) MWF 3:15
Spr (Motwani) MWF 3:15

154N. Introduction to NP Completeness—Turing machines. Reducibilities among problems; Cook's theorem; examples of NP-complete problems. Students participate in approximately the last half of 154. Prerequisite: a knowledge of formal languages and automata as in the first part of 154.
2 units, Win (Mitchell) MWF 3:15
Spr (Motwani) MWF 3:15

*4 units, Aut (Manna) TTh 11-12:15
Spr (Genesereth) TTh 1:15-2:30

3 units, Aut (Plotkin) MW 11-12:15

4 units, Aut (Pratt) MWF 3:15
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

193C. Programming the Macintosh—Students create fully functional Macintosh applications in Pascal. Topics: Macintosh user interface guidelines, fundamental Toolbox and Operating System routines, and various development environments and tools. Prerequisite: 106B or 106X. Recommended: basic knowledge of the Macintosh architecture as in 110.
4 units

193E. Object Oriented User Interface Programming—Develop applications using Objective-C, Display PostScript, and Interface Builder. Topics: fundamentals of user interface design, general use of the NeXT computer, sound and music, interapplication communication, and user-level Mach messaging. Intensive weekly programming assignments culminating in a sub-

* May be taken for 3 units by graduate students
COMPUTER SCIENCE

stantial term project. Prerequisites: knowledge of C and 107.

4 units

193U. UNIX Systems Programming and 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 (Roberts) MWF 11
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. 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 and 110.

194A. 3 units, Win (Staff) W 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, any quarter (Roberts, Virnau) TTh 7 p.m.

197A.B. AIR Mainframe Consulting—Two-quarter introduction to consulting on AIR (Academic Information Resources) computing services. 197A: weekly lectures and consulting with an experienced AIR consultant. 197B: fewer lecture hours on more advanced topics, more emphasis on consulting. Lectures emphasize skills on AIR mainframe services (predominantly UNIX); also material on computer workstations and other topics. Interested students should attend an orientation meeting the first day of the quarter; enrollment limited. Prerequisite: consent of 197 coordinator.

197A. 2 units, Aut, Win, Spr (Roberts, Kotadia) W 7-8:30 p.m.

197B. 2 units, Aut, Win, Spr (Roberts, Kotadia) Th 7-8:30 p.m.

198. Teaching of Computer Science—Teach other students by running a small discussion 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/Tressider for information. Prerequisite: 106B or 106X.

4 units, any quarter (Roberts, Teller, Wiltamuth) TTh 4:15-5:45

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.

199P. Independent Work—Like 199, but graded either Satisfactory or No Credit.

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, Spr (Roberts) Th 3:15-5:05

201. Computers, Ethics, and Social Responsibility—(Same as Symbolic Systems 100, VTSS 215.) Intended 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

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 com-
for the design and implementation of computer system architectures, with respect to the design of instruction sets. Prerequisite: 112.

3 units, Aut, Win (McCluskey)

212. Computer Architecture and Organization—(Enroll in Electrical Engineering 381.) Principles and techniques of logic design. Combinatorial circuit analysis (hazard detection); combinatorial circuit design (PLA, VLSI, and MSI techniques and testing techniques); IC logic families, flip-flop properties, sequential circuit analysis and synthesis for fundamental and pulse mode circuits, design for testability techniques. Prerequisite: 112 or equivalent.

3 units, Aut, Win, Spr (Staff)

221. 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: 157 or consent of instructor.

3 units, Aut, Win, Spr (Staff)

222. Agents—Rigorous treatment of the problems involved in building intelligent agents that interact with the physical world. Topics: the representation of knowledge about states, actions, and procedures, simulation and planning, and knowledge level agents. Prerequisites: 157, 221.

3 units, Aut (Nilsson) TTh 1:15-2:30
Spr (Staff) TTh 2:45-4

225A. Declarative Programming—Construction of programs that use an inference mechanism operating on a declarative knowledge base. Emphasis on declarative representation of domain knowledge, monotonic and non-monotonic inference methods, and on inference control methods. Some knowledge acquisition involved. Substantial Lisp programming required. Course work done in teams. Prerequisites: 157, 221, and Lisp.

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

225B. Declarative Programming Project—Independent project involving the construction and presentation of a substantial declarative program. Corequisite: 225A.

3 units, Spr (Smith) Th 7-9 p.m.

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 laboratories to societal use; what is in an Expert System; what is Knowledge Engineering. Case studies of commercial application in: 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, Win (Staff) TTh 2:45-4

227. AI Programming in Prolog—Computational techniques in artificial intelligence explained and implemented in Prolog. Search, metainterpreters, production systems, truth maintenance, learning, planning, and natural language. Students with no prior Prolog experience may take additional 1-unit Prolog tutorial. Prerequisites: programming experience and familiarity with basic notions in algorithms and complexity. Recommended: previous AI experience.

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

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

229. Approaches to Machine Learning—Survey of major research paradigms. Topics: inductive learning, explanation-based learning, genetic algorithms, analogical reasoning, case-based learning, connectionist learning, machine discovery
and PAC learning theory. Focus is on representative systems that have been built. What is the learning problem that is being addressed? What are the underlying assumptions? Where does the approach break down?

3 units, Spr (Staff)

237A,B,C. Advanced Numerical Analysis—Three-quarter graduate sequence to acquaint students in mathematical and physical sciences with the derivation and analysis of methods for solving mathematical problems on digital computers. Organized so students may take the first quarter and then either the second or third according to their interests. 237A: fundamental concepts of numerical computation. Topics: linear systems of equations, interpolation, numerical differentiation and integration, and the solution of nonlinear equations. 237B: analysis of structures and data. Topics: approximation of functions, matrix eigenvalue problem, least squares approximation and statistical computations. 237C: simulation of systems governed by ordinary and partial differential equations. Topics: methods for the solution of initial and boundary value problems. Finite difference, finite element, and collocation methods. Analysis of convergence and estimation of truncation and round-off errors. Assigned work includes analytical problems and problems to be solved with the aid of a computer. 237A is prerequisite for 237B and C. Prerequisites: 106A; Math. 103 or 113. (and Math. 130 for 237C); or equivalents.

237A. 3 units, Aut (Golub) MW 11-12:15
237B. 3 units, Win (Kreiss) MW 11-12:15
237C. 3 units, Spr (Oliger) MWF 11

240A,B. Operating Systems—Two-quarter sequence in operating systems design and implementation. 240A: fundamentals of operating system design and implementation—basic structure; synchronization and communication mechanisms; implementation of processes, process management, and scheduling; memory organization and management, including virtual memory; I/O device management, secondary storage, and file systems. 240B: combination of advanced study in standard OS topics and exposure to recent developments in OS research. Deeper coverage of issues that arise in all OS subsystems covered in 240A, plus protection and security, and performance analysis; OS support for special-purpose (e.g., real-time) systems; distributed systems, including OS support for networking, practical distributed environments, distributed kernels, and multiprocessor operating systems. Prerequisites for 240A: 110 and 140 or equivalent. Recommended: 112. Prerequisite for 240B: 240A.

240A. 4 units, Aut (McGrory, Migliore) MWF 1:15
Win (McGrory, Migliore) MWF 11
240B. 3 units, Win (Staff) MWF 1:15
Spr (Staff) MWF 110

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, Smalltalk or similar languages.

3 units, Aut (Weise) MWF 2:15

243. Advanced Compiling Techniques—Theoretical and practical aspects of building modern compilers. Topics: language and machine descriptions, code transformation, intermediate representations, basic block and flow-graphs, function calling mechanisms, dataflow analysis, register allocation, instruction scheduling, type analysis and checking, compiler-compilers. Three hours lecture; one hour discussion led by a TA. Prerequisite: 143 or equivalent.

*4 units, Win (Weise) MWF 3:15

244. Computer Networks: Architectures and Protocols—Objectives of computer networks; network structure and components; switching techniques (circuit switching and packet switching); network functions; layered network architectures (the ISO reference model); data link protocols (character-oriented protocols, bit-oriented protocols, error checking, window flow control, and multi-access protocols); network control (datagrams, virtual circuits, routing, and congestion control); transport and session protocols (end-to-end communication, interconnection of networks); presentation layer protocols are cited for point-to-point, satellite, packet radio, and local area networks. Prerequisite: 240A.

3 units, Aut (Cheriton) TTh 2:45-4
Win (Staff) (Enroll in Electrical Engineering 384.)


3 units, Win (Keller) MWF 9

247A,B. Human-Computer Interaction—Issues of human-computer interaction, including: interface design, 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. Prerequisite for 247A: 109B. Prerequisite for 247B: 247A.

247A. 3 units, Win (Winograd, Hartfield) MWF 2:15-3:45
247B. 3 units, Spr (Winograd, Hartfield) MWF 2:15-3:45


3 units, Aut (Staff) 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, Aut (Floyd) MWF 10


3 units, Win (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 (Staff) 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.

259. Introduction to Combintorial 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: 160 and Math. 42, or equivalent.

3 units, Win (Floyd) MWF 10


3 units, not given 1991-92

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: 160 and Math. 44 or equivalent.

3 units, Win (Dantzig) TTh 9:30-10:45 alternate years, not given 1992-93

ovian queues. Examples from computer systems area. Prerequisite: Statistics 116.

3 units, Win (Owicki)

270. Computer Applications in Medicine—
(Same as Medical Information Sciences 210.) Survey of use of computers in the medical field. Includes variety of research and applied environments and factors which influence the acceptance of these applications. Topics: integration of computer systems in the medical center, hospital information systems, ambulatory care systems, medical databases and networking, bibliographic search, applications to molecular biology, aids for disabled patients, image processing, computer-aided instruction, decision support systems.

3 units, Aut (Fagan, Shortliffe)

TTh 2:15-3:30

271A. Computer-Based Medical Decision Making—(Same as Medical Information Sciences 211A.) 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 decision-support tools. Emphasis on Bayesian statistics, decision analysis, artificial intelligence/ expert systems, and the synergies among such approaches. No medical background required. Prerequisite: at least one programming course.

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

271B. Computer-Based Medical Decision Making—(Same as Medical Information Sciences 211B.) Project course for students who have completed 271A and wish to implement some of those ideas in a computer program. Software tools provided. Prerequisites: programming experience and 271A.

3 units, Spr (Fagan, Musen, Shortliffe)

TTh 2:15-3:30

273. Concepts of Text—(Same as Art 281.) What every literate person should know about the basic principles of the visual organization of text. Subjects include handwriting, typewriting, typography, and computerized documents, perceptual, linguistic, and semiological issues. Consists primarily of visual exercises.

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

275. Computational Linguistics II—(Same as Linguistics 227.) Computational methods in linguistics (phonology, morphology, syntax, semantics, etc.) and applications (translation, expert systems, question answering, etc.) Individually, or in small groups, students complete a programming project involving substantial linguistic theory. The programming language is Lisp or Prolog. Prerequisites: 22 and Linguistics 120.

3-4 units, not given 1991-92

277. Topics in Computational Linguistics—
(Same as Linguistics 236.) Hands-on practicum aimed at developing tools for some area of application (e.g., machine translation). Collaborative effort involving all participants, giving opportunities to concentrate either on theoretical or implementational issues including, grammar implementations, lexicon, parsing, generation, inference and knowledge representation. Assumes some background in computational linguistics.

3 units, Win (Kay, Sag)

PRIMARILY FOR GRADUATE STUDENTS

300. Departmental Lecture Series—Recommended for first-year Computer Science graduate 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 (Roberts, Wheaton) TTh 4:15-5:30

304. Programming and Problem Solving Seminar—Limited to and recommended for Ph.D. degree candidates in computer science. Solution of various problems, numeric and symbolic, on computers. Emphasis on the research paradigms of computer science and the development of algorithms that are “beautiful” from various points of view.

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

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, not given 1991-92

309. Industrial Lectureships in Computer Science—Each quarter 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. The Autumn Quarter lecturer is Dr. Marc H. Brown, a researcher with Digital’s Systems Research Center, and developer of the MacBalsa animation system.

309A. Fundamental Algorithms using Algorithm Animation—Survey of a broad spectrum of fundamental algorithms, making extensive use of Macintosh-based interactive visualization environment. Lectures on computer-based animations of the algorithms in action. Homework requires experimentation with the animations and implementation of new algorithms using the existing library of views. Algorithms are from the domains of
sorting, searching, string processing, computational geometry, graphs, and mathematics.

3 units, Aut (Brown)

312. Processor Design—(Enroll in Electrical Engineering 382.) Computer arithmetic, high speed algorithms. Pipelined machines, timing templates design issues and cache design. Memory system design for high speed processors. Prerequisite: 212 or equivalent.

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

315A. Parallel Computer Architecture and Programming—Design and programming of architectures. Survey of different programming models; 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. Implementation trade-offs dealing with synchronization granularity, communication, data access patterns, and load balancing using case studies from real applications. Integral programming assignments are done on one or more commercial multiprocessors. Prerequisites: 140, 212, and reasonable programming experience.

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

312B. Parallel Programming Project—Continuation of 315A. A significant parallel programming project is required. Shared-memory multiprocessor, and possible message-passing machine and connection machine for use in projects. Lectures of parallel programming languages and their implementation, performance debugging of parallel programs, parallel data structures and algorithms. Guest speakers on parallel programming. Prerequisite: 315A or consent of instructor.

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


3 units, Spr (McCluskey) alternate years, not given 1992-93


3 units (Staff) alternate years, given 1992-93

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

323. Nonmonotonic Reasoning—(Same as Philosophy 326.) Formalisms for representing nonmonotonic 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, to logic programming, and to reasoning about action using the situation calculus. Prerequisite: a 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 (Shoham) 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, and notions, such as independent subgoals, reviewed and analyzed. Two parts: the basics illustrated with simple examples; and applications in various domains (robotics, process planning, etc.) Prerequisite: 221.

3 units, Win (Latombe) TTh 9:30-10:45

326. Robot Reasoning—Spatial reasoning. Representing the robot workspace, reasoning about spatial occupancy and motion, and reasoning about and under uncertainty. Path planning, generating trajectories for objects moving among obstacles. Dealing with uncertainties in model, control, and sensing; approaches—program refining, inductive learning, and pre-image backchaining. Planning sensory interaction. Grasp planning, multiple-moving-objects path planning, inference of geometrical positions from spa-
327A. Introduction to Robotic Manipulation—
Basics, and a review of current applications. Top-
ics: kinematic structure, coordinate transforma-
tions, manipulator solutions, workspace, path
selection, control, dynamics, and programming.
Recommended: knowledge of matrix algebra and
some familiarity with basic control theory and
rigid body mechanics.
3 units, Aut (Khatib) MW 2:15

327B. Introduction to Computer Vision—Visual
perception by computer with comparisons to psy-
chophysics. Image formation: projection, surface
reflectivity models and color, image sensors.
Range data analysis: range measurement, repre-
sentation of surfaces, differential geometry, and
local discontinuities. Segmentation and aggrega-
tion: local and extended discontinuities, structure
and texture. Industrial machine vision. Interpre-
tation of image data: geometric models, generic
surface interpretation, graph and network prob-
ability methods.
3 units, Win (Binford) TTh 1:15-2:30

327C. Advanced Robotic Manipulation—Se-
lected topics in control systems: robot manipula-
tor task description; end-effector representations
and operational coordinate systems; end-effector
equations of motion; non-linear dynamic decou-
pling; joint torque control and force control; re-
dundant mechanisms and kinematic
singularities; obstacle avoidance; kinematic and
dynamic characterization of manipulator sys-
tems, and design issues. Prerequisites: 327A and
consent of instructor.
3 units, Spr (Latombe) MW 12:50-2:05

327D. Advanced Robotic Manipulation—
Selected topics in control systems: robot manipula-
tor task description; end-effector representations
and operational coordinate systems; end-effector
equations of motion; non-linear dynamic decou-
pling; joint torque control and force control; re-
dundant mechanisms and kinematic
singularities; obstacle avoidance; kinematic and
dynamic characterization of manipulator sys-
tems, and design issues. Prerequisites: 327A and
consent of instructor.
3 units, Spr (Latombe) MW 12:50-2:05

329. Topics in Artificial Intelligence—Ad-
vanced 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

340. Distributed Systems—Overview of distrib-
uted systems, primarily as an extension of uniprocessor operating systems to span networks.
Presents the impact of networking on each of the
subsystems and issues discussed in 240A,B, in-
cluding basic architectural models; networking;
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 and 244.
3 units, Spr (Cheriton) TTh 2:45-4

341. Distributed Systems Project—Companion
project option for students taking 340. Corequi-
site: 340.
3 units, Spr (Cheriton)

342. Programming Language Design—Expo-
sure to problems of programming language
design and known solutions. Possible topics: for-
mal semantics, implementation considerations,
extensibility, very high level languages, evalu-
ation of language designs, the innovative features
of a variety of modern programming languages.
Prerequisites: 242, 243.
3 units (Weise)

343. Topics in Compilers—Focus is on compil-
ers for parallel architectures. Lectures/discus-
sions explore program analysis techniques and
code optimizations for a variety of parallel ma-
chines, including the superscalars, distributed
memory machines, and multiprocessors. A sig-
nificant project is included. Prerequisite: 243.
3-6 units, Win (Lam) MW 11-12:15

344. Computer Networks: Modeling and Analy-
sis—(Enroll in Electrical Engineering 484.) Net-
work functions, architectures, and protocols;
computer traffic characterization; resource shar-
ing; packet-switched store-and-forward networks
(ARPAnet); delay analysis, network design and
optimization including capacities assignment,
routing and topological design; multi-ac-
cess/broadcast protocols (used in packet-
switched satellite, ground radio, and local
networks): fixed assignment, adaptive strategies,
stability considerations and dynamic control.
Prerequisite: 265. Recommended: knowledge of
244.
3 units, Spr (Pang)

345. Theory of Database and Knowledge-Base
Systems—Logic as a data model: Horn-clause
logic, well-founded negation; object-oriented
data models and systems; combining object and
logical dictionaries. Database query optimization; algebraic laws, strategy search algorithms, semi-join-based algorithms, acyclic hypergraphs, optimization of massive acyclic joins. Optimization of logic queries: top-down and bottom-up inference, argument-binding patterns and rule/goal graphs, "magicsets" techniques for combining the advantages of bottom-up and top-down processing, optimization of conjunctive queries, generalized transitive closure and left/right-linear recursions, prototype systems using these techniques. Prerequisite: 145 or equivalent.

3 units, Spr (Staff) MWF 10


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

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. Prerequisite: solid foundation in linear algebra and discrete algorithms.

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

348B. Computer Graphics: Image Synthesis Techniques—Intermediate level, emphasizing sampling, shading, and display aspects of computer graphics. Topics: local and global illumination methods including radiosity and distributed ray tracing, texture generation and rendering, volume rendering, strategies for anti-aliasing and photorealism, human vision and color science as they relate to computer displays, and high-performance architectures for graphics. Written assignments and programming projects. Prerequisite: 248 or 348A or equivalent.

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, exotic user interface technologies such as eye tracking, head tracking and head-mounted displays, and parallel algorithms for graphics. Includes a significant project. Prerequisites: 248 or 348A, 348B, or consent of instructor.

2-6 units, Spr (Levoy)

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


3 units

351. Topics in Complexity Theory and Lower Bounds—Possible 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 and techniques for establishing limits on the possible efficiency of algorithms. Lower bounds based on the following models of computation: decision trees; straight line programs; communication complexity; branching programs; PRAMs; boolean circuits. Spacetime trade-offs and pebbling games. Prerequisites: 154 and 264, or equivalent.

3 units, Aut (Motwani) TTh 2:45-4

352. Foundations of Control Structures—Theory of constructs for controlling program execution. Theories of serial control: verification conditions; partial correctness assertions, weakest preconditions, dynamic logic. Models of serial control: state functions and relations, regular expressions, dynamic algebras. Theories of parallel control: temporal logic, CCS, CSP. Models of parallel control: state trajectories, synchroniza-
tion trees, execution traces, partial orders, metric spaces. Notions of time: ordered, real, probabilistic. Related soundness, completeness, and complexity issues. Prerequisite: 258 or consent of instructor.

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


3 units, Win (Pratt) TTh 9:30-10:45


3 units, Win (Dill) TTh 9:30-10:45

356. Reasoning About Knowledge—Knowledge plays a crucial role in distributed systems, cryptography, and artificial intelligence. Material examines formalizing reasoning about knowledge and extent to which knowledge is applicable to the areas above. Issues: common knowledge, probabilistic knowledge, 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) F 2:15-4:05

358. Topics in Programming Language Theory—Possible topics of current research interest in the mathematical analysis of programming languages: structured operational semantics, domain theory, semantics of concurrency, rich type disciplines, problems of representation independence, and full abstraction. May be repeated for credit. Prerequisites: 154, 157, 258, or equivalents.

3 units, 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

360. Analysis of Algorithms—Advanced course primarily for students doing specialized work in the analysis of algorithms. Presents each of the important paradigms used to analyze algorithms exactly. Combinatorial approaches, generating functions, techniques for exact solution of recurrences, functional operators, and asymptotic methods are studied in connection with important algorithms for sorting and searching.

3 units (Staff) not given 1991-92


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


3 units, not given 1991-92


3 units, Win (Plotkin) MW 11-12:15 alternate years, not given 1992-93

367B. Parallel Computation—Advanced parallel algorithms. Possible topics: parallel algorithms for maximal independent set and related problems; parallel graph coloring. Evaluation of straight-line code, P-complete problems, Deterministic and randomized parallel algorithms for
flows and related problems; assignment problem, matching in general graphs.

3 units (Plotkin)

*alternate years, given 1992-93*

**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, Win (Guibas) TTh 9:30-10:45

**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.

Win (Motwani) TTh 2:45-4
Spr (Plotkin) W 2:15-4:05

**371. Medical Decision Analysis**—(Same as Engineering Economic Systems 235.) Use of decision analysis in medical practice. Student teams analyze specific clinical decision problems as a term project. Topics: the decision making role of patients and physicians, medical preference models, assessing decision models in a clinical context, medical ethics, and designing and using automated medical decision tools. Prerequisite: Engineering Economics Systems 31 or 231, or equivalent.

4 units, Spr (Holtzman, Matheson) MWF 3:15-4:30


3-4 units, Aut (Winograd) 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*

**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*

**395. Database Project**—For graduate students of Computer Science. Use of database management or file systems for a substantial application, written analysis and evaluation required. Consent of instructor required. Register using the section number associated with the instructor.

*any quarter (Staff) by arrangement*

**399. Independent Project.**

*any quarter (Staff) by arrangement*

**EXPERIMENTAL**

**409. Topics in Knowledge-Based Software Engineering**—Focuses on how knowledge-based tools can provide automated assistance in developing conventional software. Topics: wide-spectrum and very-high-level languages, domain theories and formal specifications, correctness-preserving transformation rules, representation and use of programming knowledge (algorithm and data structure design, program optimization, refinement of data and control structure), performance estimation, knowledge-based support for project management, synthesis of parallel programs and architectures. Individual projects. Prerequisites: 22, 243, 257.

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

**426. Genetic Algorithms and Their Applications**—Genetic algorithms are mathematical algorithms for search, optimization, and machine learning patterned after the evolutionary processes of reproduction and survival of the fittest. Topics: mathematical justification for genetic algorithms; applications to game-playing, function optimization, pattern recognition, self-programming computers, economies, neural net design; parallel implementations; and Holland Classifier systems.

3 units, Spr (Koza) MW 1:15-2:30

**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, Win (Luckham) TTh 1:15-2:30

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.) Student-faculty discussions of research problems in the design of reliable digital systems. Areas include fault-tolerant systems, design for testability and system reliability. Emphasis on student presentations and Ph.D. thesis research.

1-4 units, Aut, Win, Spr (McCluskey)

520. Survey of Research Topics in Artificial Intelligence—(Same as Psychology 224.) Topics vary yearly. Some 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 research topics. Prerequisite: 121 or 221, or equivalent.

1 units, Aut, Win, Spr (McCluskey)


1-3 units, Aut, Win, Spr (Staff)

F 12:05-1:30

523. Readings in Artificial Intelligence—Primarily intended for students planning to take the AI qualifying exam. A series of lectures and discussions on readings in all areas of artificial intelligence research. Prerequisite: 221.

3 units, Win (Staff)

524. Seminar on Expert Systems Research—(Same as Medical Information Sciences 229.) 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: 228A or equivalent.

2 units (Musen, Shortliffe)

alternate years, given 1992-93

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) W 3:30-5

alternate years, not given 1992-93

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


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


1-3 units, any quarter (Golub)

M 4:15-5:30

540. Seminar on Computer Systems—(Enroll in Electrical Engineering 380.) 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)

545. Database Research Seminar—Presentations of current research and industrial innovation. Emphasis on discussion and evaluation. Topics: database models, knowledge bases, high performance algorithms, application of artificial intelligence techniques to large and distributed databases, and architecture of future information systems.

1-3 units, Aut, Win, Spr, Sum (Milton) F 3:15

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, Aut, Win, Spr, Sum (Cheiton) Th 4:15

801. TGR-M.S. Project.

any quarter (Staff) by arrangement

802. TGR-Ph.D. Dissertation.

any quarter (Staff) by arrangement
ELECTRICAL ENGINEERING


Chair: Joseph W. Goodman
Vice Chair: Gene F. Franklin
Associate Chair: R. Fabian W. Pease
Assistant Chair: Sharon A. Gerlach


Assistant Professors: Constance Chang-Hasnain, John M. Cioffi*, Gregory T. A. Kovacs, Marc S. Levoy, Teresa H. Y. Meng, Dwight Nishimura, Oyekunle Olukotun, David Ungar*, Daniel Weise, S. Simon Wong


Courtesey Professors: Bertram A. Auld (Research), Malcolm R. Beasley, Cary Glover, Gene H. Golub, Stig B. M. Hagstrom, Donald E. Knuth, Gilbert Masters, John McCarthy, Vaughan R. Pratt, Jeffrey Ullman

Courtesey Associate Professors: David Cheriton, Lambertus Hesselink, Norbert Pelc, Gino Wiederhold (Research)

Courtesey Assistant Professors: David L. Dill, Anoop Gupta, Monica Lam

Acting Professors: Dale Harris, Yoshihisa Yamamoto

Acting Assistant Professors: Christopher Barty, Zhi-xun Shen

Consulting Professors: Forest Baskett III, Charlie C. Bass, Carl Berglund, Bruce Deal, Bruce Delagi, Abbas Emami-Naeini, Zvonko Fazarinc, Joseph Feinstein, Sam Haddad, Robert Kosut, Franklin Kuo, Robert Maxfield, Madhally Narasinha, Yoshio Nishi, Susan Owicki, Richard Reis, Arden Sher, Paul M. Solomon, Martin Walt, James F. Young

Consulting Associate Professors: Ruby Lee, Stephen Lundstrom, Roger D. Melen, Noel P. Thompson, John F. Wakerly, Masao Yamada

Consulting Assistant Professor: Jehoshua Bruck, Norman P. Jouppi, Mehrdad Moslehi, Joseph Pang, David B. Tuckerman

Visiting Professors: H. Neal Bertram, Martin Morf, Jerry D. Gibson

Visiting Associate Professors: Byoung Kim, Samiha Mourad

* 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.

Majors must receive at least a 2.0 average letter grade indicator (LGI) in courses taken for the EE depth requirement.

Note that a Stanford undergraduate may work simultaneously toward the B.S. and M.S. degrees. See the "School of Engineering" coterminal section 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 par-
ticular, 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 may be obtained by writing to the Graduate Admissions Support Section of the Registrar’s Office, Building 590, Stanford, CA 94305. Applications are submitted to and reviewed by the Department of Electrical Engineering.

Applicants who have not yet earned the equivalent of an M.S. degree should apply for admission to study first toward the master’s degree, indicating any intention of later working toward a more advanced degree. Admission for either the Engineer or Ph.D. degree is normally available only to students who will have completed a master’s degree prior to the quarter for which they are seeking admission, and for whom the department Committee on Graduate Admissions has been able to 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 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 laboratory 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), 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 a 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 advisors, the student should file an "Application for Doctoral Candidacy." Only after receiving de-
partment approval to that application does the student become a candidate for the Ph.D. degree.

Requirements may be summarized as follows: The student must complete successfully (1) a minimum of three years of residence with graduate standing, two years of which must be in residence at Stanford; (2) one or more qualifying examinations given by the faculty of the Department of Electrical Engineering; (3) an approved program of courses in electrical engineering and allied subjects; (4) an approved topic of research and a written dissertation, based on research, which must be a contribution to knowledge; (5) an oral examination 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, comprise 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 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 Admission Support Section of the Registrar’s Office, Building 590, 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

Compilers
Computer Aided Design
Computer Architecture
Computer Networks
Computer Organization
Computer Reliability
Concurrent Languages
Concurrent Processes and Processors
Distributed Systems
Local Area Networks
Operating Systems
Performance Measurement and Modeling
Programming Environments
Programming Languages
Program Verification
Software Engineering
User Interfaces
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
Multivariable Control
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 Circuit Design
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
Laser Applications in Aeronautics, Biology, Chemistry, Electronics, and Physics
Laser Devices and Laser Physics
Nonlinear Optical Devices
Photoacoustic Phenomena
Picosecond Laser Pulses
Ultra-fast Optics and Electronics

MICROWAVES, ACOUSTICS, AND OPTICS
Acoustic Microscopy
Acousto-Optic Devices
Fiber Optics
Holography
Microwave Integrated Circuits and Devices
Nondestructive Testing
Scanning Optical Microscopes

SOLID STATE
Applied Superconductivity
Crystal Preparation: Epitaxy and Ion Implantations, and Molecular Beam Epitaxy
Defect Analysis in Semiconductors
Electron and Ion Beam Optics
Electron Spectroscopy
Electronic and Optical Properties of Solids
High Resolution Optical Lithography
Laser, Electron, and Ion Beam Processing and Analysis
Microstructure Fabrication and Applications
Molecular Beam Epitaxy
Novel Packaging Approaches for Electronic Systems
Physics and Chemistry of Surfaces and Interfaces
Semiconductor and Solid State Physics
Solar Energy Conversion
Solid State Devices: Physics and Fabrication
Ultrasmall Electron and Photo-Devices

SPACE PHYSICS AND RADIOSCIENCE
Computer Simulation of Wave-Particle Interactions
Electromagnetic Waves and Plasmas
Electron Beam Experiments in Space
Ionospheric and Magnetospheric Physics
Planetary Exploration
Propagation Studies of Winds and Turbulence
Radio Wave Scattering
Remote Sensing of Atmospheres and Surfaces
Solar-Terrestrial Interactions
Space Engineering (also see "Space Science and Astrophysics" section in this bulletin)
Space Plasma Physics
Space Vehicle Electrodynamics
Very Low Frequency Wave Propagation
VLF Wave-Injection Experiments
Wave-Induced Particle Precipitation

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

100A. Seminar—Discussion of special topics of interest to electrical engineering undergraduates: research in EE, the department, graduate schools, career opportunities, and state-of-the-art technology.

1 unit, Aut (Shott) M 4:15


3 units, Aut (Boyd) MWF 9


3 units, Win (Hellman) MWF 9

104. Digital Signal Processing—Introduction to computer-implemented signal processing systems. Digital impulse response and transfer functions; convolution; sampling theorem; z-transforms; digital Fourier transforms; FFT algorithms; digital filter design. Prerequisite: 102.

3 units, Aut (Peterson) MWF 9

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

105B. State-Space Control Design—(Enroll in Engineering 105B.)

106. Planetary Exploration—The other worlds of our solar system as revealed by recent space missions. Comparative properties of the terrestrial and Jovian planets; planetary atmospheres, surfaces, interiors, and rings; planetary and satellite orbits and spacecraft trajectories, orbital perturbations; properties of the interplanetary gas, dust, comets, and meteorites. What the planets can tell us about potential terrestrial catastrophes (acid rain, ozone depletion, nuclear winter, runaway greenhouse, collision with an asteroid or large comet). Origin and evolution of planetary systems. Remote sensing from spacecraft at radio, infrared, light, and ultraviolet wavelengths. U.S. and Soviet space programs and their comparative engineering and scientific aspects. Prerequisite: one year of college engineering, mathematics, or physics. DR:6(8)

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. Prerequisite: Engineering 40. Corequisite: 101.

3 units, Aut (Plummer) MWF 9

112. Electronics II—Basic operating principles and device equations for p-n junction diodes and bipolar junction transistors. Basics of transistor amplifier design using bipolar transistors. Prerequisites: 101, 111.

3 units, Win (Plummer) MWF 9

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 (Wakerly) TTh 1:15-2:05

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; signal modulation. Corequisite: 113.

3 units, Aut (Kovacs) TTh 9:30-10:20
Spr (Dutton) MW 3:15
3-hour lab weekly by arrangement

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 15. Prerequisites: 121, 122.

3 units, Spr (Bloom) Th 1:15
lab by arrangement


3 units, Aut (Staff) MWF 1:15
Win (Inan) MWF 2:15


3 units, Spr (Inan) MWF 1:15

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: 121 or equivalent, and Computer Science 110.

3 units, Aut, Win (Staff) MWF 8
plus 4-hour lab by arrangement

183. Advanced Logic Laboratory—Experiments in digital logic design using TTL integrated circuits, MSI and LSI registers and ALU’s, Programmable Gate Arrays, and PLA’s. 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. Prerequisite: 121 or equivalent.

3 units, Aut (Flynn) MWF 8
Win, Spr (Staff) MWF 8
by arrangement

190. Special Studies or Projects in Electrical Engineering—Independent work under the direction of a faculty member. Individual or team activities involving laboratory experimentation, design of devices or systems, or directed reading. Satisfactory/No Credit only.

by arrangement

191. Special Studies and Reports in Electrical Engineering—Independent work under the direction of a faculty member. 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.

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: prepares for life after the M.S. degree, in industry or as Ph.D. students. Speakers from faculty, students, and outside. Satisfactory/No Credit only. 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.)

207A. Digital Control Design—(Enroll in Engineering 207A.)

207B. State-Space Digital Control Design—(Enroll in Engineering 207B.)

207C. Optimal Control and Estimation—(Enroll in Engineering 207C.)

209. Nonlinear Control—(Enroll in Engineering 209.)

212. Integrated Circuit Fabrication Processes—Designed to be taken Autumn Quarter by students who will use lab for doctoral research. Fundamental principles of silicon integrated circuit fabrication processes. Technological limitations on integrated circuit design. Physical and chemical models of bulk and epitaxial crystal growth, oxidation diffusion, ion implantation, etching, deposition and lithography. Geometrical layout of bipolar and MOS devices and integrated circuits. Prerequisite for 410. Those taking it as part of their breadth sequence may take it either Autumn or Spring Quarter. Prerequisite: 112 or equivalent.

3 units, Aut (Saraswat) TTh 1:15-2:30
Spr (Wong) TTh 9:30-10:45


3 units, Aut (Wooley) MWF 10

216. Principles and Models of Semiconductor Devices—Fundamentals of carrier generation, transport, recombination, and storage in semiconductor devices. 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 CCD’s and solar cells. First-order device models that reflect physical principles and are useful for integrated-circuit analysis and design. Undergraduate prerequisites: 111, 112. Recommended for graduates: equivalent of 111, 112.

3 units, Aut (Wong) MWF 2:15
Win (Staff) MWF 11

217. Electron and Ion Beams for Semiconductor Processing—Focused and flood beams of electrons and ions are employed for processing semiconductor devices. Part I: the generation of such beams including thermionic emission, field-induced emission, first-order focusing and glow discharge processes. Part II: the interactions of such beams with the target including scattering in solids, the distribution of energy, heating, sputtering, beam-induced etching (including reactive-ion etching) and beam-induced deposition. Introduction to computer modeling of etching and deposition. Prerequisite: 212 or equivalent.

3 units, Spr (Pease) MWF 8
alternate years, not given 1992-93

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, FPGAs. Prerequisites: basic knowledge of digital systems, logic design. Prerequisite: 112 or consent of instructor.

3 units, Win (El Gamal) MWF 1:15
lab by arrangement

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 introduction to the band theory of solids. Prerequisite: Physics 57 or equivalent.

3 units, Aut (J. Harris) TTh 9:30-10:45

229B. Thin Films and Interface Microanalysis—(Enroll in Materials Science and Engineering 323.)

231. Laser I—Introduction to lasers and how they work, including quantum transitions in atoms, stimulated emission and amplification, rate equations, saturation, feedback, coherent op-
tical oscillation, laser resonators, and optical beams. Limited primarily to steady-state behavior; uses classical models for atomic transitions with little quantum mechanics background required. Prerequisites: electromagnetic theory to a level of at least 142, preferably 241, and some knowledge of atomic or modern physics such as Physics 57, 130-131.

3 units, Aut (Barty) MWF 8

232. Lasers II—Continuation of 231 emphasizing dynamic and transient effects, including spiking, Q-switching, mode locking, frequency modulation, frequency and spatial mode competition, linear and nonlinear pulse propagation, short pulse expansion and compression. Prerequisite: 231.

3 units, Win (Barty) MWF 9

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.

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

239A. Solid State Theory: Survey—(Enroll in Applied Physics 272.)

239B. Solid State Theory: Continuation—(Enroll in Applied Physics 273.)

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, dipole and array antennas, interferometers, and reciprocity; wave guides, fiber optics, and acoustic delay lines. Uniaxial and gyrotropic anisotropic media with magnetoionic plasma, and ferrite applications. Nonlinear effects. Mode coupling, resonators, and gaussian wave packets. Prerequisite: 241.

3 units, Win (Eshleman) 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, Win (Lusignan) MWF 8

245. Waves Measurement Techniques—Lecture/lab on experimental techniques used for measurement of waves, employing techniques common to several fields. Experiments selected from research at Stanford: measurement of waveguide parameters, measurement of striplines, and time domain reflectometry with the network analyzer, fiber-optic waveguide measurements, optical diffraction, laser beam measurements, acousto-optic diffraction, measurements of the scanning optical microscope and measurements of capillary waves in water with the scanning optical microscope. Enrollment limited to 15. Prerequisites: 142 or equivalent, and consent of instructor.

3 units, Spr (Kino) TTh 10

246. Microwave Circuit Theory—Coherent development of the concepts and applications of distributed circuits. Emphasis on MIC structures (microstrip, coplanar waveguide, slotline, finline, and imageline) capable of transmitting millimeter wave analogue signals and picosecond pulses. Modal properties (TEM, quasi-TEM, TE, TM) of general guidelines. Higher order mode excitation effects at discontinuities (steps, bends, etc.) and junctions are modeled by lumped equivalent cir-

3 units, Win (Auld) MWF 2:15

247. Introduction to Optical Fiber Communications—Components: optical fibers, step index and graded index, multi-mode and single-mode fibers, attenuation and dispersion, optical sources and transmitters, LED and laser, single-mode and multi-mode lasers. Semiconductor and Nd (YAG lasers); output power, modulation bandwidth, linearity, side modes, linewidth, RIN, chirp; optical detectors and receivers; PIN and APD; quantum efficiency and responsivity; dark current; capacitance and bandwidth; integrating front end and transimpedance receivers. Systems: digital systems and bit-error-ratio, analog systems and signal-to-noise ratio, detection statistics and quantum limit, equalization, receiver noise and sensitivity. Applications: digital trunking, TDM hierarchy (DSO through DS3), SONET, undersea cables, local area networks, FDDI, AM and FM analog links, subcarrier multiplexing and video distribution. Advanced technologies: wavelength-division-multiplexing; coherent systems employing amplitude, frequency, and phase modulation; heterodyne and homodyne; phase noise and polarization fluctuations; diversity techniques; optical amplifiers; semiconductor and fiber amplifiers; travelling-wave and Fabry-Perot amplifiers. Prerequisites: 113, 142. Corequisite: 278.

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

249. Introduction to Space, Telecommunications, and Radioscience—Experimentation in the near-earth environment using radio waves and other probes. The STAR environment: earth, ionosphere, magnetosphere, interplanetary space, planetary environments. Tools including transmitters, antennas, receivers, sensors, radars, displays. Telecommunications. Electromagnetic waves, acoustic waves, gravity plasmas. Applications to current experimental programs. Planning and execution of experiments. Prerequisites: familiarity with electromagnetics at the level of Physics 53 and senior or graduate standing.

3 units, alternate years, given 1992-93

250. Communications Design Seminar—Seminars on 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 (D.Harris) T 4:15
Win (Staff) T 4:15
Spr (Lusignan) T 4:15


3 units, Spr (Tyler) MWF 1:15

254. Principles of Radar Systems—Analysis and design, emphasizing synthetic aperture radar. 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 1992-93

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 (Inan) MWF 10
Win (Nishimura) TTh 9:30-10:45
Spr (Gray) TTh 2:45-4

262. Two Dimensional Imaging—2D autocorrelation, 2D Fourier, 2D Hartley, Hankel, Abel, and Radon transforms; projection-slice theorem. 2D delta functions, 2D impulse response, sampling theorems, image aliasing. Presentation of 2D images, contours, grey levels, matrices, contrast adjustment, perspective projection. 2D noise, speckle, thermal imaging with microwaves, noise images. Restoration, principal solu-
tion, restoration in the presence of noise. Reconstruction from projections (tomography). Indirect imaging (interferometry). Applications to various fields. Prerequisite: 261 or equivalent.

3 units, Win (Staff) MWF 3:15


3 units, Aut (Widrow) TTh 9:30-10:45
Spr (Meng) TTh 9:30-10:45

265. Applications of the Fast Fourier Transform (FFT)—(Enroll in Music 420.)

268. Introduction to Modern Optics—(Enroll in Engineering 270A.)

271. Introduction to VLSI Systems—For EE, Computer Science and Computer Science Engineering students with background in computers, processors, or 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 (DeMicheli) TTh 11-12:15
Spr (Horowitz) MW 11-12:15

272A. Design Projects in VLSI Systems—For students with research and applications interest in VLSI systems. Experience in designing large-scale MOS ICs. Working in teams of two, students complete modest-sized CMOS projects through layout, simulation, and design-rule checking. Topics: design tools and techniques (instruction on the use of computer tools), common design problems and some solutions to them, testing and testability, and floor planning and communication. Prerequisites: 271, experience with timesharing facilities.

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

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 (Cover) TTh 2:45-4

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. Prerequisite: 278 and 102 or 261.

3 units, Win (Gray) TTh 2:45-4

281. Microcomputer-Based System Design—Lectures on the architecture and design of microcomputer-based systems. Lab experiments use student-designed Motorola 68000 systems and utilize the latest Hewlett-Packard microprocessor system development tools. Final design project required. Based on the 68000 or alternatively on single chip microcomputers such as the Motorola 68HC11 or the Intel 8051. Prerequisites: 121, 181.

3 units, Win (Peterson) TTh 9:30-10:45

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 (Staff) TTh 1:15-2:30
Win (Staff) TTh 11-12:15
Spr (Staff) TTh 4:15-5:30

283. Compilers—(Enroll in Computer Science 143.)


3 units, Win (Owicki) TTh 9:30-10:45

285. Programming Languages—(Enroll in Computer Science 242.)

286A,B. Operating Systems—(Enroll in Computer Science 240A,B.)

287. Programming Paradigms—(Enroll in Computer Science 107.)

288. Software Project Laboratory—(Enroll in Computer Science 194.)
289. Concurrent Programming—(Enroll in Computer Science 140.)

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.

by arrangement


3 units, Aut (da Rosa) MWF 3:15


3 units, Win (da Rosa) MWF 3:15

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

GRADUATE

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 (Plummer) T 4:15

Win (Dutton) T 4:15

Spr (Saraswat) T 4:15

311. Characterization and Computer Modeling of Semiconductor Devices—Computer simulation techniques for IC process and device modeling. Use of SUPREM for process modeling and SEDAN for device analysis to characterize effects such as bipolar current gain and MOS threshold voltage. Model parameter extraction for SPICE. Prerequisite: 216.

3 units, Win (Dutton) MW 11-12:15


3 units, Win (Wooley) MWF 10


3 units, Spr (Wooley) TuTh 11-12:15

316. VLSI Devices and Technology—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, point defect mechanisms in fabrication technology, 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, Spr (Plummer) TuTh 2:45-4

317. Microolithography—Fundamentals of exposure and development of resist patterns down to sub-micron 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 1992-93


3 units, Win (De Micheli) TuTh 4:15-5:30
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 present topics related to the project area, e.g., design representation and capture; simulation and verification techniques; synthesis systems; design management methods for large scale systems. Prerequisites: 218 and 318, or consent of instructor.

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

322A. Basic Quantum Mechanics—Two quarter sequence provides a firm foundation in quantum mechanics in condensed matter physics and solid-state electronics. 322A: 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, Win (White) MWF 1:15

322B. Basic Quantum Mechanics—Applications of quantum mechanics to selected problems. Approximation schemes developed are variational methods, perturbation, and time-dependent perturbation. Complications arising from identical particles. Example applications: the helium atom, covalent bonding, electrons in solids, tunneling, and quantum well devices. Prerequisite: 322A.

3 units, Aut (White) MWF 1:15

324. Applications of Quantum Theory—Unified approach involving the density matrix to lasers, field quantization, and multiple quanta effects. Emphasis on the techniques for obtaining the appropriate equations of motion, rather than detailed investigation of specific devices. Topics: rate equations, spontaneous emission, laser action, infrared absorption, multiple photon absorption, relativistic quantum effects, and free-electron lasers. Prerequisite: 322B or Physics 231.

3 units, Spr (Pantell) MWF 11 alternate years, not given 1992-93

328A,B. Physics of Semiconductor Devices—Physical principles that govern operation of semiconductor devices and their applications in advanced semiconductor devices. Two quarter sequence: 328A emphasizes semiconductor physics such as quantum mechanics, energy band theory, semiconductor statistics, semiclassical transport theory, scatterings, and quantum mechanical transport theory; 328B emphasizes the applications of semiconductor physics in advanced semiconductor devices, such as heterojunction (HJ) p-n diodes, HJ-bipolar transistors, HJ-FET's electron transfer devices, and photonic devices. Many examples are related to the up-to-date research carried out in lab. Prerequisites: 216, 228, and 328A (for 328B). Recommended: 238.

3 units, Win, Spr (Sigmon) 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 many 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—Advancements in experimental (329) and theoretical capabilities have produced an explosion of scientific work on semiconductor surfaces and interfaces on an atomic level. The results and implications, practical and scientific, are covered systematically. Semiconductor-metal, -oxide, -semiconductor, and -insulator interfaces are included and correlations made between them. Emphasis on 3-5 and other compound semiconductors. Identified key concepts give unity and allow the student to follow new developments as they arise. Prerequisites: 238 or equivalent, and consent of instructor.

3 units, Spr (Helms) TTh 1:15-2:30 alternate years, not given 1992-93

333. GaAs Process Technology—Fundamental properties of GaAs important for device fabrication. Differences in fundamental mechanisms such as diffusion, defect chemistry, and annealing from those of Si. Emphasis on fabrication procedures and techniques based on a planar direct ion implantation process in semi-insulating GaAs directed toward digital IC's, MESFET, and primary logic cells discussed in detail. Course similar to 212. Prerequisites: 228, 238.

3 units, alternate years, given 1992-93

334. Superconducting Electronics—Introduction to 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. Recom-
mended: exposure to quantum mechanics and a good grounding in electromagnetic theory.

3 units, Win (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, Aut, Win, Spr (Bates) by arrangement

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, McWhorter) WF 3:15-4:30 lab by arrangement


3 units, Spr (S. Harris) MWF 2:15

347. Optical Methods in Engineering Science—(Enroll in Aeronautics and Astronautics 220.)


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

349. Advanced Modern Optics—(Enroll in Engineering 270B.)

350. Radioscience Seminar—Seminars by internal and external speakers in space physics, planetary exploration, ionospheric and magnetospheric physics, radar and remote sensing of the environment, applied electromagnetics, waves in optical fibers and information systems with space applications. Student-faculty discussions follow seminar.

1 unit, Aut (Peterson) W 4:15-5:30
Win (Inan)
Spr (Tyler) W 4:15-5:30

352. Electromagnetic Waves in the Ionosphere and Magnetosphere—Magnetioptical theory in multi-component media; signal dispersion; group ray velocity; wave polarization; refractive index surfaces; ray tracing; absorption; boundary effects; interpretation of natural phenomena (whistlers, VLF emissions); remote sensing in plasmas; communication; theory of wave-particle interactions in the magnetosphere. Prerequisite: 142 or equivalent.

3 units, alternate years, given 1992-93

354. Introduction to Radio Wave Scattering—Integral and differential equations of radio waves scattering; exact approximate, and numerical solutions of single particle scattering for spheres and cylinders. Multiple scattering; formulation and solution techniques for equation of transfer in discrete media and scattering by continuous media in weak and strong regimes. Scattering from rough surfaces with large and small roughness scales. Applications to radar, radar astronomy, remote sensing, and biological media. Prerequisite: 241 or equivalent, or consent of instructor.

3 units, alternate years, given 1992-93

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 profilome-
162 SCHOOL OF ENGINEERING

368. Digital Image Processing—(Enroll in Aeronautics and Astronautics 268.)

369A. Medical Imaging Systems I—Imaging internal structures within the body using high-energy radiation studied from a systems viewpoint. Modalities covered: x-ray, computerized tomography, and nuclear medicine. Analysis of existing and proposed systems in terms of resolution, modulation transfer function, detection sensitivity, noise, and potential for improved diagnosis. Prerequisite: 261. Recommended corequisite: 366.

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

369B. Medical Imaging Systems II—Imaging internal structures within the body using non-ionizing radiation studied from a systems viewpoint. Modalities covered: ultrasound and magnetic resonance. Analysis of ultrasonic systems including diffraction and noise. Analysis of magnetic resonance systems including physics, Fourier properties of image formation, and noise. Prerequisite: 261. Recommended: 366 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 (Widrow) Th 4:15-5:30
Win (Nishimura) Th 4:15-5:30
Spr (Staff) Th 4:15-5:30

371. Advanced VLSI Circuit Design—Analysis and design of high performance digital integrated systems. Focus is on developing and using simple models to quickly evaluate the trade-offs involved in obtaining high performance systems. Bipolar, CMOS, and BiCMOS circuits. Common subsystems (e.g., memory arrays, register files, ALUs) are used to evaluate technologies and circuit designs. Final project involves the design of subsystems for a high speed computer. Prerequisites: 271, 313, or consent of instructor.

3 units, Spr (Horowitz) MWF 10

372. Quantization and Data Compression—Theory and design of codes for quantization and signal compressions systems (source coding systems), systems which convert analog of 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, not given 1991-92


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


3 units, Spr (Widrow) Th 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 1992-93


3 units, Aut (Gibson) TTh 11-12:15


3 units, not given 1991-1992

377. Computer-Aided Analysis of VLSI Systems—Introduction to simulation techniques used in VLSI circuit and system design. Topics: formulation of circuit equations, modified nodal analysis, Gaussian elimination and LU decomposition sparse matrix techniques, DC analysis of nonlinear circuits (Newton-Raphson method and its modifications), transient analysis of nonlinear circuits (linear multistep integration), relaxation based methods (Gauss-Seidel-Newton methods and waveform relaxation), timing verification and Penfield-Rubinstein technique, switch level simulation, event-scheduling and selective trace, functional level simulation, mixed-mode and heterogeneous simulation, distributed event-driven simulation and hardware simulation accelerators. Prerequisites: Math. 113 and 271, or consent of instructor.

3 units, alternate years, given 1992-93


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

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 (Staff) TTh 9:30-10:45

379B. Digital Communication II—Capacity calculation, cut-off rates, convolutional codes, trellis
164 SCHOOL OF ENGINEERING

and lattice codes, shaping codes, encoder/decoder complexity, spread-spectrum methods. Prerequisites: 278, 379A.
3 units, Spr (Staff) TTh 2:45-4

380. Seminar on Computer Systems—Discussion of current research in the design, implementation, analysis, and use of computer systems ranging from integrated circuits to operating systems and programming languages.
1 unit, Aut, Win, Spr (Staff) W 4:15-5:30

381. Logic Design—Principles and techniques of logic design. Combinational circuit analysis (hazard detection); combinational circuit design including PLA, VLSI, and MSI techniques and testing techniques; IC logic families, flipflop properties, sequential circuit analysis and synthesis for fundamental and pulse mode circuits, design for testability techniques. Prerequisite: 182 or equivalent.
3 units, Aut, Win (McCluskey) TTh 2:45-4

382. Processor Design—Computer arithmetic, high-speed algorithms. Pipelined machines, timing templates, design issues, and cache design. Memory system design for high-speed processors. Prerequisite: 282 or equivalent.
3 units, Win (Flynn) MWF 11

383. Advanced Compiling Techniques—(Enroll in Computer Science 243.)

384. Computer Networks: Architectures and Protocols—Objectives of computer networks; network structure and components; switching techniques (circuit-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.
3 units, Aut (enroll in Computer Science 244) Win (Pang) TTh 2:45-4

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—Student/faculty discussions of research problems in computer organization, memory hierarchy, machine representation, and emulation of conventional and abstract machines.
1-4 units, Aut, Win, Spr (Flynn) 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 involve lab experimentation, design of devices or systems, or directed reading. Graded Satisfactory/No Credit only.
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.
by arrangement

392E. Telecommunications Network Engineering—Integrated telecommunications networks complexity exceeds the level where design can be accomplished by procedural methods and analytical techniques alone. Networks from systems engineering and systems architecting perspectives. Case studies and examples. Heuristic reasoning emphasized. Procedural methods (e.g., optimization) and analytical tools (e.g., modeling
and simulation). General engineering considerations necessary to design complex systems and integrated telecommunications networks. Topics: voice/data/video integration, telecommunications systems and networks, methodologies for complex systems architecting and design. Prerequisites: familiarity with introductory concepts of network switching and transmission. Recommended: 244 or 392F, or equivalent.

3 units, Aut (D. Harris) MWF 2:15

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

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 on practical aspects of IC fabrication, including silicon wafer cleaning, photolithography, chemical etching, oxidation, diffusion, ion implantation, chemical vapor deposition and physical sputtering. Prerequisites: 212, consent of instructor.

3 units, Win (Wong) by arrangement

412. Advanced Integrated Circuit Laboratory—Experimental projects on technology, equipment, and software for fabrication of integrated circuits and microstructures. May be repeated for additional credit. Prerequisites: 212 and consent of instructor; 410 may be required for some projects.

3 units, Spr (Saraswat) T 1:15-2:30

ELECTRICAL ENGINEERING 165


3 units, Win, Spr (Solomon) 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 (Spicer, Pease, Pianetta) 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 1992-93

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, Aut (Hellman) TTh 1:15-2:30

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 1992-93
481C. Topics in Computer Graphics—(Enroll in Computer Science 348C.)

482. Advanced Computer Organization—Topics in high performance and concurrent systems; single and multiple instruction stream systems; memory structures and control; high performance networks; algorithms; concurrency detection; applications considerations; system design and analysis. Prerequisites: 282, 382.
3 units, Spr (Hennessy) TTh 4:15-5:30

483. Topics in Compilers—(Enroll in Computer Science 343.)

484. Computer Networks: Modeling and Analysis—Network functions, architectures and protocols; computer traffic characterization; resource sharing; packet-switched-store-and-forward networks (ARPAnet); 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 (Pang) TTh 9:30-10:45

3 units, Spr (Flynn) TTh 11:12-12:15 alternate years, not given 1992-93

3 units, Spr (Peterson) MWF 9 alternate years, not given 1992-93

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 1992-93

3 units, Spr (McCluskey) TTh 2:45-4 alternate years, not given 1992-93

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: David G. Luenberger
Professors: Donald A. Dunn, Ronald A. Howard, David G. Luenberger, William J. Perry, James L. Sweeney
Associate Professors: Samuel S. Chiu, Ross D. Shachter, Edison T. S. Tse
Assistant Professor: Ennio Stacchetti
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

The Department of Engineering-Economic Systems (EES) prepares individuals for careers in analyzing, managing, and creating activities of a business, financial, technical, or social nature ranging from individual projects to entire enterprises. The department emphasizes logical analysis using mathematical representations and advanced computational procedures, but complements this analysis with careful attention to framing of issues, for-
mulation of problems and implementation of results.

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.

APPROACH

The formal course work is organized around a set 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. The concepts are presented in a set of core courses that provide a foundation for direct application and prepare students for advanced courses that explore the frontiers of research.

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.

BACKGROUND REQUIRED

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 not required but will prove helpful.

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. University regulations governing the M.S. are described in the "Degrees" section of this bulletin. The department does not have a thesis requirement for the master's degree. In addition to meeting University requirements, M.S. programs must contain a total of 45 units of course work. This total must include at least 36 units of regular lecture courses, 27 units of which must be courses in EES with letter grades. These courses must include at least five of the department's core courses and at least 3 units of project work. (See "Courses" below for a list of courses that meet these requirements.) Finally, a letter grade indicator (LCI) of 2.75 must be achieved on the total course program.

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.
In addition to the University requirements, the student must complete successfully: (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 and 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 a graduate degree 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 complete successfully (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 four 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 $26,000 per year is required to cover tuition and expenses.

A limited number of fellowships for first-year students are available through the department. These pay tuition plus an allowance of approximately $900 per month during the academic year. 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 may be obtained from the School of Engineering.

The application forms for all types of assistance may be obtained from the Graduate Admissions 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 August 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 the student 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 complete the project successfully. Internships for international students must conform to visa restrictions. Internships are not required, but many students elect to participate.

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 such problems as evaluating hazardous processes, research and development, and energy investment.

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 and disputes involving risks of injury or death, (4) the use of decision analysis in medicine, and (5) the mutual exploration of the fields of decision analysis and artificial intelligence.

**INTELLIGENT SYSTEMS**
(Chiu, Fehling, Holtzman, Luenberger, Shachter, Tse)

This program seeks to understand and enhance the intelligent problem-solving capabilities of humans and human-computer systems. It focuses on the design, development, and evaluation of computer-based "intelligent decision systems" that aid human decision makers in solving complex problems, and autonomous computational "agents" that fully automate more routine problem solving activities. Program participants investigate how computers can be used as powerful tools to gather, encode, and organize the knowledge and skills essential for successful problem solving, and then to employ the encoded knowledge in carrying out complex, real-world tasks. Problem-solving tasks currently under investigation include decision making in both business and medical environments, computer-aided supervision and control of large-scale production activities, and development of intelligent robotic devices for use in hazardous environments.

The concepts and methods of several disciplines contribute significantly to the work on intelligent systems. Research and teaching in this program emphasize interdisciplinary approaches that combine mathematical, analytic techniques from the systems and decision sciences with empirical methods and models from cognitive science and computational approaches from computer science and artificial intelligence (AI).

Much of the research in this program is conducted through the Laboratory for Intelligent Systems (LIS), directed by Professor Fehling. Internships are available at several local firms that are active in developing intelligent systems for use in a wide range of application environments. Both basic and applied research is currently underway in the LIS.

Basic research activities include work on the following: (1) computation models that combine qualitative and quantitative descriptions to support diagnostic reasoning about complex, dynamic systems; (2) methods to automate the construction of a situation-specific decision model from a knowledge base; (3) computational methods for planning, replanning, and executing plans under uncertainty; methods for problem-solving and decision making under significant real-time performance constraints; and (4) problem solving by members of social organizations and by organizations as a whole.

Applied research in the LIS includes the following: (1) decision aids for enterprise-wide management; (2) aids for supporting formulation and implementation of competitive product development strategies; (3) medical decision aids for critical care applications; (4) automated intelligent control of multi-state, continuous production processes; and (5) intelligent control systems for robotic vehicles for use in heavy industry.

**ECONOMIC ANALYSIS**
(Chiu, Dunn, Luenberger, Stacchetti, Sweeney, Tse)

This program includes modeling and analysis of economic entities and their interactions. Several specific areas, described below, have commanded particular attention.

**Natural Resource Economics**—Examines the particular problems associated with depletable or renewable natural resources, including energy,
biological, mineral, and environmental 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)

The energy modeling and analysis activity centers around the Energy Modeling Forum (EMF) and the Energy, Natural Resources, and the Environment Program (ENREP) of the Stanford Center for Economic Policy Research (CEPR). The 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, the EMF is based at Stanford with Professor Weyant as Director.

Current EMF studies focus upon key world oil market uncertainties, energy and the environment, and energy policy in Japan.

Research sponsored by CEPR includes modeling and analysis of world oil markets, of oil storage policies, and of long-term contracts in markets for coal. Additional research includes regulation of public utilities, optimal stockpiling under a gaming strategy, energy and the environment, representation of uncertainty in models, development models of OPEC, oil and gas finding rates, and disequilibrium modeling under stochastic rationing.

MATHEMATICAL SYSTEM ANALYSIS
(Chiu, Luenberger, Stacchetti, 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 observer, 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, 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 of 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, 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 include: formulation and analysis of difference and differential equations; state-space formulation; linear systems, fundamental solution sets, equilibria, dynamic diagrams; and eigenvector analysis of linear systems, the concept of stability. Systems with positive variables: Frobenius-Perron theory, stability, existence of positive equilibria, comparative statics. Markov Chains; finite and infinite Markov Chains, limiting distributions, transient state analysis, state statistics. Applications include: cohort population models, social structures, migration models, national economics, price cycles, cultural media dynamics, Peter Principle of organizational hierarchies, Richardson’s theory of arm races, Homans-Simon model of group interaction, population growth. Prerequisite: Math. 113 or equivalent.

4 units, Win (Tse) MW 9:30-10:45

201B. Dynamic Systems—Transforms, concepts of control and feedback, controllability, observability, and canonical forms. Nonlinear system analysis; stability, Liapunov functions, general summarizing functions. Introduction to optimal control theory; variational methods, the Pontryagin maximum principle, the Hamilton-Jacobi-Bellman equation. Applications include: Volterra’s predator-prey model, genetic transference, the spread of epidemics, optimal resource allocation.

4 units, Spr (Chiu) TTh 1:15-2:30

209. Quantitative Methods in Transportation and Urban Service Systems—Quantitative techniques of engineering, management, and systems sciences emphasizing applications in transportation systems analysis (urban, air, ocean, highway, pick-up and delivery systems) and in the planning and design of logistically oriented service systems (e.g., fire and police departments, emergency medical services, emergency repair services). Unified study of functions of random variables, geometrical probability, multi-server queuing theory, spatial location theory, network analysis, and graph theory. Implementation difficulties. Examples of applications: evaluation of technologies for vehicle location, routing and control, controlling randomness in mass transit systems, design of dial-a-ride transportation systems, operation and control of police patrol dispatch strategies. Prerequisite: 221 or equivalent.

3 units, Spr (Chiu) MW 1:15-2:30

alternate years, not given 1992-93

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 or equivalent.

3 units, Win (Sweeney) TTh 9:30-10:45

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, Spr (Stacchetti) TTh 9:30-10:45

ECONOMICS

155. Economics of Natural Resources—(Same as 255; graduate students register for 255.)

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 or equivalent.

3 units, Win (Sweeney) TTh 9:30-10:45

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, Spr (Stacchetti) TTh 9:30-10:45
212C. Economic Analysis—Continuation of 212B. Theoretical topics: welfare (criteria for evaluation of public projects, impossibility theorems); economics of uncertainty; and economics and information.

3 units, Aut (Luenberger) TTh 1:15-2:30

214. Public Policy Analysis—Law and economics as a conceptual framework for policy formulation and evaluation. Examples of policies expressed in the form of property rights, contract law, tort law, criminal law, antitrust law, and public utility regulation. Analysis of the economic effects of laws and regulations. Recommended: Economics 51 or concurrent registration in 212A.

3 units (Dunn) given 1992-93

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 (Dunn) given 1992-93

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; model impacts of proposed trade restrictions; develop a competitive analysis for an anti-trust litigation; analyze investment options by a regulated industry.

4 units, Spr (Sweeney) TTh 11-12:15

255. Economics of Natural Resources—(Undergraduate students register for 255.) Economic analysis of natural resource use and preservation, including clear air and water, pollution, depletable mineral resources, energy, and biological 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: Economics 51 or 51Q. Recommended: Math. 43.

5 units, Aut (Sweeney) MW 12:20-2:05

DECISION ANALYSIS

31. Introduction to Decision Analysis—Decisions, and how people make them. 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: decision trees, influence diagrams, Bayesian updating, value of information, valuing intangibles, probability assignment, risk preference, and analysis of large-scale decisions; examples are from every major field of application and provide the philosophical concepts and practical techniques necessary to achieve mastery in decision-making in a complex, dynamic, and uncertain world. DR:6(8)

3 units, Aut (Howard) TTh 11:15-12:15
231. Decision Analysis—Development of a normative rationale for individual and group action in the face of uncertainty, complexity and dynamism. Presentation of the procedures necessary to reduce the rationale to practice. Encoding of information and preferences. Discussion of utility measures of risk preference and discounting measures of time preference. Analysis of problems using decision trees that include risk and time preference. Determination of the economic value of perfect and imperfect information on one or several variables in a decision problem. Design of economic information-gathering experiments. Examples from business, engineering, law, and medicine. Applications from private and public sectors of the economy. 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 artificial intelligence for delivering automated decision analysis assistance. Topics: design and analysis of classes of decisions, representing the decision analysis process, automating of probability and risk attitude assessments, automating sensitivity analysis, and representing deterministic decision models. Discussions tailored around a substantial term project. Student teams design and implement a narrow-scope intelligent decision system, or write a paper addressing a major research topic in intelligent decision systems. Prerequisites: 231 and either 285 or Computer Science 221.

4 units, Aut (Holtzman) MWF 3:15-4:30

235. Medical Decision Analysis—(Same as Computer Science 371.) Use of decision analysis in medical practice. Student teams analyze specific clinical decision problems as a term project. Topics: the decision making role of patients and physicians, medical preference models, assessing decision models in a clinical context, medical ethics, and designing and using automated medical decision tools. 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 theory to apply that knowledge in practice, and to extend the domain of rational analysis. Teams analyze a current decision problem faced by an actual decision maker, and carry out the technical procedures of modeling, information assessment, and value encoding by communicating with individuals who are usually not trained in logical analysis. Problems chosen have covered every level of decision-making from the university to the community of nations, and many fields of human endeavor. Project evaluations are based solely on the professional quality of analysis and presentation. Prerequisite: 231.

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. Sensitizes the individual to ethical issues, providing the means to form ethical judgments, and questions desirability of physical coercion and deception as a means to reach any end. An exploration of human action and relation in society is conducted in the light of previous thought, and is used to provoke additional research on the desired form of social interactions. Attitudes toward ethical dilemmas are explored by creating an explicit personal code. Selected issues from the full range of human affairs test the student's framework for ethical judgment.

1-4 units, Spr (Howard) T 2:45-5:15

OPTIMIZATION


4 units, Aut (Tse) TTh 9:25-10:50

Newton, conjugate gradient, variable metric, methods of feasible directions, reduced gradients, gradient projection, penalty, multipliers, and projected Lagrangian methods. Unified approach toward global and local convergence of algorithms. Prerequisites: graduate standing, Math. 113 or equivalent. Recommended: Math. 115.

4 units, Spr (Shachter) MW 9:30-10:45

246. Investment Science—Introduction to the modern foundations of quantitative investment analysis, both theory and practical application. 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, option theory, futures contracts, optimal portfolio growth). Examples of applications for every major topic.

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

253. Optimal Dynamic Systems—Development of optimal control theory and its applications to social, economic, and life systems. Pontryagin maximum principle developed from geometric point of view. Problems with inequality constraints; transversality condition; singular control; linear systems with quadratic cost; discounting cost; infinite horizon problem. Sufficient conditions for optimality. Applications include: management of renewable resources, dynamic theory of the firm, control of predator-prey systems, and optimal economic growth. Prerequisite: 201B.

3 units (Tse) alternate years, given 1992-93

263. Principles of Optimization—A large segment of the field of optimization is effectively unified by a few geometric principles of linear vector space theory. Introduction to functional analysis; linear vector spaces, normed spaces, Banach space, Hilbert space. Projection theorem in Hilbert spaces with applications to least-square estimation and minimum norm control. Dual spaces and linear functionals, the Hahn-Banach theorem. Convex optimization, duality theory, Kuhn-Tucker theorem with applications to production planning, resource extraction. Prerequisites: 201B or Math. 113, Math. 115.

3 units (Tse) MW 1:15-2:30 alternate years, not given 1992-93

APPLICATIONS AND RESEARCH

170. The Role of Technology in National Security—(Same as Political Science 134P, VTSS 171.) Examines critical decisions made by the U.S. including development of the A-bomb and H-bomb, the crash development of the ICBM and SLBM after Sputnik, the decisions made in the wake of the energy crisis in the 70s, the space program, and current issues, e.g., high-density TV, the human genome project, and the SDI program. Also, briefly, how decisions to develop the A-and H-bombs were made in the U.S.S.R. and China, and comparison of the role of the U.S. and Soviet governments in their respective space programs. Focus: the process by which technical issues are synthesized into the decision process, and how they are explicated for the policymaker with no background in technology; the role of technical agencies, governmental committees, and science advisory boards and the way these groups interact to bring a broad spectrum of informed advice to the senior policymaker. Guest specialists from business, technological, and government areas provide key lectures.

3 units, Aut (Perry) MW 4:15-5:30

206. Decision System Project Course—Class studies a recurring decision problem and constructs a prototype decision system to assist in its solution. Emphasis is on developing methodology to provide insight to decision makers, using techniques from the core courses. Design and implementation focus on representation of problem structure, and interactions among different subsystems created by class. Possible generalization of tools for use in future years. Prerequisites: four EES core courses or consent of instructor.

4 units, Sum (Shachter) TTh 9:10-5 alternate years, not given 1992-93

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

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 tradeoffs, resource management, and uncertainty in a national or international setting. Emphasis on integrated utilization of modeling tools drawn from diverse methodologies and the requirements for successful application in a policy-making or strategy development context. The links between art, theory, and practice are emphasized. Prerequisites: 212A, 231, and 241, or equivalent.

3 or 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) Th 2:30-4

285. Problem-Solving and Intelligent Systems—Study of types of beliefs and cognitive processes required for intelligent problem-solving. Some emphasis on programming skills necessary for building computational systems that employ specific problem-solving strategies to carry out difficult tasks. Interdisciplinary review of important perspectives on problem solving from Artificial Intelligence (AI), theories of rational decision making, and analytical methods from the systems sciences such as optimization, dynamic system modeling, and control. Topics: review of basic techniques for programming using the LISP programming language, building data structures for representing knowledge and beliefs, modeling complex domains, pattern matching and unification, inference methods based on search and logical deduction, methods for control and efficiency and focus of an inference process, and the generic architecture of an intelligent agent. Prerequisites: 221 or 241; some experience writing program in some high level language (Pascal, C, or Fortran), or LISP.

4 units, Win (Fehling) MWF 2:15-3:45

286. Building Intelligent Systems—Advanced topics of computer-based intelligent problem-solving systems including computer-based planning, advanced techniques for efficient control of problem solving actions, review of alternative 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. Students form teams that design and implement a simple intelligent system to perform a well defined problem-solving task. Pre-requisite: 285 or an equivalent introductory course in artificial intelligence.

3 units, Spr (Fehling) W 2:15-3:45

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 incompetence; 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

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

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)
by arrangement

470. Analysis of National Security Problems—Students and faculty explore significant issues in national security to find specific problems which may be treated by analytical methods. Students select topic, present it to the class, and prepare a research paper on it. Because of its interactive nature, enrollment limited with priority given to EES students. Pre- or corequisite: 170.
1-3 units, Aut, Win, Spr (Perry, Shachter)
by arrangement

INDUSTRIAL ENGINEERING AND ENGINEERING MANAGEMENT

Emeriti: (Professors) Eugene L. Grant, Robert V. Oakford, Henry E. Riggs, David A. Thompson
Chair: Warren H. Hausman
Associate Chairs: Robert C. Carlson, James V. Jucker
Associate Professors: Kathleen M. Eisenhardt, James E. Hodder, Robert H. Keeley, Robert I. Sutton
Assistant Professor: Margaret L. Brandeau
Professor (Teaching): Robert McGinn
Lecturer: Charles F. Banfe
Affiliated Faculty: David Beach (Mechanical Engineering), Robert A. Burgelman (Graduate School of Business), J. Michael Harrison (Graduate School of Business), Frederick S. Hillier (Operations Research), Charles A. Holloway (Graduate School of Business), James C. March (Graduate School of Business), David B. Montgomery (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 government, or in public, quasi-public, or non-profit institutions.

Engineering management is concerned with the knowledge and processes required to manage technically based enterprises.

UNDERGRADUATE PROGRAM

BACHELOR OF SCIENCE

The program leading to the B.S. degree in Industrial Engineering is stated earlier under the “School of Engineering” section of this bulletin. This curriculum is planned to serve those students whose long-run objective is the planning, designing, and implementing of complex economic and technological management systems where a scientific and engineering background is necessary or desirable. The fundamentals of engineering are stressed. The Industrial Engineering program is designed to introduce the student to measurement and control theory, organization theory and behavior, management, economic analysis and modeling, facilities planning and design, and 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 surrounding community.

Many students completing the bachelor’s program will wish to pursue graduate study in industrial engineering, in other professional schools—law, medicine, or business—or in fields related to industrial engineering such as economics, statistics, or operations research.

GRADUATE PROGRAMS

The Department of Industrial Engineering and Engineering Management (IEEM), in collaboration with other departments of the University, offers programs leading to the degrees of Master of Science, Engineer, and Doctor of Philosophy in Industrial Engineering and to the degree of Master of Science—Engineering Management. The department also offers a master’s degree in Manufacturing Systems Engineering in cooperation with the Department of Mechanical Engineering.
Applicants for admission as graduate students in IEEM must submit the results of the verbal, quantitative, and analytical parts of the Graduate Record Examination. The deadline for application is February 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 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). 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. While the program has a strong practitioner orientation, the department is also committed to furthering research in this area. The terminal degree for students interested in a research/academic career in engineering management would be the Ph.D. in Industrial Engineering with the appropriate concentration.

**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 manufacturing 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.

COURSES

UNDERGRADUATE

60. Engineering Economics—(Enroll in Engineering 60.)

100. Organizations: Theory and Management—Survey of classical and modern organization theory, covering the behavior of the individual, the work group, and the organization. Enrollment limited to undergraduates with preference to IEEM majors.

4 units, Aut (Eisenhardt) sec. 1 TTh 10-11:50 sec. 2 TTh 1:15-3:05

107. Work, Technology, and Society—(Enroll in VTSS 170.) 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. with attention to the situation 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 innovation work policies in Silicon Valley firms. Limited enrollment. DR:9(5)

4 units (McGinn) given 1992-93


4 units, Win (Lee) MW 8:30-9:45

125. Manufacturing Systems Design—(Graduate students register for 225.) The concepts and techniques of designing and improving performance and productivity in systems composed of and influenced by people, organizational factors, environmental factors, and technology. Emphasis on the design of high performance manufacturing systems. Multidisciplinary approach. Includes the use of simulation as a tool for design
133. Industrial Accounting—Introduction to basic accounting concepts and operating characteristics of accounting systems. Principles of financial and cost accounting, design of accounting systems, techniques of analysis, and cost control. Designed for the user of accounting information and not as introduction to professional accounting career. Interpretation and use of accounting information for decision making is stressed. Students who have taken or are taking elementary accounting should not enroll. Videotapes.

3 units, Aut (Bhimjee) TTh 1:15-2:30
Sum (Bhimjee) MTWTh 8
1 hour by arrangement

180. Senior Project: Organizations—Students participate in a major project in groups of four. Attention to problem identification and definition emphasizing synthesizing feasible solutions to real problems. Restricted to IE majors in their senior year not enrolled in 183 or 186. Prerequisites: 100, 121, 125, 133, 235, 260, Engineering 40; Operations Research 152, 153.

4 units, Win (Eisenhardt, Sutton) TTh 11-12:15

183. Senior Project: Economic and Financial Analysis—Restricted to IE majors in their senior year not enrolled in either 180 or 186. A major project, in groups of four, with attention to problem identification and definition; emphasis on search for feasible solutions to real problems and appropriate treatment of uncertainties when relevant. Prerequisites: 100, 121, 125, 133, 235, 260; Engineering 40; Operations Research 152, 153.

4 units, Win (Keeley, Paté-Cornell) TTh 11-12:15

186. Senior Project: Production—Restricted to IE majors in their senior year not enrolled in either 180 or 183. A major project in groups of four, emphasizing problem identification and definition. Students apply analytic methodology obtained from previous course work, when appropriate; emphasis on developing feasible solutions to real problems. Prerequisites: 100, 121, 125, 133, 235, 260; Engineering 40; Operations Research 152, 153.

4 units, Win (Brandeau, Lee) TTh 11-12:15

191. Directed Study—Directed study on a subject of mutual interest to student and faculty member. Student must find a faculty sponsor and submit a one-page description of plan.

1 or more units (Staff) by arrangement

201. Creative Problem Solving—(Same as Engineering 190.) Open to all undergraduates and graduates. Problem solving emphasizing problem definition, creativity, and interpersonal 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, Spr (Adams) MW 2:15-4:05

203. Organizational Behavior and Management—Organization theory; concepts and functions of management; behavior of the individual, the work group, and the organization. Emphasis on case and related discussion. Enrollment limited to 50 graduate students per section; priority given to IEEM majors.

3 units, Spr (Sutton) TTh 10-11:15


4 units, Spr (Jucker) MW 2:15-4


4 units, Aut (Keeley) MWF 9
Win (Hodder) MWF 10

237. International Investment and Financing—Evaluating international corporate investments including the implications of exposure to exchange rate movements, trade barriers, and international taxation. Capital structure and hedging decisions are examined in relation to taxation, exchange rate, and political risk issues. Implications for accounting, financial, and production practices. Enrollment limited and at discretion of instructor (preference given to students with Economics 165). Prerequisite: 235. Recommended: Economics 165.

3 units, Spr (Hodder) TTh 8:30-9:45
240. Engineering Risk Analysis—Techniques of analysis of engineering systems involving a trade-off between risks (technical, human, environmental, etc.) and benefits. Four parts: elements of decision analysis; reliability analysis and probabilistic techniques (fault trees and event trees); economic analysis of failure consequences (including property damage, financial loss, and human casualties); and case studies. The case studies (space systems, nuclear power plants, liquefied natural gas terminals, and dams) are of interest to engineering students of various backgrounds. Emphasis on the questions of human safety for decisions of public and private sector. Prerequisites: Statistics 116 and Engineering 60, or equivalent.

3 units, Win (Paté-Cornell) MWF 1:15

260. Analysis of Production and Operating Systems—(Graduate students take 261.) Introduction to the design, operation, and control of production systems using mathematical, computational, and modern analytical techniques. Topics: determination of optimal facility location, determination of production lot sizes, optimal timing and sizing of production capacity expansion, and introduction to inventory control. Prerequisites: Operations Research 152, Statistics 116.

4 units, Aut (Staff) TTh 9:30-10:45

261. Inventory Control and Production Systems—Topics in scheduling and control of production and inventory systems. Functions of inventory, determination of order quantities and safety stocks, alternative inventory replenishment systems, item forecasting, production-inventory systems, materials requirements planning (MRP), master scheduling, operations scheduling, and Just-in-Time systems. Prerequisites: Statistics 116 or equivalent.

3 units, Win (Hausman) TTh 10-11:15

268. Manufacturing Strategy—Enrollment limited to IEEM graduate students; preference 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 (Staff) MW 8:15-9:45

269. Industrial Management—Priority given to IEEM graduate students. Introduction to marketing and management policy for industrial products. Focuses on real life industrial settings. Topics: market segmentation and selection, positioning, product design, pricing, channels of distribution, sales organization, promotion, communication, and response to competitive actions. The interaction of functional policies and overall corporate strategy is stressed. Extensive case studies.

4 units, Win (Kosnik) TTh 8-9:30

270. Managing Technology for Competitive Advantage—(Same as Business 359.) Open to graduate engineers and second-year M.B.A.s.; enrollment limited and at discretion of instructor. Key issues of technology management focusing on the business unit level. Part I: the management of product or process development projects. Part II: the management of engineering functions. Part III: the integration of technology and business strategy. Case based. Prerequisite: 235 and 269 or first-year M.B.A. core.

4 units, Spr (Keeley) 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, Spr (Keeley) 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. Also for 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 35 graduate students.

4 units, Aut (Banfe) TTh 1:20-3:05

290. Risk Analysis Seminar Series—Five seminars (every other week) covering a range of aspects of risk analysis techniques and applications; assessment problems and valuation questions; technical, political, economic, and psychological aspects of risk-benefit decision making presented by speakers from universities and industry. No letter grades. Attendance required. Recom-
mended: previous exposure to probabilistic methods.
1 unit, Spr (Paté-Cornell) Th 4:15-5:30

291. Directed Study—Directed study on subject of mutual interest to student and faculty member. Student must find a faculty sponsor.
1 or more units (Staff) by arrangement

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, Win (Jucker) M 2:15-5

325. Psychology and Organizational Behavior—Enrollment limited to Ph.D. students. How basic psychological processes influence individual behavior in organizations, behavior of work groups, and organizations. How theory about cognition, emotion, and personality is used to enhance and obscure knowledge about organizations, and how such knowledge guides future research. Introduction to a variety of methods for studying organizations, and learning of some of the nuances of writing-up organizational research for publication. Prerequisite: consent of instructor.
3 units (Sutton) given 1992-93

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, Aut (Eisenhardt) W 1:15-3:30

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, Spr (Sutton) W 9-12

330. Doctoral Seminar in Financial Decisions—Open to doctoral students with research interest in the application of financial and economic theory to industrial engineering problems. Topics from current published literature and working papers. Content varies with faculty and student research interests. Prerequisite: Business 620. Recommended: Business 326.
3 units, Spr (Hodder) M 2:15-5

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, multigoal optimization. Reading material is primarily from journal articles. Prerequisite: 260.
3 units, Win (Staff) TTh 11-12:30

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) given 1993-94

364. Single and Multi-Location Inventory Models—Theoretical treatment of the management and control problems of inventory systems in production and distribution. Models for both single and multi-location systems are studied. Emphasis on operating characteristics, performance measures, and optimal operating and control policies. Prerequisite: Statistics 217 or equivalent.
3 units, Spr (Lee) M 9-12
alternate years, not given 1992-93

366. Optimization Models in Manufacturing—Optimization models for manufacturing system design and control, focusing primarily on deterministic models. Topics: resource allocation problems, scheduling and sequencing problems, models of flexible manufacturing systems, manufacturing cell design, and queuing network models of manufacturing systems. Prerequisites: 260
or equivalent, Operations Research 152 or equivalent.
3 units (Brandeau)
alternate years, given 1992-93

390. IEEM Doctoral Research Seminar—Presentations of current research papers by speakers from inside and outside the department. Ph.D. students must attend during every quarter in residence. No letter grades or units given.

Aut, Win, Spr (Staff) T 4:15-5:45

MATERIALS SCIENCE AND ENGINEERING

Emeriti: (Professors) Theodore H. Geballe, O. Cutler Shepard, Oleg D. Sherby, John C. Shyne, Robert L. White
Chair: Stig B. Hagstrom
Associate Chair: John C. Bravman
Associate Professor: John C. Bravman
Assistant Professor: Bruce M. Clemens
Professor (Research): Robert S. Feigelson, Alan K. Miller

Courtesy Professor: Curtis W. Frank
Consulting Professors: Paul A. Flinn, Timur Hali-cioğlu, Michael A. Kelly, David Redfield, Arden Sher, Donald L. Smith, John Stringer, Jeffrey Wadsworth, Henry Wise

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, 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 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.

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 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 PROGRAM

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.

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 general 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. Final changes to the Master's Program must be submitted no later than one academic quarter prior to degree conferral.

Degree requirements (for students entering after September 1, 1991) 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 (except for students who have had equivalent lab courses at other universities or equivalent practical experience).
3. Five courses selected from MSE 151, 152, and 201 through 209.
4. No more than 3 units of attendance-only seminars may be used in fulfilling the requirements for the M.S. degree.
5. Approved electives to bring total units to 45.
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 one quarter before the degree is granted. The total units of MSE 200 and attendance-only seminars should not 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 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, must file with the department 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 filed 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, 1991) 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. Students who have passed the departmental oral examination are qualified to complete the "Application for Candidacy" for the Ph.D. degree. 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 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 (LCI) 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 proceeding the University Oral examination.

ADVANCED SPECIALTY COURSES


**Materials Characterization**—Elect. Engr. 329, 331; MSE 320, 321, 322, 323, 324, 325, 347.


**Synthesis and Processing Materials**—Chem. Engr. 221, 222, 230, 231, 233, 234; MSE 310, 311, 312, 313, 314, 315, 316, 331; Mech. Engr. 262A.

* Not given after Autumn 1991.
** Not given after Winter 1991.

COURSES

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


3 units, Win (Stevenson) TTh 10-11:15


3 units, Aut (Hagstrom) TTh 9-10:15

161. Materials Science Labs I—(Formerly 160/202A.) 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 (Bravman) W 2:15-3:45


2 units, Win (Clemens) W 3:15-5

163. Materials Science Labs III—(Formerly 162/202C.) 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, Nix) M 3:15-5

170. Undergraduate Research—Participation in a research project.

3-6 units, any quarter (Staff)

by arrangement

178. Foundations of Electricity, Magnetism, and Optics—(Formerly 178.) 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 2:15-3:30

191. Mathematical and Computational Methods in Materials Science—(Formerly 209.) For undergraduates; see 201 for description.

4 units, Aut (Barnett) MWF 11

and by arrangement
192. Solid State Thermodynamics—For undergraduates; see 202 for description.
4 units Aut (Stevenson) TTh 10:30-11:45
and by arrangement

193. Atomic Arrangements in Solids—(Formerly 150.) For undergraduates; see 203 for description.
4 units, Aut (Bravman, Sinclair) MWF 10
and by arrangement

194. Phase Equilibria and Statistical Thermodynamics—For undergraduates; see 204 for description. Prerequisite: 192.
4 units, Win (Barnett) MWF 9
and by arrangement

195. Waves and Diffraction in Materials—For undergraduates; see 205 for description. Prerequisite: 193 (formerly 150).
4 units, Win (Hagstrom) MWF 1:15
and by arrangement

196. Imperfections in Crystalline Solids—For undergraduates; see 206 for description.
4 units, Win (Sinclair, Nix) MWF 10
and by arrangement

197. Rate Processes in Materials—(Formerly 152.) For undergraduates; see 207 for description. Prerequisites: 191, 192, and 194 (formerly 151).
4 units, Spr (Clemens) MWF 9
and by arrangement

198. Mechanical Properties of Materials—(Formerly 155.) For undergraduates; see 208 for description.
4 units, Spr (Nix) MWF 11
and by arrangement

199. Electronic Behavior of Materials—(Formerly 198.) For undergraduates; see 209 for description.
4 units, Spr (Bates) MWF 1:15
and by arrangement

200. Graduate Special Problems.
1-15 units, any quarter (Staff)
by arrangement

3 units, Aut (Barnett) MWF 11

3 units, Aut (Stevenson) TTh 10:30-11:45

203. Atomic Arrangements in Solids—(Formerly 180.) 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, Sinclair) MWF 10

3 units, Win (Barnett) MWF 9

3 units, Win (Hagstrom) MWF 1:15

3 units, Win (Sinclair, Nix) MWF 10

3 units, Spr (Clemens) MWF 9

208. Mechanical Properties of Materials—(Formerly 185.) 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—(Formerly 198.) 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) MWF 1:15

230. Materials Science Colloquium.

1 unit, Aut (Hagstrom) MWF 3:30
Win (White) F 3:30
Spr (Huggins) F 3:30

300. Research.

1-15 units, any quarter (Staff)
by arrangement

310. Electrochemistry and Corrosion—(Formerly 226.) Development of electrochemical principles with application to corrosion, electrolytic processes, and galvanic cells. Prerequisite: elementary thermodynamics.
given 1993-94

311. Solution Thermodynamics and Phase Equilibria—(Formerly 281.) Principles of phase equilibria, with application to binary and ternary systems. Relationships between phase diagrams, solution thermodynamics, and thermochemistry. Practical applications of phase diagrams.

3 units (Stevenson)
appearances

312. New Methods in Thin Film Synthesis—(Formerly 229.) Techniques to control the growth of 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 and research proposal writing.

3 units, Spr (Hagstrom, Smith) MWF 10

313. Synthesis and Processing of Ceramics—New methods of synthesis and processing of ceramic materials are described.

3 units, Aut (Huggins) MWF 1:15

314. The Science of Crystallization—(Formerly 201A,B.) 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 both bulk crystals and thin films.

3 units, Aut (Tiller) TTh 11-12:15

315. Polymer Physics—(Enroll in Chemical Engineering 233.)

3 units, Spr (Frank)
appearances

316. Polymer Chemistry—(Enroll in Chemical Engineering 234.)

3 units (Frank)
appearances

317. Statistical Thermodynamics—Systematic development of the methods of statistical mechanics, with application to problems in materials science. Prerequisite: 204 (formerly 181).

3 units (Staff) not given 1991-92


3 units (Sinclair)
appearances

321. Transmission Electron Microscopy—(Formerly 243.) 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 (formerly 180), or equivalent.

3 units, Aut (Sinclair) TTh 2:15-3:30
appearances, not given 1992-93

322. Transmission Electron Microscopy Laboratory—(Formerly 253.) 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. Prerequisite: 320 or 321.

2-3 units, Spr (Marshall) by arrangement

323. Thin Film and Interface Microanalysis—(Formerly 255.) 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, Win (Braumann) TTh 1:15-2:30

324. Surface Analytic Chemistry—(Enroll in Geology 310.)

3 units, Spr (Hochella) MW 10

325. X-Ray Diffraction—(Formerly 208.) 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. Prerequisite: 203 (formerly 180).

3 units, Aut (Clemens) MWF 10

326. X-Ray Diffraction Laboratory—(Formerly 325.) Advanced lab for x-ray diffraction techniques. Several experiments which evince concepts presented in 324 performed (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 are used.

3 units, Win (Clemens) TTh 10-11:15

331. Materials Considerations in Semiconductor Processing—(Formerly 210.) Emphasis on an atomistic understanding of the key processes involved in the synthesis of integrated circuits. Designed to help one think qualitatively and semi-quantitatively about the details of these processes. Topics: doping (diffusion and ion implantation), solid state regrowth and laser annealing, chemical vapor deposition and epitaxy, oxidation and nitridation, and defect generation during processing. Prerequisite: elementary thermodynamics and kinetics.

3 units, Spr (Huggins) TTh 10-11:15

332. Solid State Ionnics—(Formerly 232.) 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 (formerly 181) and Engineering 50, or equivalent.

3 units, Win (Huggins) TTh 8:30-9:45 alternate years, not given 1992-93

333. Amorphous Semiconductors—(Formerly 224.) Atomic bonds, electronic states, and structures; especially the covalent bond and tetrahedral coordination. Disordered potentials, electronic states, and energy-band tails in heavily doped crystals and amorphous materials; localized and extended states. Electron transport, mobility edges and gap. Optoelectronic properties, defects, instabilities and applications. Amorphous silicon as a prototype. Prerequisites: 205 and 209 (formerly 188) and knowledge of semiconductor physics.

3 units (Redfield)
alternate years, given 1992-93

334. Basic Physics for Solid State Electronics—(Formerly 218; enroll in Electrical Engineering 228.)

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

335A,B. Physics of Semiconductor Devices—(Formerly 228A,B; enroll in Electrical Engineering 328A,B.)

3 units, Win, Spr (Sigmon) MWF 3:15

337. Electrical and Magnetic Properties of Solids—(Formerly 231; enroll in Electrical Engineering 238.)

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

338. Fundamentals of the Detection of Optical Radiation: Materials and Processes—(Formerly 239.) 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 photodetector, 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., Hg1-xCdxTe for detection in the 3 µm to 5 µm and 8 µm to 12 µm atmosphere windows and GaAs and Si for detection of visible radiation. Prerequisites: 209 (formerly 188), or Electrical Engineering 216.

3 units (Bates)
alternate years, given 1992-93
340A,B. Basic Quantum Mechanics—(Formerly 259A,B; enroll in Electrical Engineering 322A,B.)
3 units, Aut, Win (White) MWF 1:15

342. The Electronic Structure of Surfaces and Interfaces—(Formerly 268; enroll in Electrical Engineering 329.)
3 units, Spr (Pianetta) TTh 9:30-10:45

343. The Science of Semiconductor Interfaces—(Formerly 278; enroll in Electrical Engineering 331.)
3 units, Spr (Helms) TTh 1:15-2:30

344. Solid-State Characterization Laboratory—(Formerly 302; enroll in Electrical Engineering 337.)
3 units, Aut, Win, Spr (Bates) by arrangement

345. Electronic Properties of Solid Materials—(Formerly 198.) Survey of electronic properties of metals, semiconductors, and insulators, emphasizing free electron models. Origin and properties of energy bands in crystalline solids, and applications to electronic transport in the presence of electric or magnetic fields or thermal gradients, and to optical properties. Prerequisites: 205 and 209 (formerly 188), or equivalent.
3 units, Aut (Bube) MWF 2:15
not given after 1991-92

346. Photoelectronic Properties of Solids—(Formerly 235.) Models of photoconductivity, recombination, steady-state, and transient methods for photoelectronic analysis of imperfections, Photo-Hall and photo-thermoelectric effects, polycrystalline materials and grain boundary effects, amorphous materials, superlattices. Prerequisites: 205 and 209 (formerly 188) or 345 (formerly 198).
3 units, Win (Bube) MWF 2:15
not given after 1991-92

3 units, Spr (White) TTh 1:15-2:30

350. Mechanics of Materials—(Formerly 203.) Elementary continuum mechanics, kinematics of stress and strain, Hooke’s law for isotropic and anisotropic solids, simple stress states, phenomenological plasticity. Prerequisite: 208 (formerly 185) or a course in strength of materials.
3 units (Barnett)
alternate years, given 1992-93

351. Strength and Microstructure—(Formerly 205.) 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—(Formerly 207A.) 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 1992-93

3 units, Aut (Nix) MWF 11
alternate years, not given 1992-93

354. Introduction to Fracture Mechanics—(Formerly 238; enroll in Mechanical Engineering 240A.)
3 units, Spr (Gao) TTh 10:45-12

355. Time-Dependent Plasticity—(Formerly 249.) 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 (formerly 185).

3 units, Aut (Nix)

alternate years, given 1992-93

356. Structural Fatigue—(Formerly 257; enroll in Mechanical Engineering 245.)

3 units (Nelson)

alternate years, given 1992-93


3 units, Win (Nix) MWF 11

alternate years, not given 1992-93

358. Aerospace Structural Materials—Current research and development of structural materials in the aerospace industry. Processing and properties of these advanced materials for various applications (Al-Li alloys, high temperature aluminum, refractory metal alloys, superalloys, intermetallics and metal-matrix and ceramic-matrix composites.) Development philosophy (e.g., weight saving, strengthening and toughening), and the potential commercial applications. Prerequisite: 208 (formerly 185) or 351 (formerly 205).

2 units, Spr (Nieh) MW 8

400. Participation in Materials Science Teaching—(Formerly 310.)

1-3 units, Aut, Win, Spr (Staff)

by arrangement

401. Seminar in Mechanical Properties of Solids—(Formerly 341.)

1 unit, Aut, Win, Spr (Nix) T 4

402. Seminar in Solid-State Electrochemistry—(Formerly 342.)

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

403. Photoelectronic Materials and Devices Seminar—(Formerly 343.)

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

404. Seminar in Solid State Chemistry—(Formerly 345.)

1 unit, Aut, Win, Spr (Stevenson)

F 2:15-3:05

405. Seminar in Applications of Transmission Electron Microscopy—(Formerly 346.)

1 unit, Aut, Win, Spr (Sinclair)

by arrangement

406. Seminar in Thin Film Science and Technology—(Formerly 347.)

1 unit, Aut (Clemens) W 4

Win (Hagstrom) W 4


1 unit, Aut (White) Th 4:15

MECHANICAL ENGINEERING


Chair: William C. Reynolds

Associate Chair: John K. Eaton


Laboratory Directors: David Beach (Program Director, Manufacturing Systems Engineering and Mechanical Engineering Student Shops), Mark Cutkosky (Manufacturing Sciences Lab), 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 Rehabilitation R & D Center), Parviz Moin (Center for Turbulence Research)


Associate Professors: Mark Cutkosky, Rolf A. Faste, David Kelley, Reginald E. Mitchell, M. Godfrey Mungal, Drew V. Nelson, Juan Simo

Assistant Professors: Mark Cappelli, Huajian Gao, Sanjiva Lele, Stephen J. Niksa, Sheri D. Sheppard

Professors (Research): Dean R. Chapman, Felix E. Zajac

Professor (Teaching): David W. Beach

Courtesy Professors: Leslie J. Dorfman, Vincent R. Hentz, George S. Springer, Robert L. Street
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, 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 very important. Both undergraduate and graduate programs provide excellent technical background for work in environmental pollution control, transportation, ocean engineering, 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 laboratories, shops, and offices. The Applied Mechanics Division covers dynamics, mechanics of deformable solids, fracture mechanics, fluid dynamics, and experimental and computational mechanics.

Design Division emphasizes the design process and is specifically concerned with manufacturing technology, automatic control, robotics, kinematics, fatigue and fracture mechanics, experimental stress analysis, finite element analysis, optimization, design aesthetics, design research, human factors, biomechanics, rehabilitation engineering, computer-aided design, microcomputers in design, and design research. 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.

Thermosciences Division offers courses and specialized work in applied thermodynamics, energy systems, combustion, fluid mechanics, heat transfer, plasma sciences, nuclear energy, 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 original theoretical, computational, and experimental investigations in the strength and deformability of elastic and inelastic elements of machines and structures; fracture mechanics, vibrations, and nonlinear dynamics; analysis, synthesis, and control of systems; flow dynamics of liquids and gases, including geophysical and astrophysical applications; and biomechanics.

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 includes presses, autoclave, and filament winder. X-ray, ultrasound, and an electron microscope are available for nondestructive testing. The lab also has mechanical testers, environmental chambers, and a high speed impactor. Lab projects include design of composite structures, evaluation of environmental effects on composites, and development of novel manufacturing processes.

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, 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 electrohydrostatic materials test systems, are available in the School of Engineering Structures and the Solid Mechanics Research Laboratory. Laboratories in bio- and rehabilitation-engineering are available through the School of Medicine and the Palo Alto Veterans Affairs Medical Center.

The division also maintains student model shops which include machine tools, CAD/CAM, foundry, welding, wood, and plastics facilities. 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 a Center for Turbulence Research (CTR). The Thermosciences Laboratory is equipped with representative power, fluid handling, refrigeration, and heat and mass transfer equipment, and extensive special facilities for advanced graduate research in convective heat transfer and fluid mechanics, turbulence, internal combustion engine research, and other work relevant to energy systems conducted by the Heat Transfer and Turbulence Mechanics (HTTM) group. The High Temperature Gasdynamics Laboratory (HTGL) is engaged in research activities in plasma sciences, magnetohydrodynamics (MHD) for energy conversion, laser chemistry and processing, combustion, chemistry of pollutant formation, and development of laser-based diagnostics for high temperature gases. The experimental capability of the HTGL includes a variety of plasma facilities for plasma disposition and processors, normal and superconducting magnets, three shock tubes, several advanced laser systems, diagnostic devices for combustion gases and plasmas, dedicated minicomputers, a central laboratory computer (VAX-750), and laboratory combustors, including a coal combustion facility and supersonic combustion facilities. A wide variety of instrumentation, extensive shop facilities, utilities, and research space 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-XMP, CRAY-2, and CDC CYBER 205 computers.

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, VTSS, engineering fundamentals, and engineering depth) must be taken for a letter grade if the instructor offers the option.
An individually designed major in Biomechanical Engineering (B.S.E.: Biomechanical Engineering) is offered and may be appropriate for some students preparing for medical school or graduate bioengineering studies. Information and course suggestions are available from the ME Student Services office.

Grade Requirements—To be recommended by the department for a B.S. in Mechanical Engineering, a student must achieve the minimum letter grade indicator (LGI) set by the School of Engineering (2.0 in engineering fundamentals and engineering depth).

COTERMINAL B.S./M.S. PROGRAM

Stanford undergraduates who wish to continue their studies for the Master of Science degree in the 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 Mechanical Engineering 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 (for example, fluid mechanics, applied thermodynamics, applied 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 rigid and elastic body mechanics, materials, fluid mechanics, thermodynamics, heat transfer, nuclear reactor engineering, magnetohydrodynamics, biomechanics, and systems engineering, 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: partial differential equations, linear algebra, complex variables, or numerical analysis 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 advisers 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.

3. Approved Electives (to bring the total number of units to 39): all these units must have adviser approval. Graduate engineering, math, and science courses are normally approved, and upper-level undergraduate courses may be approved if consistent with the student's objectives. Of the 39 units, no more than 6 may come from ME 291 and 292, and no more than 3 may come from the other courses numbered 290-299 or other seminars. Students planning a Ph.D. degree should discuss with their adviser the desirability of taking 291 or 292 during the master's year.

4. Unrestricted Electives (to bring the total number of units 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>Total</td>
<td>45</td>
</tr>
</tbody>
</table>

* Taken jointly each quarter.
** Students are expected to create a plan of graduate studies suited to their personal needs. The courses listed below are recommended electives and may require enrollment approval by the instructor.

GRADUATE DESIGN OPTIONS

Biomedical Design
ME 281A,B,C. Orthopedic Biomechanics
ME 284. Dynamics of Viscous Fluids and Suspensions
ME 285. Biomechanical Fluid Mechanics

Computers in Design
ME 212A,B. Geometric Modeling
ME 218A,B,C. Smart Product Design

Design Management
Indust. Engr. 133. Industrial Accounting
Indust. Engr. 269. Industrial Marketing
Indust. Engr. 271. New Enterprise Management
MANUFACTURING ENGINEERING SYSTEMS

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. Automation and Machine Design
ME 217A,B,C. Design for Manufacturability
ME 218A,B,C. Smart Product Design
ME 313. Ambidextrous Thinking
ME 319. Robotic and Vision Systems

The engineering management subjects include:

Indust. Engr. 211. 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 bioengineering 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 bioengineering 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 the Graduate Division Special Program.

ENGINEERING

As described in the “School of Engineering” section of this bulletin, each department in the school may sponsor students in a more general degree, the M.S. in Engineering. Sponsorship by the Department of Mechanical Engineering (ME) requires (1) filing 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 prerequisites.

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, at least tentatively, 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 regular channels for admission to the M.D. program and satisfactorily complete 204 units in courses and clerkships approved for credit toward the M.D. degree. Of these, 72 quarter units must be in clerkships. For further information on the M.D. program, consult the 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 Technology

**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.)

lated to course material. Limited enrollment Spring Quarter. When possible, register for Winter Quarter. Prerequisites: Engineering 10 and 30. Recommended: concurrent Engineering 12.

4 units, Win (Staff) MWF 10  
Spr (Mungal) MWF 11  
lab MTWTh 1:15-3:05 or 3:15-5:05, or one 2-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 laboratory projects. Weekly demonstrations. Prerequisite: Engineering 40.

3 units (Eaton) given 1992-93

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. Final paper on history, function, and effect product had on society. Prerequisite: keen sense of curiosity.

3 units, Aut (Sheppard) MW 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, Strum-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 enroll in 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. Recommended: 101, Engineering 11.

4 units, Aut, Win (Beach) TTh 9-11  
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 (Nelson) MW 1:15-2:40

112. Mechanical Systems—Emphasizes quantitative 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 term projects apply principles developed to the quantitative design on paper of a complete
Mechanical system to meet specified functional goals. Co- or prerequisites: 103, 111.

3 units, Win (Staff) TTh 1:15-2:40

113. Engineering Design—Application of information from various sources to create tangible objects and intangible system concepts to improve the quality of human life. 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 (Cutkosky, Sheppard) MW 1:15-3:05

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 (Shubert) MW 1:15-3:05

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 (Staff) MW 1:15-3:05

115C. Design Sketching—Freehand sketching, rendering, and design development. Work is guided by instructor. Concurrent assignments in 115 and 116 series provide subject matter, but the class is open to anyone wishing to improve free-hand drawing skills.

1 unit, any quarter (Staff) one evening weekly

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 (Moggridge, Kelley) TTh 9-12

116B. Advanced Product Design—Need identification by means of various strategies: technology push, market pull, design history, societal trends, self-awareness. The role of perception and personal values in problem definition and entrepreneurship. Students identify a project area to be pursued as a thesis in 116C.

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. Prerequisites: 116B.

3 units, Spr (Burnett, Boyle) TTh 11-1:05


4 units, Aut (Katz) MW 2:15-4:05

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.

3 units, Spr (DeBra, Beach) TTh 9 lab by arrangement

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 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 (Cappelli) MWF 10 lab one afternoon by arrangement

131B. Fluid Mechanics—Continuation of 131A.

3 units, Win (Mungal) MWF 10

131C. Thermosciences—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, 131 A, and Engineering 30.

3 units, Win, Spr (Staff) lecture T 9
labs 4 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. Several sessions devoted to demonstrations and practical examples. Assumes a background in dynamics and math.

Prerequisites: Engineering 12, Math. 43, or equivalent. Recommended: Math. 113 and Engineering 40, or equivalent (can be taken concurrently).

4 units, Aut (Cutkosky) 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 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 (Ferziger) 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 (Niksa) MWF 9


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

201. Applications of Complex Variables—Theory of analytic functions, with applications to evaluation of definite integrals by contour integration, solution of physical problems by conformal mapping, and solution of partial differential equations by means of integral transforms. Knowledge of the algebra of complex numbers
and the derivative of a complex function is assumed.

3 units, Win (Van Dyke) MWF 11


203. Perturbation and Asymptotic Methods with Applications—(Enroll in Math. 270.)


3 units, Aut (Staff)

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, Win (Cantwell) MWF 10

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, Spr (Van Dyke) MWF 10

208. Vector and Tensor Analysis—(Enroll in Aeronautics and Astronautics 192.)

DESIGN AND CONTROLS

209. Aesthetics of Machinery—Effects of design strategy selection, design media, construction and assembly strategies, human factors, and explicit or intuitive personal criteria on the appearance of machinery and designed objects. Students explore these issues and develop an awareness of their personal design style through design and construction of small-scale mechanical devices. Enrollment limited to 15; consent of instructor required.

1-3 units (Faste) alternate years, given 1992-93

210A. Automation and Machine 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 student 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 advisers. Project content may include: mechanism design, automation design, manufacturing process design, consumer product, and biomedical device design. Students wishing to integrate microcomputer technology, sensors, and automatic control theory should enroll in both 210 and 218. Students may exit the 210 series only at the end of 210A.

4 units, Aut (Leifer, Staff) TTh 3:15-5:05

210B. Automation and Machine 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, assembly, test, service, cost, and human factors. Incremental test/assessment development cycles are supported by the design lab's CAD, simulation, and physical prototyping facilities.

4 units, Win (Leifer, Staff) TTh 3:15-5:05

210C. Automation and Machine 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 prevails throughout 210C and climaxes at the Design Affiliates Symposium where projects are formally presented to an industrial audience.

4 units, Spr (Leifer, Staff) 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. First quarter: rational and intuitive problem-finding procedures to identify design projects within an unexplored area of need. Second quarter: explore concepts, perform necessary experiments and research, and construct a working prototype. Third quarter: refine and finalize the design. A demon-
stration model is built and presented to a professional jury. Corequisite: concurrent Art 360.

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, Sun (Wilde) MWF 10

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, Spr (Larkin) MW 10

lab by arrangement

214. Quality and the Products of Technology—Dimensions of product quality studied 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) MW 11-1

215. The Designer in Society—Participants’ career objectives and psychological orientation are compared with existing social values and conditions. Emphasis on assisting individuals in assessing their roles in society. Readings on political, social, and humanistic thought related to technology and design. Term project. Limited enrollment; open to graduate students of all disciplines. Mandatory class attendance.

3 units, Win (Roth) W 1:15-4:05


3 units, Spr (Wilde) MWF 10

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, Aut (Barkan) 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, Win (Barkan) TTh 8-9:15

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.

4 units, Aut (Staff) 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 (Staff) 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 through 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 (Staff) TTh 1:15-3:15

219A. Introduction to Robotic Manipulation—(Enroll in Computer Science 327A.) Basics and a review of current applications. Topics: kinematic structure, coordinate transformations, manipulator solutions, workspace, path selection, control and dynamics, and programming. Recommended: knowledge of matrix algebra and some familiarity with basic control theory and rigid body mechanics.

3 units, Win (Khatib) MWF 2:15

219B. Introduction to Computer Vision—(Enroll in Computer Science 327B.)

219C. Advanced Robotic Manipulation—(Enroll in Computer Science 327C.)

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, Win (Adler) T 10:15-12

221. Human Factors—Design of man-machine systems and analysis emphasizing considerations involving considerations of human anatomy, sensory acuity, strength and effort capability, and decision-making skills. Man-machine interface issues addressed in the form of design projects.

3 units, Win (Verplank) MW 4:15-6:05

222. Kinematic Synthesis of Mechanisms—The rational design of linkages. The problem of determining linkage proportions to fulfill various design requirements is treated analytically. Topics: three- and two-dimensional displacements and motions, the theory of higher plane curves, higher-order path-curvature analysis, circle and center-point theory.

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

224. Advanced Manufacturing Automation—For students who have some familiarity with controls and manufacturing, are interested in manufacturing research, and are familiar with solid mechanics. Discussion of the underlying physics of manufacturing processes. Sensor-driven flexible manufacturing. Basic issues and the unit process level; the acquisition and interpretation of sensory data, adaptive control, machine learning, in-process inspection, spatial reasoning, and integration with CAD. Enrollment limited to 15. Prerequisites: 219A or experience with automated equipment, and a basic understanding of control systems, solid mechanics, and manufacturing methods.

3 units, Win (Cutkosky) TTh by arrangement

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.)

227B. Dynamic Games—(Enroll in Aeronautics and Astronautics 278C.)

228. Advanced Robotic Manipulation—(Enroll in Computer Science 327C.)


3 units, Spr (DeBra) by arrangement

MECHANICS OF SOLIDS

230. Advanced Kinematics—Kinematics from mathematical and engineering viewpoints. Introduction to algebraic geometry. Application of matrix, tensor, and dual-quaternion methods to kinematic analysis and synthesis. Students must prepare reports on problems in kinematics.

3 units, Win (Roth) M 2:15-4:45

204 SCHOOL OF ENGINEERING

ear velocities. Inertia scalars, vectors, matrices, and dyadics; principal moments of inertia.

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


3 units, Spr (Kane) 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 (Kane) given 1992-93


3 units (Kane) given 1992-93


3 units (Hughes) given 1992-93

234B. Finite Element Methods in Fluid Mechanics—Continuation of 234A.

3 units (Hughes) given 1992-93

234C. Finite Element Methods in Fluid Mechanics—Continuation of 234B.

3 units (Hughes) given 1992-93


3 units, Aut (Simo) TTh 2:45-4


3 units, Win (Simo) TTh 2:45-4


3 units, Spr (Simo) 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, Win (Kettel)

237. Free and Forced Motion of Structures—
(Enroll in Aeronautics and Astronautics 244A.)

238A. Introduction to Continuum Mechanics—
Basic kinematics of continuum deformation. Stress, strain, strain rate, and constitutive relations. Thermodynamics and energy principles. Applications to deformation of solids and fluids. Prerequisites: Engineering 11, Math. 130, or equivalent.

3 units, Aut (Gao) MWF 10


3 units, Win (Gao) MWF 10


3 units (Simo) given 1992-93


3 units (Staff) given 1992-93


3 units (Simo) given 1992-93

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 micro-mechanisms of fracture. Prerequisite: 238A or equivalent.

3 units, Spr (Gao) TTh 10:45-12

240B. Advanced Fracture Mechanics—
Continuation of 240A. Three-dimensional crack analysis; interfacial cracks; viscoelastic crack analysis; numerical methods in fracture mechanics; crack interactions with other material defects such as dislocations and inclusions. Applications of fracture mechanics to composite materials. Prerequisite: 240A.

3 units (Gao) given 1992-93

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 (Steele) MWF 3:15

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 sur-
faces; hyperbolic paraboloids. Prerequisite: 111 or Civil Engineering 114.

3 units, Win (Steele) MWF 1:15


3 units, Spr (Steele) given 1992-93


3 units, Spr (Steele) TTh 1:15-2:30


3 units (Staff) given 1992-93


3 units, Win (Springer)


3 units (Nelson) given 1992-93

246. Atmospheric and Space Physics—(Same as Aeronautics and Astronautics 227.) Introduction to geophysics and astronomy emphasizing conditions in solar and planetary atmospheres, inter-planetary space, and on 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, photosphere, chromosphere, corona of the Sun, and 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 solar wind with Earth and other objects in the solar system.

3 units, Aut (Spreiter) TTh 2:45-4

247A. Strength and Microstructure—(Enroll in Materials Science and Engineering 351.)


3 units, Spr (Nelson) M 2:15-5:05

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 (Moffat) TTh 8-9:15
251A. Fluid Mechanics—Exact and approximate analysis of fluid flow covering kinematics, global and differential equations of mass conservation, momentum, and energy. Forces and stresses in fluids. Euler's equations and the Bernoulli Theorem are generated for, and applied to, inviscid flows. Flows of simple viscous fluids using the Navier-Stokes equations. Boundary layer (thin shear) layer approximation. Solutions for some flows obtained by analytical and numerical methods examined. Prerequisite: graduate standing.

3 units, Aut (Eaton) MWF 8

251B. Fluid Mechanics—Laminar and turbulent flow, emphasizing thin shear layers and introducing inviscid, irrotational flows. Topics: exact solutions for viscous flows; creeping flow. Boundary layer separation, boundary layer stability, transition to turbulence. Reynolds averaged Navier-Stokes equations. Introduction to bounded and free turbulent shear layers and some approximate methods of solution. Conditions for irrotational flow; stream function and velocity potential in exact and approximate solutions, superposition of solutions, complex potential function, circulation and lift. Examples from internal flows including ducts, nozzles, diffusers, and turbomachinery blading. Prerequisite: 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) MWF 10


3 units (Staff)

253. Radiative Heat Transfer—Fundamentals of radiation heat transfer; analysis of gray-body and wavelength dependent systems; 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) MTWF 10 plus one 4-hour lab


3 units, Aut (Bowman) MWF 1:15

256. Fluid Dynamics of Turbomachinery—Operation, theory, and elements of design of turbines, bladed pumps and compressors, windmills, propellers, and other machines that perform by the dynamic interaction of a moving fluid with a bladed rotor. Emphasis on the problem of efficient exchange of energy between the fluid stream and the mechanical elements of the machine. Prerequisites: 251A and 255, or equivalents.

3 units (Johnston)

259A. Numerical Methods in Fluid Mechanics—(Enroll in Aeronautics and Astronautics 214A.)

259B. Numerical Computation of Compressible Flow—(Enroll in Aeronautics and Astronautics 214B.)

259C. Numerical Computation of Viscous Flow—(Enroll in Aeronautics and Astronautics 214C.)
260. Geophysical Fluid Dynamics—Introduction to fluid flow and wave phenomena in the atmosphere, oceans, and interior of the Earth, in interplanetary space, and in the solar atmosphere. Effects of rotation, stratification, gravity, and electromagnetic forces. Application to general circulation, mountain lee waves, and Rossby waves in the atmosphere, surface and internal gravity waves and wind-driven circulation of the oceans, hydromagnetic dynamo processes in the liquid core, and solar wind flow and waves in interplanetary space. Prerequisite: 258 or equivalent.

3 units, Spr. (Spriter) MW 3:15-4:30


3 units, Aut. (Reynolds) MWF 3:15

261B. Analytical Methods for Turbulent Flows—The analytical framework of homogeneous turbulence, turbulent transport, rational modeling of turbulence in flows of engineering interest, zonal models for turbulent flows and sub-grid scale and near-wall modeling for large eddy simulation. Prerequisites: 261A, plus a graduate sequence in fluid mechanics.

3 units, Spr. (Bradshaw) MWF 3:15

262A. Physical Gas Dynamics—Concepts and techniques for description of high-temperature and chemically reacting gases from a molecular point of view. Introductory kinetic theory, chemical thermodynamics, and statistical mechanics as applied to properties of gases and gas mixtures. Transport and thermodynamic properties, law of mass action, and equilibrium chemical composition. Maxwellian and Boltzmann distributions of velocity and molecular energy. Examples and applications from areas of current interest, such as combustion and gas radiation.

3 units, Aut. (Niksa) MWF 9


3 units (Hanson) alternate years, given 1992-93

263. Partially Ionized Plasmas and Gas Discharges—Introduction to partially ionized gases and the nature of gas discharges. Topics: fundamentals of plasma physics emphasizing collisional and radiative processes, equilibrium and non-equilibrium plasmas; plasma diagnostics, application to energy conversion devices, and materials processing.

3 units, Spr. (Cappelli) MW 3:15

264. Optical Diagnostics and Spectroscopy—Introduction to spectroscopy of gases and laser-based diagnostic techniques for measurements of species concentrations, temperature, density, velocity, and other flowfield properties. Topics: electronic, vibrational, and rotational transitions; spectral lineshapes and broadening mechanisms; absorption, fluorescence, Rayleigh and Raman scattering methods; collisional quenching. Prerequisite: 262A or equivalent.

3 units, Win. (Hanson) MWF 11 alternate years, not given 1992-93


4 units, Spr. (Hanson) MWF 10 one 3-hour lab by arrangement

268. Experimental Methods in the Thermosciences—Planning experimental programs, uncertainty analysis, and selection of instrument systems. Steady-state measurements of heat flux, temperature, pressure, and flow rate. Mean-velocity and mean-temperature measurements in boundary layers. Advanced lab problems in heat transfer and fluid dynamics. Prerequisites: at least one graduate course each in heat transfer and fluid mechanics, or consent of instructor.

4 units, Spr. (Moffat) MWF 10 one 4-hour lab by arrangement


3 units, Spr. (Ferziger) MWF 2:15 alternate years, not given 1992-93
270. Engineering Thermodynamics—Thermodynamic analysis of engineering systems emphasizing systematic methodology for application of basic principles. Introduction to availability analysis. Thermodynamics of gas mixtures and reacting systems. Use of modern computational equations of state. Thermodynamics of condensed phases. Prerequisites: undergraduate background in engineering thermodynamics and computer skills.

3 units, Aut (Reynolds) MWF 8

271. Combustion and Pollution—Heat of reaction, adiabatic flame temperature, and chemical composition of products of combustion; production of pollutants in combustion systems; kinetics of chain branching; conservation equations for multi-component reacting flows; explosions, fuel oxidation; propagation and structure of laminar premixed flames; detonations. Prerequisite: 262A or 270, or consent of instructor.

3 units, Win (Bowman) MWF 2:15

272. Advanced Combustion—The role of chemical and physical processes in combustion; ignition, flammability, and quenching of combustible gas mixtures; flame stabilization; laminar and turbulent diffusion in flames; combustion of fuel droplets and sprays; combustion of coal. Prerequisite: 271 or consent of instructor.

3 units, Spr (Bowman) MWF 11

274. Introductory Hypersonic Aerophysics—(Enroll in Aeronautics and Astronautics 212.)

BIOMECHANICS

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

1 unit, Aut, Win, Spr (Carter) T 4:15


3 units, Aut (Carter) MW 3:15-4:30

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, spine fractures, and osteoarthritis. Limited enrollment. Prerequisite: 281A.

3 units, Win (Carter) W 7:15-8:15

WF 3:15-4:30

281C. Musculoskeletal Biomechanics-III—(Continuation of 281B.) Limited enrollment.

3 units, Spr (Carter) W 7:15-8:15

MF 3:15-4:30

284. Dynamics of Viscous Fluids and Suspensions—(Enroll in Aeronautics and Astronautics 209.)

285. Biomedical Fluid Mechanics—(Enroll in Aeronautics and Astronautics 229.)

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

293. Innovation—(Enroll in VTSS 166.) The nature, processes, and management of research and development in industrial societies. Socio-technical systems as the physical bases of society. Creation of abundant societies and rise of R&D in final quarter of 19th century in the U.S. and Germany. Conventional linear model and improved chain-linked model. Comparison of scientific (reductionist) view with the consistent view needed in innovation; operational consequences. Japanese and U.S. styles of innovation and their cultural bases. Modes of institutionalizing R&D. Barriers to innovation and countervailing forces. Revolutionary and evolutionary innovation in small and large companies. Effects of management style on the development of group cooperation. Effects of industry and of product life cycle.
Government role in innovation. Limited enrollment.

3 units, Win (Kline) TTh 1:15-3:05

294A, B. Design Forum—Invited speakers address issues of interest to designers. Brief presentation followed by open discussion.
1 unit, Aut, Win (Staff) F 3:15

294C. Craftsmanship Forum—Guest craftsmen make presentations exploring the romance of technology and the relationship between craftsmanship and design. Diverse presentations have included musical instrument building, microsurgery, historical machinery, pipe organ construction and voicing, and blacksmithing.
1 unit, Spr (Freund) F 3:15

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, Simo) Th 4:15-5:30

1 unit, Aut, Win, Spr (Beach) F 2-3

297. Design Theory and Methodology Forum—A mixture of research reports, literature reviews, and guest speakers promotes vigorous examinations of the cognitive basis for designer behavior and design tool specification.
1 unit, Aut, Win, Spr (Leifer) W 4:15-5:30

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

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) MW 11-12:15

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, Spr (Sheppard) WF 3:15-4:30

313. Ambidextrous Thinking—Visual and kinesthetic thinking skills developed and exercised in the context of solving design problems. Quickly executed perspective, orthographic, diagrammatic, and three-dimensional sketches emphasized. Exercises to appreciate and develop the entire body's role in creative thinking. Emphasis on fluent and flexible idea production.
3 units, Aut (Paste) lecture/lab MW 3:15-5:10

315A, B. Integrated Design, Manufacturing, and Marketing—(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 for both quarters.

3 units, Aut, Win (Beach, Lovejoy, Srinivasan) WF 1:20-3:05, lab by arrangement

319. Robotic and Vision Systems—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, Spr (Cutkosky) TTh 6-7:30 p.m.


3 units (Barnett, Gao) given 1992-93

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, Aut (Lele) TTh 11


3 units, Win (Lele) TTh 11

351C. Advanced Fluid Mechanics—Special topics change for each offering. Compressibility effects in viscous flows, effects of rotation, stratification and buoyancy, modern concepts in nonlinear 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. Prerequisite: graduate-level courses in compressible flow and viscous flow.

3 units, Spr (Moin) TTh 11

OPERATIONS RESEARCH

Emeritus: Kenneth J. Arrow, George B. Dantzig
Chair: Richard W. Cottle
Associate Professor: Peter W. Glynn
Professors (Research): Walter Murray, Michael A. Saunders
Consulting Professors: Alan J. Hoffman, Stepan Karmardian, Gerald S. Shedler
Consulting Associate Professors: Austin J. Lemoine, 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 Division 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 socioeconomic 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 life-long 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:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp. Sci. 106A or 105A, or 106X Computer Programming</td>
<td>3*</td>
</tr>
<tr>
<td>Math. 103. Matrix Theory and its Applications OR 241. Linear Programming</td>
<td>3*</td>
</tr>
<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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<td>OR 251. Probability Models in Operations Research</td>
<td>3</td>
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<td>OR 252. Stochastic Models in</td>
<td>3</td>
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<tr>
<td>Operations Research</td>
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<td>OR 253. Simulation</td>
<td>3</td>
</tr>
<tr>
<td>OR 281. Cases in Operations Research</td>
<td>3</td>
</tr>
<tr>
<td>OR 282. Projects in Operations Research</td>
<td>3</td>
</tr>
</tbody>
</table>
OPERATIONS RESEARCH 213

Stat. 116. Theory of Probability 3*
Stat. 200. Introduction to Statistical Inference 3
Stat. 217. Introduction to Stochastic Processes 3
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 12

Total.................................................. 45

* 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 advisors for qualified students in the Ph.D. program, the availability of thesis supervisors for the Engineer degree is very limited. Therefore, before being permitted by the department to continue study after the M.S. degree, the student must have personally arranged for a faculty sponsor for thesis supervision and, if financial support is needed, for a research assistantship for the thesis project. These arrangements are then subject to the approval of the department's Admissions and Financial Aid Committee.

The University's basic requirements for the Engineer degree are outlined in the "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 in their program at Stanford.

2. Requirements in Operations Research: at least five of the courses in Group 1 (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, 349, 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 examined on their selection of three of the following courses: 340, 341, 342 or 348, and 345. Similarly, for the second examination, students select three of the following courses: 351, 355, 356, 359.

A student performing satisfactorily in the Ph.D. program normally is eligible to receive a
M.S. in Operations Research, if desired, after completing 45 units of course work.

Ph.D. MINOR

Doctoral students in other departments may obtain a minor in Operations Research by completing 20 units of 200 or higher-level courses in the department with an average letter grade indicator (LGI) of 3.0 or higher. The courses normally include OR 241, 243, 251, and 253 or approved substitutes.

FELLOWSHIPS AND ASSISTANTSHIPS

Financial aid is available on a competitive basis for qualified doctoral candidates. This includes a number of fellowships as well as some research assistantships supported by departmental research grants and contracts. Although these research assistants work closely with the faculty on their research projects, they usually are able to take close to a full course load. Supplementary financial aid can sometimes be obtained by grading, assisting in special projects, or from University loans.

All applicants for financial assistance must take the General Test and the Subject Test (in a field of the applicant's choosing) of the Graduate Record Examination.

Applications for fellowships and assistantships should be made to the Graduate Admissions Office by February 15.

COURSES

PRIMARILY FOR UNDERGRADUATES

50/150. Models and Applications of Operations Research in Society—(Graduate students register for 150.) Intended for students in the social sciences or pre-engineering desiring a broad introduction to the potential role of operations research in modern society. Analysis of important socioeconomic problems by methods of operations research. Problem areas drawn from energy, environment, health, and urban planning. Term paper required for 150. Prerequisite: high school algebra. DR:4(6) or DR:6(8)

3 units, Spr (Lieberman) MW 4:15-5:30

Sum (Staff) TTh 1:15-3:15

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, nonlinear programming, and integer programming. Applications 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 (Manne) MWF 1:20-2:05

Spr (Hillier) MWF 1:20-2:05


4 units, Win (Iglehart) MTWTh 1:15

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

150. 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, Win (Glynn) TTh 2:15-3:30

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.

241. Linear Programming—Linear programming emphasizing standard model formulation, fundamental theorems, variations of the simplex method, and parametric programming. GAMS/MINOS software is used. Corequisite: Math. 103.

3 units, Aut (Cottle) TTh 1:15-2:30

Sum (Staff) TTh 1:15-3

242. Network Programming—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 (GAMS/MINOS). Corequisite: 241 or equivalent.

3 units, Aut (Eaves) TTh 2:45-4

3 units, Win (Eaves) MW 8:30-9:45

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


3 units, Win (Manne) TTh 9:30-10:45

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 (Lieberman) TTh 9:30-10:45

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 (Iglehart) TTh 9:30-10:45

253. Simulation—(Doctoral students register for 353.) Generation of uniform and non-uniform 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: a working knowledge of FORTRAN, or PASCAL; Statistics 217 or equivalent.

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

254. Projects in Operations Research—(Ph.D. students enroll in 382.) Integrates (and enhances) 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.

3 units, Win (Dantzig) TTh 2:45-4:15

258. Case Studies in Operations Research—(Ph.D. students enroll in 381.) Integrates (and enhances) 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: 251 and consent of instructor.

3 units, Win (Savage) by arrangement

259. 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 application aspects of the field. Formulation of standard linear programming models. Alternative techniques for solving linear programs. Theory of polyhedral convex sets, linear inequalities, alternative theorems, and duality. Variants of the simplex method, dual simplex method, product form of the inverse. Upper bounding, sensitivity analysis, economic interpretations. Large-scale linear programming, decomposition principles. Prerequisite: Math. 113 or consent of instructor.

4 units, Aut (Dantzig) TTh 1:15-2:30
lab 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—Theory, algorithms, and applications of network optimization. Shortest paths, maximum flows, minimum-cost flows. Spanning trees. Heaps. Intractable problems and heuristics. Applications to project planning, open-pit mining, production, planning, transportation, distribution, capacity planning. 3 units (Staff) not given 1991-92

346. Mathematical Programming Computation—(Same as 246.)

3 units, Sum (Staff) MW 3:15-5

347. Sectoral and Economywide Modeling—(Same as 247.)

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

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, alternate years, given 1992-93

349. Combinatorial Optimization—(Same as Computer Science 363.) Algorithms for optimization of combinatorial structures. Topics: maximum flows, minimum-cost flows, bipartite matching and assignment problem, general matching, stable marriage, polynomial-time algorithms for linear programming and approximation algorithms for NP-hard problems. Emphasis on recent developments in the field. Prerequisite: Computer Science 161 or 264, or equivalent.

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


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

353. Simulation—(Same as 253.)

3 units, Spr (Glynn) TTh 11-12:15
Sum (Staff) MW 1:15-3


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

3 units, Aut (Veinott) TTh 11-12:15

358. **Queueing Theory**—Advanced nonmeasure theoretic course on the foundation of queueing theory. Topics: Markovian queues, embedded Markov chains, general single server queue and random walk theory, limit theorems for average values and extreme values of waiting times, queueing networks, multiple channel queues in heavy traffic, and diffusion approximations. Prerequisite: 359.

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


3 units, Win (Iglehart) TTh 9:30-10:45


5 units, not given 1991-92

366. **Interdisciplinary Seminar on Conflict Resolution**—(Same as Business 694, Economics 386, Law 325, Psychology 283.) Addresses problems of decision making, risk analysis, conflict resolution and negotiation from normative and descriptive perspectives.

1-2 units, Win (Arrow, Mnookin, Ross, A. Tversky, Wilson) T 4-6

367. **Welfare Economics**—(Same as Economics 280.) Social choice theory; optimal mechanism design; welfare measurement and identification using hedonic price methods. Analysis of constrained second best.

5 units, Win (Hammond)

369. **Interdisciplinary Workshop in Risk Management**—(Same as Economics 388.) Examines a number of current issues in risk management from an organizational perspective. Speakers from engineering, economics, law, medicine, and business; also risk management private consultants.

1 unit (Arrow, Lieberman)
not given 1991-92

371. **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, Spr (Dantzig) by arrangement

375. **Lattice Programming**—Theory and applications of lattice programming. This qualitative theory of optimization and equilibria predicts the direction of change of optimal and equilibrium decisions resulting from changes in exogenous parameters without computation or data collection. Representation of sublattices and subsemilattices. Quasisublattices. Monotone selections from and fixed points of point-to-set mappings. Least elements. Existence and monotonicity of minima of sub* functions in parameters. Substitutes and complements in network flows. Polynomial-time algorithms. Applications to inventory management, transportation, dynamic programs, integer programs, statistical decisions, best approximation, and cooperative and noncooperative games.

3 units, Win (Veinott) by arrangement

381. **Case Studies in Operations Research**—(Same as 281.)

3 units, Win (Dantzig) TTh 2:45-4:15

382. **Projects in Operations Research**—(Same as 282.)

3 units, Spr (Manne) MW 9-10:15

399. **Research**—Research in department.
any quarter (Staff) by arrangement
SCIENTIFIC COMPUTING AND COMPUTATIONAL MATHEMATICS PROGRAM

Core Faculty: Gene Golub (Computer Science), Joseph B. Keller (Mathematics), Joseph Oliger (Computer Science)

Associate Faculty: Khalid Aziz (Petroleum Engineering), Robert Dutton (Electrical Engineering), George M. Homsy (Chemical Engineering), Thomas J. Hughes (Mechanical Engineering), Thomas Kailath (Electrical Engineering)

Affiliated Faculty: S. Boyd (Electrical Engineering), A. Bryson (Aeronautics and Astronautics), J. Cioffi (Electrical Engineering), R. Cottle (Operations Research), T. Cover (Electrical Engineering), G. Dantzig (Operations Research), S. Doniach (Applied Physics), C. Eaves (Operations Research), J. Friedman (Statistics), T. Friedman (Electrical Engineering), J. Koseff (Civil Engineering), R. MacCormack (Aeronautics and Astronautics), W. Murray (Operations Research), W. Reynolds (Mechanical Engineering), B. Roth (Mechanical Engineering), M. Saunders (Operations Research), J. Simo (Mechanical Engineering), R. Street (Civil Engineering), M. Van Dyke (Mechanical Engineering), D. Wilde (Mechanical Engineering)

The Scientific Computing and Computational Mathematics Program (SC/CM) is interdisciplinary and leads to the M.S. and Ph.D. degrees. It is designed for students interested in studying and developing computational tools in those aspects of applied mathematics that are central to modeling in the physical and engineering sciences. Graduates of this program are expected to be able to deal with a scientific problem from its formulation, moving through its mathematical analysis to algorithm development and implementation. The symbiosis of applied mathematics and numerical computing is stressed, but there is emphasis on areas such as symbolic computation and computer architecture.

The program prepares students for research in the rapidly expanding field of supercomputing.

GRADUATE PROGRAMS

MASTER OF SCIENCE

A candidate must complete a program of 45 units of courses numbered 100 or greater, of which at least 18 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 advisor 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. 135, 173, 222, 230A, B, C, 256A, B, C, 270, 274. Other courses can be taken with consent of the advisor 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, 339; Mechanical Engineering (ME) 235A, B, C.

3. Computer Science (6-9 units): students can take a selection of courses from CS 108A, 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 advisor and committee. The following courses would be acceptable candidates: ME 251A, B, 269; Aeronautics and Astronautics 210A, B, 214A, B, C; Civil Engineering 210A, B; Electrical Engineering 363, 364, 365, 378A, B.

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. This examination covers basic courses in mathematics, numerical analysis, and computer science as described in the "Master of Science" degree program above. Students who have obtained the master's degree in another program must satisfy the candidacy requirement within one year of entering the program. Those entering the program with a B.S. are expected to satisfy the candidacy requirement by the end of the second year.

3. Beyond the requirements for candidacy, the student must complete a focused course of study of at least 48 units. The program should be designed to develop a deep, focused background in the research area to be pursued in the dissertation. Approval of the program must be obtained from the SC/CM Committee.

4. In addition, the student must have an adequate knowledge of a coherent area of application and must complete at least 12 units in that area.

5. The most important requirement for the Ph.D. is the dissertation. Within a reasonable period after passing the qualifying examination, the student must obtain the agreement of a faculty member to be the dissertation adviser. A reading committee must be selected before the student is admitted to Terminal Graduate Registration (TGR), and this committee should be frequently consulted by the student before the University oral examination. Upon completion of a substantial portion of the dissertation, the student must pass a University oral examination in defense of the dissertation.
The School of Humanities and Sciences, with over 40 departments and interdepartmental degree programs, is the primary locus for the liberal arts education offered by Stanford University. Through exposure to the humanities, undergraduates study the ethical, aesthetic, and intellectual dimensions of the human experience, past and present, and so are prepared to make thoughtful and imaginative contributions to the culture of the future. Through the study of social, political, and economic events, they acquire theories and techniques for the analysis of specific societal issues, as well as general cross-cultural perspectives on the human condition. And through exposure to the methods and discoveries of mathematics and the sciences, they will become better-informed participants and leaders in today's increasingly technological societies.

Further, the exciting research environment within the school offers both undergraduates and graduate students the intellectual adventure of working on their own research projects, side by side with the school's distinguished faculty. While a few of the school's graduate programs offer professional degrees such as the Master of Fine Arts, most are academic and research programs leading to the Ph.D. Doctoral programs emphasize original scholarly work by the graduate students, often at the frontiers of knowledge, and normally require the students to participate in the supervised teaching of undergraduates. Indeed, in the school as in the University more broadly, graduate students are of central importance in the development of a community of scholars.

The fact that so many different disciplines lie within the same organization is one reason why the school has had great success in promoting interdisciplinary teaching and research programs. Whether 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, 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 of Science, Innovative Academic Courses, 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 Divisions Special Programs” section in this bulletin.

UNDERGRADUATE PROGRAM IN AFRICAN AND AFRO-AMERICAN STUDIES

**Chair:** Horace Porter (English)
**Steering Committee:** David Abernethy (Political Science and African Studies), Earl Black (African and Afro-American Studies), Sandra Drake (English), Harry Elam (Drama), James Gibbs (Anthropology), John Rickford (Linguistics), Thomas Massey (Humanities and Sciences), Arthur Walker (Applied Physics), Sylvia Wynter (Spanish and Portuguese), student representative from the Black Student Union

**Participating Faculty:** Lucius Barker (Political Science), Clay Bates (Engineering), Clay Carson (History), Sandra Drake (English), John Gill (Engineering), William Gould (Law), Kennell Jackson (History), Halifu Osumare (Athletics), Horace Porter (English), John Rickford (Linguistics), Arthur B. C. Walker (Applied Physics), Sylvia Wynter (Spanish and Portuguese)

**UNDERGRADUATE MAJOR**

The curriculum is based on the idea that the African and Afro-American Studies (AAAS) program should provide an interdisciplinary introduction to (I) the field of Afro-American history, culture, and society as a central component of the United States; (IIA) to the field of African history, culture, and society, and to (IIB) the emerging field of the history, culture, and society of the Black diaspora. The student major is expected to develop a specialized knowledge in all three fields but with special emphasis on the first.

All majors and double majors are expected to take a total of 63-65 units. Of these, 33-35 units must be selected from the core courses (I); AAAS 105 is mandatory. Fifteen units each are to be selected from the two other groups of courses (IIA and IIB). Each of these course groupings consolidates as well as broadens the work of the core and further develops the understanding the major has for issues in the AAAS field.

This selection constitutes option (A). In addition, students majoring in AAAS may take option (B) which consists of the core courses (I) and either (IIA) or (IIB) and a choice of a thematic concentration in part III. Part III also consists of 15 units.

AAAS majors have numerous opportunities to obtain academic advising. The director advises all the majors, and their progress is closely followed by the program coordinator. When the time comes to choose between the two options for study, faculty with expertise in the different areas are available. The program aims to provide the best possible advising for majors and also gives the students a chance to discuss academic choices with the many faculty involved in the program.

**REQUIREMENTS**

**I. CORE COURSES**

(33-35 units)

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>73. Black English</td>
<td>5</td>
</tr>
<tr>
<td>105. Introduction to Afro-American Studies</td>
<td>5</td>
</tr>
<tr>
<td>118. Race and Gender in American Sport</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>Anthropology 122. Film Images of African-American Culture</td>
<td>5</td>
</tr>
<tr>
<td>Drama 5. Introduction to Black American Drama</td>
<td>5</td>
</tr>
<tr>
<td>Linguistics 153. Inter- and Intra-Ethnic Variation in Urban Vernacular English</td>
<td>5</td>
</tr>
<tr>
<td>English 161A. Afro-American Writing, 1950-1970</td>
<td>5</td>
</tr>
<tr>
<td>English 161B. Afro-American Writing, 1970-Present</td>
<td>5</td>
</tr>
<tr>
<td>English 161C. 20th-century Afro-American Literature</td>
<td>5</td>
</tr>
<tr>
<td>English 161D. Afro-American Autobiography</td>
<td>5</td>
</tr>
<tr>
<td>History 157. Afro-American History: Modern Civil Rights Movement</td>
<td>5</td>
</tr>
<tr>
<td>History 164. Race and Ethnicity and the American Experience</td>
<td>5</td>
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</tbody>
</table>

IIA. AFRICAN HISTORY, CULTURE AND SOCIETY (15 units)

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>115. Africa and Philosophy, Philosophy and Africa</td>
<td>5</td>
</tr>
<tr>
<td>History 148. Introduction to African History</td>
<td>5</td>
</tr>
<tr>
<td>History 148C. Africa in the 20th Century</td>
<td>5</td>
</tr>
<tr>
<td>Political Science 118B. Southern Africa: Race, Class, and Political Change</td>
<td>5</td>
</tr>
</tbody>
</table>

IIB. HISTORY, CULTURE, AND SOCIETY OF THE BLACK DIASPORA (15 units)

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>114. Africa and the Black Diaspora</td>
<td>5</td>
</tr>
<tr>
<td>185. African-Caribbean Roots of American Jazz Dance</td>
<td>2</td>
</tr>
<tr>
<td>248. The Caribbean-Americas: An Introduction to their Literature and Thought</td>
<td>5</td>
</tr>
<tr>
<td>249. The Afro-Hispanic World: An Introduction</td>
<td>5</td>
</tr>
</tbody>
</table>
III. THEMATIC CONCENTRATION

This area allows the student to focus 15 units of work on themes that either develop previous work in the major or explore new areas. There are five possible themes. In choosing a theme, the student is advised by a faculty member with a specialization in the area or discipline as well as by the chair of the program. The themes are as follows:


Expressive Culture of the Africa Diaspora—Afro-American Studies 186, African-Caribbean Dance Technique; Drama 155, American Drama, 1960s to the Present; Dance 81 and 82, Jazz Dance I and II (the last two are suggested but units are not counted toward major).

African Development—Food Research 103, The World Food Economy; Food Research 121, Development and Population Interaction; Food Research 136, Population Perspectives in the Third World; Economics 118, Economics of Development; Economics 122, Theory of Capitalist Development; Political Science 123D, Political and Ethical Aspects of Foreign Aid.

Afro-American History and Society—Afro-American Studies 126, Black Perspectives on Medicine; Afro-American Studies 127, Professional Development for Minority Engineers; Political Science 181, African Americans in the Political System; Psychology 127, Afro-American Psychology; and Sociology 144, Social Mobility.

The Fifth Choice—Part III allows the major to devise a program around a special theme. In organizing this plan, the major works with a specialist on the chosen theme and with the chair of the program. The plan is approved by the steering committee. Honors work is possible as part of this option.

DOUBLE MAJORS

Many students in the program are double majors. Over the years, students have found that continuing a major in one field with a strong 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 (33-35 units) should be taken. In addition, 30 units from various departmental offerings, e.g., English 161A,B, must be chosen. The total number of units required for a double major in this field is, therefore, 63-65 units. To determine the additional units, the prospective double major should consult with the chair 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 chair. A written proposal must be submitted for consideration no later than Autumn Quarter of the senior year.

UNDERGRADUATE SCHOLARS PROGRAM (USP)

Initiated in 1986, 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 (3-5 units, Winter and Spring Quarters) on the transcript of the participants. A special, high-quality video that has been made to advertise the program is available for viewing by interested applicants. A student can register in this program through Afro-American Studies 198A (3-5 units). Kennell Jackson, Jr., from the Department of History, is the head of the USP.

COURSES

The core course (105) is a broad survey of the Afro-American experience. Team-taught by faculty from the humanities and social sciences, it introduces themes such as retained Africanisms, the Black family, Black studies, and Afro-American literature, history, and identity. Interaction with professors also helps students plan future courses of study.

AAAS PROGRAM OFFERINGS

59A, B, C. Dance Theater Production. 1-5 units, Aut, Win, Spr (Osumare)

105. Introduction to African and Afro-American Studies—(Same as Anthropology 105.) Introduces African and Afro-American Studies as an interdisciplinary field. Explores contrasting and contradictory interpretations of several key, representative aspects of African and Afro-American
social and cultural institutions. Topics: African survivals in the New World; New World slavery; the Black family; the Afro-American as artist; and the Afro-American identity. Why interpretations developed at particular times, and the relationship between African and Afro-American Studies and other academic disciplines. DR:3(*)

5 units, Win (Porter) MWF 11

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, Spr (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:2,8(3*)

5 units, Wynter

118. Race and Gender in American Sport—Focusing on race and gender, examines sport as a complex metaphor of American life. Sport as ritual, work, and play. Readings include anthropological, historical, sociological studies, and fiction and autobiography.

5 units Spr (Porter)

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 African-Americans' self-conceptions, in their status and power in American society, and in their role in the film industry, and changes in overall American race relations and American popular culture, including the film media. DR:3

5 units (Gibbs) not given 1991-92

126. Black Perspectives in Medicine—Through readings, discussions, and contact with Black doctors and other health care professionals, examines the role of Blacks in medicine and issues specific to the delivery of health care services in the Black community.

3 units, Aut (Staff)

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)

161C. 20th-Century Afro-American Fiction—(Same as English 161C, Comparative Literature 161C.) Afro-American fiction from the Harlem Renaissance. Writings of Jean Toomer, Zora Neale Hurston, Ernest Gaines, Richard Wright, Ralph Ellison, James Baldwin, Toni Morrison, Ishmael Reed, James Alan McPherson, Gloria Naylor, and Alice Walker. DR:3,7

5 units, Spr (Porter) MWF 11


5 units (Porter) not given 1991-92

190A,B,C. Directed Reading.

1-15 units, Aut, Win, Spr (Staff)

195A,B,C. Independent Study.

3-5 units, Aut, Win, Spr (Staff)

195D,E,F. Independent Study: The King Papers.

3-5 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)

200A,B,C. MESA Tutors Project.

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

248. The Caribbean-Americas: An Introduction to Their Literature, Thought, and Cultural Worlds—(Same as Spanish 248, English 262G.) 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, Aut (Wynter)

249. Afro-Hispanic Cultural Worlds: An Introduction—(Same as Spanish 249, Comparative Literature 249.) 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 Win (Wynter)

291. "Race," Discourse, and the Origin of the Americas: A New World View of 1492—(Same as Spanish 291.) Examines major texts related to
the Event of 1492 and to the prelude voyage of the Portugese 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, Spr (Wynter)

**OFFERINGS IN OTHER DEPARTMENTS**

See respective department listings for course descriptions and Distribution Requirement (DR) information.

**ANTHROPOLOGY**

15/116. Anthropological Perspectives on American Culture—(Same as Education 116X.)
- 3-5 units Spr (G. and L. Spindler)

- 5 units (Gibbs) not given 1991-92

**DANCE**

182. Jazz Dance II.
- 1 unit, Aut, Win, Spr (Osumare)

183. Jazz Dance III.
- 1 unit, Win (Osumare)

- 2 units, Aut (Osumare)

- 2 units, Spr (Osumare)

**DRAMA**

5. Introduction to Black American Drama.
- 4 units, Aut (Elam)

29. Theater Performance: Acting.
- 1-3 units, any quarter (Staff)

39A, B, C. Theater Performance: Crew.
- 1-3 units, any quarter (Staff)

- 4 units, Win (Elam)

**ECONOMICS**

118. The Economics of Development—Prerequisite: Economics 51.
- 5 units, Spr (Kochar)

**EDUCATION**

201. History of Education in the United States—(Same as History 158.)
- 3 units (Tyack) not given 1991-92

**ENGLISH**

- 5 units (Drake) not given 1991-92

161B. Afro-American Writing, 1970-Present.
- 5 units (Drake) not given 1991-92

161H. Narration, Detection, and Social Marginality.
- 5 units Spr (Drake)

**FOOD RESEARCH INSTITUTE**

103. The World Food Economy—(Same as Economics 106.)
- 5 units, Win (Falcon, Naylor)

121. Development and Population Interaction in the Third World—(Same as Economics 119.)
- 5 units, Win (Yotopoulos)

136. Population Perspectives in the Third World—(Same as Economics 133, Human Biology 136, Sociology 153.)
- 5 units, Spr (Arthur)

166. International Trade Policy—(Same as Economics 166.)
- 5 units, Spr (Pearson)

**HISTORY**

148. Introduction to African History.
- 5 units, Aut (Jackson)

148C. Africa in the 20th Century.
- 5 units, Spr (R. Roberts)

246. Undergraduate Colloquium: Black Hair as Culture and History.
- 5 units, Spr (Jackson)

247. East Africa and its Historical Writing.
- 5 units Win (Jackson)

248B. Undergraduate Colloquium: Law in Colonial Africa.
- 5 units, Spr (R. Roberts)

248S. Senior Research Seminar: Colonial State and Society in Africa.
- 5 units, Win (R. Roberts)

249S. Senior Research Seminar: Colonial State and Society in Africa.
- 5 units, Spr (R. Roberts)

264S. Senior Research Seminar: Martin Luther King and Civil Rights.
- 5 units, Aut (Carson)

**LINGUISTICS**

73. African American English.
- 4 units, given 1992-93
AFRICAN STUDIES 225

150. Introduction to Sociolinguistics.  
4-6 units, Aut (Guy)

153. Inter- and Intra-Ethnic Variation in Urban Vernacular English.  
4-6 units, Aut (Rickford)

602A,B,C. Beginning Hausa.  
4 units, Aut, Win, Spr (Staff)

606A,B,C. Beginning Swahili.  
4 units, Aut, Win, Spr (Masagara)

4 units, Aut, Win, Spr (Masagara)

618A,B,C. Beginning Zulu.  
3 units, Aut, Win, Spr (Staff)

POLITICAL SCIENCE

118B. Southern Africa: Race, Class, and Political Change.  
5 units, Spr (Abernethy)

181. African-Americans and the Political System.  
5 units, Spr (Barker)

PSYCHOLOGY

127. Afro-American Psychology.  
3 units, Aut (McCants)

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), Martin Carnoy (Education), Walter P. Falcon (Food Research Institute), James Lowell Gibbs, Jr. (Anthropology), William B. Gould (Law), Timothy E. Josling (Food Research Institute), William R. Leben (Linguistics), Scott R. Pearson (Food Research Institute), Hans N. Weiler (Education and Political Science), Sylvia Wynthrer (Spanish and Portuguese)

Associate Professors: Joel S. Beinin (History), Sandra E. Drake (English and Comparative Literature), Kennell A. Jackson, Jr. (History), Francisco O. Ramirez (Education), Richard Roberts (History)

Assistant Professors: Marcel Fafchamps (Food Research Institute), Akhil Gupta (Anthropology)

Lecturer: Khalil Barhoum (Linguistics)

Curators: Peter Duignan (Senior Fellow, Hoover Institution), Karen Fung (Deputy Curator, Hoover Institution), Lewis Gann (Senior Fellow, Hoover Institution)

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.

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, Hausa, and Arabic, the committee arranges with the Special Language Program in the Department of Linguistics to offer specialized instruction in other African languages. In recent years, the Special Language Program has offered courses in Shona, Zulu, Igbo, Yoruba, Bambara, Wolof, and Afrikaans.

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 adviser 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:

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. Having 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 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: (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. As a field of concentration within the regular master's and doctoral programs of the different 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 also permit students to specialize in African Studies. The A.M. program in International Policy Studies aims to prepare students for careers in policy-determining positions in an international setting in the private and public sectors. The Food Research Institute, which offers an A.M. and a Ph.D., has a long-standing interest in research and teaching related to problems of food, agriculture, and rural development in tropical Africa. The programs in International Development Education in the School of Education focus on issues of educational policy and planning in Africa, and in the Third World more generally. The Stanford International Development Education Committee (SIDE) offers both an A.M. and a Ph.D., for which specialization in international education policy and administration is possible.

2. Through a Graduate Division 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.

COURSES

AFRICAN AND AFRO-AMERICAN STUDIES

105. Introduction to African and Afro-American Studies—(Enroll in African and Afro-American Studies 105, Anthropology 105.) Introduces African and Afro-American Studies as an interdisciplinary field, exploring contrasting and contradictory interpretations of several key, representative aspects of African and Afro-American social and cultural institutions. Topics: African survivals in the New World; New World slavery; the Black family; the Afro-American as artist; and the Afro-American identity. Why interpretations developed at particular times and the relationship between African and Afro-American Studies and other academic disciplines. DR:3(*)

5 units, Win (Porter) MWF 11

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, Spr (Wynter)

115. Africa and Philosophy, Philosophy and Africa: Introduction to a Polemic—(Enroll in African and Afro-American Studies 115.) Introduces an ongoing debate between African intellectuals. Which political "philosophy" (liberal humanism or Marxism-Leninism in their African variants or a resurgent/Islamic fundamentalism) will best serve a viable contemporary Black African civilization? If not one of these, what then? DR:2 or 8(3*)

5 units (Wynter)

ANTHROPOLOGY

105. Introduction to African and Afro-American Studies—(Enroll in African and Afro-Ameri-
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: 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, Win (Porter)

141. Ethnic Conflicts and Nation-States in the Contemporary World: The Ethnic Question in Comparative Perspective—(Enroll in Latin American Studies 180, Political Science 127R.) See Political Science 127R.

5 units, Win (Stavenhagen)

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, but emphasizing Africa and South Asia. DR:9(5)

5 units (Gupta) not given 1991-92


5 units (Gibbs) not given 1991-92

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. Consent of instructor.

1 unit, Aut (Carnoy) M 12-1:05

and by arrangement

306B. Education and Political Change—(Enroll in Education 306B, Political Science 221.) Introductory analysis of the relations between education and politics from a comparative perspective. Topics: the study of education and politics, questions of legitimacy in educational policy, international factors in educational policy and development, the politics of educational planning and reform, processes and conditions of political learning.

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

and by arrangement

306C. Cultural Approaches to Education and Development—(Enroll in Education 306C.) Examines 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 using Japan and Indonesia as case studies. 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 (Rohlen) alternate years, not given 1992-93

306D. Sociology of Development and Education—(Enroll in Education 306D, Sociology 306.) 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) MW 1:15-3:05

and by arrangement

FOOD RESEARCH

103. The World Food Economy—(Enroll in Economics 106, Food Research 103.) 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.

5 units, Win (Falcon, Naylor) MW 9-10:50
121. Development and Population Interactions in the Third World—(Enroll in Economics 119, Food Research 121.) Historical and contemporary examination of the record of economic development and of population growth suggest 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. Interactions and causal effects between economic development and population growth.

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

129. Planning and Analysis of Development Projects—(Enroll in Economics 129/229, Food Research 129.) Techniques for designing, costing, appraising, and managing development projects. Modules: project planning and scheduling using CPM and PERT 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 (Gotsch) given 1992-93


5 units, Spr (Arthur) 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.

5 units, Aut (Fafchamps) TTh 1:15-3:05

HEALTH RESEARCH AND POLICY

270. International Health—(Enroll in Health Research and Policy 270.) Discussion of world distribution of selected diseases and health problems; international organizations and control programs; environmental, social and economic factors in relation to health, particularly in developing countries; and comparative health care systems in poor and wealthy countries. Also, preparation for work and experience abroad. Prerequisite: consent of instructor.

2-4 units, Spr (Basch) Th 1:15-3:05

HISTORY

148. Introduction to African History—(Enroll in History 148.) African history from ancient Africa to the 1990s. From the ancient societies, e.g., Egypt, to the democracy movements of the 1990s. What is history in Africa, and how do Africans see their various pasts?

5 units, Aut (Jackson) MTWTh 9

148C. Africa in the 20th Century—(Enroll in History 148C.) Transformation of African societies during colonial rule. Resistance to colonial conquest; decline of the old elite and rise of the new one; conflicting ideologies and consequences; nationalism; decolonization. DR:2(*)

5 units, Spr (Roberts) MTWTh 11

248/348. Undergraduate Colloquium: Culture Contact and Cultural Transformation in Precolonial and Colonial Africa—Focuses on the dynamics of culture contact and the transformational impact these contacts have had on the cultures of those African societies which have been the recipients of new ideas, peoples, and/or material cultures. Cultural contacts include those which have occurred among different African communities, and between different African, Islamic, and European cultures. The social implications of the cultural changes identified for the communities examined.

5 units, Aut (Greene) T 1:15-3:05

248S. Senior Research Seminar: Colonial State and Society in Africa.

5 units, Win (Roberts) T 2:15-4:05

249S. Senior Research Seminar: Colonial State and Society in Africa.

5 units, Spr (Roberts) T 2:15-4:05

LINGUISTICS

The following courses may be offered given sufficient enrollment and provided funding is available.

602A,B,C. Beginning Hausa—(Enroll in Linguistics 602A,B,C.) Successful completion of
602C may fulfill the foreign language requirement.

4 units, Aut, Win, Spr (Staff)

606A,B,C. Beginning Swahili—(Enroll in Linguistics 606A,B,C.) Successful completion of 606C may fulfill the foreign language requirement.

4 units, Aut, Win, Win, Spr (Masagara)

608A,B,C. Advanced Swahili—(Enroll in Linguistics 608A,B,C.)

4 units, Aut, Win, Spr (Masagara)


4 units, Aut, Win, Spr (Masagara)

610A,B,C. Beginning Yoruba—(Enroll in Linguistics 610A,B,C.)

4 units, Aut, Win, Spr (Staff)

614A,B,C. Beginning Shona—(Enroll in Linguistics 614A,B,C.)

3 units, Aut, Win, Spr (Staff)

618A,B,C. Beginning Zulu—(Enroll in Linguistics 618A,B,C.)

3 units, Aut, Win, Spr (Staff)

Other African Languages—Any other African language can be taught through the Special Language Program, provided a tutor is available. Some languages which have been taught in the past are: Afrikaans, Bambara, Igbo, and Wolof. Contact the Special Language Program office, (415) 723-3636.

POLITICAL SCIENCE

25. Colonialism and Nationalism in the Third World—(Enroll in Political Science 25.) 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 DR:9(5*)

5 units (Abernethy) given 1992-93

118B. Southern Africa: Race, Class, and Political Change—(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, and the impact of movements, corporations, and international organizations based outside the region. Attention to domestic politics and foreign policy of South Africa. DR:2 or DR:9(5*)

5 units, Spr (Abernethy)

127R. Ethnic Conflicts and Nation-States in the Contemporary World: The Ethnic Question in Comparative Perspective—(Enroll in Anthropology 141, Latin American Studies 180, Political Science 127R.) Overview of the major ethnic conflicts in the world: who is involved, what are the issues, how they are being handled. The re-emergence of ethnic movements and the challenge to the nation-state. Principal theories accounting for ethnic conflicts and their critique. The question of individual and collective human rights. The international system (the UN and its specialized organs). Case studies from Eastern and Western Europe, Asia, Africa, Latin America, Canada, and the U.S.

5 units, Win (Stavenhagen)

132D. Political and Ethical Aspects of Foreign Aid—(Enroll in Political Science 132D.) General and case study materials examine the characteristics of bilateral and multilateral "official development assistance"; trends in its volume and composition; the complex relationship between aid providers and recipients; ethical problems posed in the allocation, monitoring, and evaluation of development assistance; international disaster relief operations.

5 units (Abernethy) given 1992-93

140A,B,C. Ethics of Development in a Global Environment (EDGE)—(Enroll in Engineering 297A,B,C; Political Science 140A,B,C.) Seminars with a series of speakers on current development issues, emphasizing problems of the poorer nations. Autumn Quarter: world resources—energy, food, housing, population, and environment and the political development and dependencies of developing regions. Winter Quarter: the role of institutions affecting the transfer of technology—political systems, World Bank, transnationals. Spring Quarter: the role and responsibilities of the individual who wants to affect development. One unit credit for speaker series (lecture);
3 additional units for optional workshops treating selected issues in more depth and writing a term paper. (Sequential registration not required.)

1 or 4 units, Aut, Win, Spr (Fagen, Lusignan)
W 7:30-9:30 p.m., workshops by arrangement

222. Decolonization in Asia and Africa, 1940-1980—(Enroll in Political Science 222.) Comparison of the dynamics of decolonization and "new state" formation. Factors affecting the timing, speed, nature, and extent of violence in the decolonization process, and the character of the regime ruling the new state. Case studies: India/Pakistan, Indonesia, Indochina, Ghana, Ivory Coast, Algeria, Angola, and Zimbabwe. 5 units, Spr (Abernethy)

SOCIOLGY

146. The Social Foundations of Democracy—(Enroll in Sociology 146, 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 reemergence of democracy in the past decade. Case studies of individual national experiences with democracy. 5 units, Spr (Diamond) MWF 11

RELATED MATERIALS

Students who wish to increase their knowledge of Africa may consider the following courses, of which at least 25 percent of the content is devoted to Africa:

ANTHROPOLOGY


164. Ecological Anthropology.

DANCE


FOOD RESEARCH


The following courses have some Africa content and present conceptual substance that is helpful to understanding African societies and institutions.

ECONOMICS

118. The Economics of Development.

EDUCATION

206B. Project Workshop in International Development Education.


FEMINIST STUDIES

103A. Seminar: International Feminism—Theory and Practice.

FOOD RESEARCH


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, on leave 1991-92), Wanda Corn (Art, on leave 1991-92), George Fredrickson (History), Albert Gelpi (English), Richard Gillam (American Studies Program Coordinator), Hubert Marshall (Political Science), Horace A. Porter (English, African and Afro-American Studies), Jack Rakove (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 speci-
fically on race and ethnicity. Majors who take five or more such courses have the option of graduating with a race and ethnicity specialization in American Studies.

All American Studies majors work closely with a faculty coordinator to develop an independent study plan consisting of 14 (or more) courses of at least 60 units. All are to be taken for a letter grade. Study plans must emphasize one of three general 

_Distribution of Courses—_All students must take a minimum of five courses in their primary area of concentration, plus at least three courses in each of the other two areas. Of these eleven courses, three are specifically required of all students: American Studies 150 in the Thought and Imagination concentration, and History 165A and 165B in the Social Organization and Behavior concentration. All majors are expected to obtain a solid grounding in their five-course area of concentration. For those emphasizing Policy and Institutions, this ordinarily means taking Political Science 1 and 10 as two of the five courses in their concentration.

**Core Seminars**—In addition to satisfying the 5-3-3 course concentration requirements described above, all majors must take American Studies 200 and a second core seminar approved by the program. Ideally, American Studies 200 should be taken as soon as possible after declaring the major.

**Race and Ethnicity Component**—All students must take American Studies 164. This course, like the two core seminars, is to be taken in addition to the 11 courses that fulfill the 5-3-3 distribution requirement. Majors must also take a second race and ethnicity course as part of their 11 course, 5-3-3 concentration requirement. A list of courses satisfying the race and ethnicity component in American Studies may be obtained from the program administrator.

**Optional Specialization in Race and Ethnicity**—Students who take at least five approved race and ethnicity courses 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 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 seek honors by writing a senior thesis for 10 to 15 units of credit. This application is to include the topic and a proposed outline of the senior thesis. The 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 on Mayfield Avenue 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**

**AMERICAN STUDIES**

150. American Literature and Culture to 1855—(Same as English 121.) Detailed study of important and 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. Required for the American Studies major. (Thought and Imagination)

5 units, Win (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.) DR:8f(3)

5 units, Win (Gillam)

152. Introduction to Material Culture—(Same as History 152A.) American history through the evidence of things. Introduction to methods of interpreting or “reading” artifacts and to different categories of material culture, including folk art, industrially-produced artifacts, and vernacular architecture and landscape. (Thought and Imagination or Social Organization and Behavior.)

5 units, given 1992-93

152. Introduction to Material Culture—(Same as History 152A.)

153. Introduction to Art and Architecture—(Same as History 153A.)

179. Introduction to American Law—(Same as Law 106, Political Science 182F.) American law for undergraduates. The structure of the American legal system, including the courts; American
legal culture; the legal profession and its social role; the scope and reach of the legal system; the background and impact of legal regulation; the relationship between the American legal system and American society in general. (Social Organization and Behavior or Policy and Institutions.)

DR:9(5)
5 units, Win (Friedman)

RACE AND ETHNICITY

164. Race and Ethnicity in the American Experience—(Same as 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.

AMERICAN THOUGHT AND IMAGINATION

AFRICAN AND AFRICAN-AMERICAN STUDIES

105. Introduction to African and Afro-American Studies.
5 units, Win (Porter)

AMERICAN STUDIES

150. American Literature and Culture to 1855—(Same as English 121.) See "Core Lectures."
5 units, Win (Fliegelman)

151. The Transformation of American Thought and Culture, 1865 to the Present—See "Core Lectures."
5 units, Win (Gillam)

ANTHROPOLOGY

132. Language, Culture, and Education in Native North America.
5 units, Win (Nelson-Barber)

150. American Indian Ways of Knowing: 500 Years of Change and Continuity.
5 units, Spr (Nelson-Barber)

ART

130D. American Art After WWII.
4 units, Win (Jones)

4 units, Aut (Joncas, Solomonson)

4 units, Spr (Jones)

COMPARATIVE LITERATURE

169B. Readings in the Asian-American Novel—
(Same as English 169B.)
5 units, Win (Palumbo-Liu)

169D. Readings in Asian-American Short Fiction—(Same as English 169D.)
5 units, Spr (Palumbo-Liu)

DRAMA

5. Introduction to Black American Drama.
4 units, Aut (Elam)

65. American Musical Theater.
4 units, Aut (Eddelman)

4 units, Win (Walker)

155. American Drama, 1960s to Present.
4 units, Win (Elam)

4 units, Win (Walker)

4 units, Spr (Walker)

ENGLISH

112. Masterpieces of American Literature.
5 units, Aut (Gelpi)

123A. Presentations of American Women—
(Same as Feminist Studies 102A.)
5 units, Spr (Wald)

124B. Contemporary Chicano Narrative—
(Same as Spanish 187.)
5 units, Spr (Saldivar)

160D. Cinema and Literature.
5 units, Win (Marsh)

161C. 20th-Century Afro-American Fiction—
(Same as Afro- and Afro-American Studies 161C.)
5 units, Spr (Porter)

161H. Narration, Detection, and Social Marginality.
5 units, Spr (Drake)

162A. Study of Chicanas.
5 units, Win (Candelaria)

5 units, Win (Fields)

175. Henry James.
5 units, Aut (Dekker)

179B. Faulkner.
5 units, Aut (Moser)

187B. Seminar: William Carlos Williams.
5 units, Spr (Sorrentino)
5 units, Win (Candelaria)

MUSIC

5A. Music in America.  
3 units, Aut (Cohen)

RELIGIOUS STUDIES

53. Jews and Judaism in America.  
4 units, Spr (Eisen)

AMERICAN SOCIAL ORGANIZATION AND BEHAVIOR

AMERICAN STUDIES

151. The Transformation of American Thought and Culture, 1865 to the Present—See "Core Lectures."  
5 units, Win (Gillam)

179. Introduction to American Law—(Same as Law 106, Political Science 182F.) See "Core Lectures."  
5 units, Win (Friedman)

ANTHROPOLOGY

102. Native American Cultures of North America.  
5 units, Win (Barnett)

116. Anthropological Perspectives on American Culture—(Same as Education 116X.)  
3-5 units, Spr (G. and L. Spindler)

132. Language, Culture, and Education in Native North America.  
5 units, Win (Nelson-Barber)

150. American Indian Ways of Knowing: 500 Years of Change and Continuity.  
5 units, Spr (Nelson-Barber)

182A. Archaeology and Education at Zuni Pueblo.  
3-9 units, Spr (Rick)

ECONOMICS

5 units, Win (Wright)

HISTORY

5 units, Aut (Staff)

54S. Introductory Seminar: The Environment and American Society Since 1900.  
5 units, Win (Staff)

5 units, Aut (Staff)

67S. Introductory Seminar: Social Change in Industrializing America—A Case Study of Chicago.  
5 units, Aut (Sawislak)

156. The History of Human Differences: The Disabilities Minorities in America.  
5 units, Win (Longmore)

157. Introduction to Afro-American History.  
5 units, Spr (Carson)

159. Introduction to Asian American History.  
4-5 units, Aut (Chang)

165A. 18th-Century America—Required for the American Studies major.  
5 units, Aut (Rakove)

165B. 19th-Century America—Required for the American Studies major.  
5 units, Win (Sawislak)

165C. 20th-Century America.  
5 units, Spr (Bernstein, Camarillo)

5 units, Spr (Freedman)

173C. Introduction to Feminist Studies.  
5 units, Win (Freedman)

251S. Undergraduate Colloquium: Poverty and Homelessness in America.  
5 units, Win (Camarillo)

5 units, Spr (Kleiman)

5 units, Aut (Camarillo)

264S. Senior Research Seminar: Martin Luther King and Civil Rights.  
5 units, Aut (Carson)

265A. Undergraduate Colloquium: Sexuality in American History—No priority for American Studies majors.  
5 units, Spr (Freedman)

265S. Senior Research Seminar: Asian American History.  
5 units, Spr (Chang)

LINGUISTICS

153. Inter- and Intra-Ethnic Variation in Urban Vernacular English.  
4 units, Spr (Rickford)

SOCIOLOGY

104. The Sociology of Gender—(Same as Feminist Studies 134.)  
3-5 units, Spr (Ridgeway)
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<th>Course Number</th>
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<th>Units</th>
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<th>Instructor(s)</th>
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<tbody>
<tr>
<td>136</td>
<td>Seminar: The Political Sociology of American Security Policy (Same as Political Science 145L)</td>
<td>5</td>
<td>Spring</td>
<td>Eden</td>
</tr>
<tr>
<td>167</td>
<td>Women and Organizations (Same as Feminist Studies 135/235)</td>
<td>5</td>
<td>Spring</td>
<td>Krieger</td>
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<td>179</td>
<td>Introduction to American Law (Same as Law 106, Political Science 182F)</td>
<td>5</td>
<td>Winter</td>
<td>Friedman</td>
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<tr>
<td>100</td>
<td>Political Science 1. Major Issues of American Public Policy</td>
<td>5</td>
<td>Autumn</td>
<td>Marshall</td>
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<td>10. American National Government</td>
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<td>Winter</td>
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<td>106M. Bureaucratic Politics</td>
<td>5</td>
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<td>177. Seminar: Courts, Politics, and Public Policy</td>
<td>5</td>
<td>Spring</td>
<td>Barker</td>
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<td>181. African Americans and the Political System</td>
<td>5</td>
<td>Spring</td>
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<td>183D. Politics of Welfare Policy</td>
<td>5</td>
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<td>186. Urban Politics and Policy</td>
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<td>Spring</td>
<td>Fraga</td>
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<td></td>
<td>188K. Politics and Policy for Children, Youth, and Families (Same as Education 105, History 158B)</td>
<td>3</td>
<td>Autumn</td>
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<td>191. Seminar: The President, the Press, the Public, and Politics</td>
<td>5</td>
<td>Spring</td>
<td>Brody</td>
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<td></td>
<td>196A,B. Seminar: Issues of Race in American Politics</td>
<td>5</td>
<td>Spring</td>
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<td>275. Seminar: Courts as Policy Institutions</td>
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<td>292A. Seminar: American Political Institutions</td>
<td>5</td>
<td>Spring</td>
<td>Ferejohn</td>
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<tr>
<td>292B</td>
<td>Introduction to Political Behavior</td>
<td>5</td>
<td>Winter</td>
<td>Sniderman</td>
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<tr>
<td>292C</td>
<td>Seminar: American Political Institutions</td>
<td>5</td>
<td>Spring</td>
<td>Moe</td>
</tr>
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<td>101</td>
<td>Science, Technology, and Contemporary Society</td>
<td>4-5</td>
<td>Autumn</td>
<td>McGinn</td>
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**VALUES, TECHNOLOGY, SCIENCE, AND SOCIETY**

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<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Units</th>
<th>Term(s)</th>
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<td></td>
<td>101. Science, Technology, and Contemporary Society</td>
<td>4-5</td>
<td>Autumn</td>
<td>McGinn</td>
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**CORE SEMINARS**

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<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Units</th>
<th>Term(s)</th>
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<tbody>
<tr>
<td></td>
<td>Seminars taken at Stanford in Washington count as Core Seminars with the consent of the student's adviser, a program coordinator, or the program chair.</td>
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<tr>
<td>200</td>
<td>The American Character (Same as History 260A)</td>
<td>5</td>
<td>Winter</td>
<td>Fliegelman</td>
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<tr>
<td>205</td>
<td>Undergraduate Colloquium: The Religious Dimensions of American History (Same as History 257)</td>
<td>5</td>
<td>Spring</td>
<td>Longmore</td>
</tr>
<tr>
<td>206</td>
<td>Undergraduate Colloquium: The Cultures of Early America (Same as History 255)</td>
<td>5</td>
<td>Spring</td>
<td>Longmore</td>
</tr>
<tr>
<td>208</td>
<td>Seminar: Psychological Themes in American Fiction (Same as English 186A)</td>
<td>5</td>
<td>Autumn</td>
<td>Moser</td>
</tr>
<tr>
<td>210</td>
<td>American Catholic Writers (Same as English 187E)</td>
<td>5</td>
<td>Winter</td>
<td>A. Gelpi</td>
</tr>
<tr>
<td>212</td>
<td>Ideas in America from the Revolution to 1900 (Same as History 271A)</td>
<td>5</td>
<td>Autumn</td>
<td>Fredrickson</td>
</tr>
<tr>
<td>214</td>
<td>The American 1960s: Thought, Protest, and Culture (Same as History 260S)</td>
<td>5</td>
<td>Autumn</td>
<td>Fredrickson</td>
</tr>
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<td></td>
<td>Attempts to define the meaning of the American 1960s, emphasizing the “new sensibility” that emerged during this crucial decade in American history. Topics: black protest, the New Left, the counter culture, the new literature and journalism, the role of the media in shaping dissent, and the legacy of the 60s protest. DR:3†</td>
<td>5</td>
<td>Spring</td>
<td>TTh 1:15-3:05</td>
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<tr>
<td>219</td>
<td>The Popular Book in America (Same as English 186D)</td>
<td>5</td>
<td>Spring</td>
<td>Fliegelman, Ryan</td>
</tr>
</tbody>
</table>
221. The Rhetoric of Technology in 20th-Century America—(Same as History 252, VTSS 157.) Examination of technical artifacts as sites around which groups construct and contest cultural meaning. The rhetoric employed in popular media to discuss technologies (telephone, airplane, and computer) illuminate changes in the autonomy or dependency of individuals and groups in society; the relative authority and power of technical experts and amateurs; and in the values, beliefs, and practices of individuals and groups vis-a-vis machines.
5 units, Aut (J. Corn)

225. Undergraduate Colloquium: Topics in the History of the American West—(Same as History 253A.)
5 units, Aut (Sawislak)

228. Undergraduate Colloquium: The Constitution in American Politics—(Same as History 250A.)
5 units, Win (Rakove)

229. Asian American History Seminar—(Same as History 265S.)
5 units, Spr (Chang)

232. Undergraduate Colloquium: The Social History of Mental Illness in the U.S.—(Same as History 273.)
5 units, Win (Horn)

INDIVIDUAL WORK

AMERICAN STUDIES

195. Directed Research.
3-5 units (Staff) by arrangement

199. Directed Reading.
2-5 units (Staff) by arrangement

250. Honors Project—Prerequisite: consent of the chair of American Studies.
5-15 units, any quarter (Staff)

ANTHROPOLOGY

Chair: George A. Collier
Associate Professors: William H. Durham (on leave), James A. Fox, John W. Rick, Sylvia Yanagisako (on leave)
Assistant Professors: Carol L. Delaney, Akhil Gupta (on leave)

Lecturer: Louise S. Spindler

Assistant Professors: Lori D. Hager, Sharon Nelson-Barber, Joel H. Streicker

Visiting Associate Professor: Gail Kligman

Visiting Assistant Professor: Cheleena Mahar

Affiliated Faculty: Shirley Brice Heath (English), Reynaldo Martorell (Food Research Institute), Raymond McDermott (School of Education), Thomas P. Rohlen (School of Education)


Teaching Fellows: Susan Charnley, Lisa Yoneyama

The courses offered by this department are designed to: (1) provide undergraduates with instruction in anthropology, a discipline treating humanity from the broad viewpoints of culture, society, biological heritage, and personality; (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 of Anthropology is responsible for a large collection of historic and prehistoric cultural and skeletal 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. Keesing Museum (room 111K) in the Department of Anthropology. Continuing excavations on Stanford property by department archeologists (under the direction of the Campus Archeologist) contribute materials to the collections.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The Department of Anthropology offers two programs leading to the Bachelor of Arts degree: the major in Anthropology, and an interdisciplinary program, the major in Social Sciences (Anthropology). An honors program is offered in both majors. To declare the major a student must fill out the Declaration of Major form in the Registrar's Office, contact the student affairs coordinator in the department who will explain the degree requirements, and then 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 Affairs 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. Applications for this major must be received no later than the beginning of the Winter Quarter of the junior year. 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 Individually Designed Major.

The Honors Program in Anthropology is open to all majors in the department. Candidates of sophomore or junior standing should submit an application to the student affairs 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 (1, 1A, 7-22, 127-168); (3) Linguistic Anthropology (4, 5, 18, 71-79, 167, 171-178); (4) Archaeology (3, 182A, 184-189); (5) Biological Anthropology (2, 6, 180, 181, 183). 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 field research in archae-
ology 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 affairs coordinator in the department. Other prospective students should request application materials from the Graduate Admission Support 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 February 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 only exceptional cases are considered.

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 Support 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. program includes a number of required courses and examinations. It also allows the student to develop a flexible program reflecting special interests, under the supervision of a faculty committee chosen by the student. Students are encouraged to plan for completion of all work for the Ph.D. in five years.

As part of the Ph.D. requirements, students must:

1. Pass within the first year, at an acceptable graduate level, four of the courses in Anthropology designated by the faculty as evaluation
238 SCHOOL OF HUMANITIES AND SCIENCES

courses, including History of Anthropological Theory.
2. Submit an acceptable, substantial research paper in the Spring Quarter of the first year.
3. During the second year, pass at a satisfactory level at least three additional graduate-level courses in the department.
4. Serve as a teaching assistant for two courses, usually during the second year of graduate study. An approved internship may be substituted for part of this requirement.
5. By the end of the second year, pass at least one course designated as satisfying the graduate requirement in anthropological methods.
6. Pass, by the end 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. (This is a requirement of students whose native language is English. Students whose native language is not English are exempted from this requirement by demonstration of satisfactory command of English.)
7. By the end of the second year, after completing the above requirements and recruiting the special examination committee, and upon recommendation of the anthropology faculty, petition for admission to candidacy.
8. Pass a special examination (written and oral), normally given during the 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.
9. Prepare a dissertation proposal to be approved by the student’s dissertation committee before undertaking doctoral research.
10. Present an approved dissertation based upon independent research.

Ph.D. MINOR

The requirements for a minor in Anthropology consist of 30 units of anthropology taken at Stanford with an LGI of “B” or better in each course. Students minoring in Anthropology must: have an adviser within the department; with the adviser, develop a coherent course of study related to the Ph.D. program, including three courses in theory/methods and one course in a geographical area; file with the student affairs coordinator in the department the Minor Requirement for Ph.D. Candidate form and a copy of the major department program or candidacy form; and have a representative from the Department of Anthropology on the University Oral Examination Committee.

FINANCIAL SUPPORT

The department endeavors to provide needed financial support (tuition plus stipend) to all students admitted to the Ph.D. program who maintain a satisfactory course of study. Currently, the source of this support is school funds. 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 16. A student who wants a comprehensive introduction to all four subfields of anthropology should take Anthropology 1, 2, 3, 4, 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, and related topics. Lectures, films, and readings are used in the presentation of culture case studies illustrating basic generalizations. DR:2†(∗) or DR:9†(4∗ or 5∗)
3 or 5 units, Aut (Mahar)

1A. Social and Cultural Anthropology: World Views and Encounters—How peoples have understood and construed their place within humankind in the cosmos, and how peoples have interacted in the contexts of imperial and colonial expansion. Emphasizes the experience of peoples in the western hemisphere.
5 units, Win (G. Collier, Fox)
2. Genes, Culture, and Human Diversity—
(Same as Human Biology 1.) Introduction to genetic and cultural evolutionary theory as applied to the analysis of human diversity. Case study approach illustrates general principles of evolutionary and cultural evolutionary theory as applied to the analysis of human diversity. Case study approach illustrates general principles of evolution and similarities and differences between genetic and cultural change. Topics: Mendelian genetics, molecular biology, Darwinian theory, the modern synthesis, the concept of culture, cultural diversity, marriage and kinship, and cultural evolution. May be taken as a first course in anthropology or human biology. DR:5(7*) or DR:9(5*)

3 or 5 units (Durham, Wolf) not given 1991-92

3. Human Prehistory—The aims, methods, and data of prehistoric archaeology. The development of human society from early hunters through late prehistoric civilizations. Examines archaeology 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:5(5*)

3-5 units, Aut (Rick)

4. Language and Culture—(Same as Linguistics 4.) Language as part of culture. Individual and community repertoires of languages, dialects, jargons, registers, and nonverbal communication, and their rules of use. Structure of discourse, including conversation, narrative, and poetry. Language as a martial art: style, strategy, and politics in manipulating the rules of use. Linguistic relativity, encodability, and cultural origins of vocabulary and grammar.

4-5 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 innate nature of language acquisition. Vision, color terminology, and biological explanation in linguistic theory.

4-5 units (Fox) given 1992-93

6. Human Origins—(Same as Human Biology 106.) Evidence for the evolution of humankind from its beginnings several million years ago to the emergence of Homo sapiens. Emphasizes fossil hominin remains from their discovery to their interpretations for elucidating human origins. DR:5(7)

5 units, Spr (Hager)

7. Investigating Culture: Introduction to Anthropology—Appropriate for students going overseas, foreign students, and for freshmen. 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 1991-92

10. Identities—(Same as Feminist Studies 147A.) Seminar examines processes shaping people’s self-conceptions and conceptions of others, focusing on the role of class, race, and gender in shaping ethnic identities. What are Western concepts of “self” and how have these concepts been appropriated or transformed by individuals and groups asserting oppositional identities? Readings in texts on social theory and literature, popular culture and official documents, e.g., immigration policies or high school history textbooks.

5 units (J. Collier) given 1992-93

11. Sex Roles and Society—(Same as Feminist Studies 140.) The diversity of women’s and men’s roles, experiences, and self-conceptions in a number of human societies. A critical perspective on contemporary views of the “nature” of women and men, and how women and men shape and are shaped by particular forms of social life. DR:2t(5*)

3-5 units, given 1992-93

14. Cultures in Crisis—The present 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. The global and national factors of local problems. Seminar with maximum student participation. Enrollment limited to 15. DR:2(5*)

5 units (Befu) not given 1991-92

15. Anthropological Perspectives on American Culture—(Same as Education 116X; upper division students register for 116.) 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:9(5) or DR:3
3-5 units, Spr (G. and L. Spindler)
TTh 2:15-3:45

17. Astronomy and Culture—Cross-cultural histori cal examination of a variety of astronomies, focusing on the relations among conceptual systems, cultural practices, and empirical reality. Comparison of ancient Maya calendrical astronomy, Pacific Islanders’ navigational astronomy, and ancient and Medieval Western astronomy.
3 units, (Fox) not given 1991-92

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 deci plement, major writing systems of the world, scribal practice, and current issues and problems in literacy.
4-5 units, Aut (Fox, McDermott)

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 1991-92

73A,B,C. First-Year Spoken Yucatec Maya—For beginners. Introduction to the language of the Maya of Yucatan, Mexico. Emphasis on modern spoken Yucatec, with some attention to colonial and pre-Columbian writings.
3 units (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 Incas 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 Social 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 a particular anthropological analysis of a nonwestern society. Enrollment limited to 20.
5 units, Aut (Staff)
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, ethnography, and use of documentary materials. Strategies of successful entry in the community, research ethics, interpersonal dynamics, and the reflexive aspects of fieldwork. Prerequisite: introductory course in anthropology or consent of instructor.
5 units, Spr (Thompson)

94. Post-Field Research Seminar—(Same as Latin American Studies 153.) Helps undergraduates analyze and write about material gathered during summer fieldwork, emphasizing writing and revising as key steps in analysis and composition. Students critique classmates' work and revise their own writing in light of others' comments. Reading/discussion on power issues in fieldwork and ethnographic writing, thus setting craft concerns within broader political contexts. Objective: produce an excellent ethnographic report based on original field research.
5 units, Aut (Streicker)

95. Honors Program—Directed independent study and honors thesis work for students admitted to program.
any quarter (Staff) by arrangement

96. Directed Individual Study—For undergraduate students with special needs, and showing capacity to do independent work. Prerequisite: 1 or consent of instructor.
any quarter (Staff) by arrangement

99. Honors/Masters Writing Workshop—(Graduate students register for 199.) For students in the process of writing honors theses or master's theses. 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 North 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, Win (Barnett)

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. DR:2(*)
3-5 units, Aut (G. Collier)

104. Agrarian Change, Marginality, and Human Rights in Latin America—(Same as Latin American Studies 128, Political Science 128R.) Introduction to agrarian change, trends, and urban marginality in Latin America, focusing on the characteristics of traditional peasant societies, land tenure systems, agrarian reforms and revolutions, peasant movements, agricultural modernization, rural to urban migrations, urban marginality and the informal sector, the problem of natural resources and ecological deterioration, foreign investments and state policies regarding the agricultural sector, the state and policies of urbanization. The relation of the above to changing power structures and the human rights of peasantries, migrants, indigenous peoples, and urban squatters.
5 units, Aut (Stavenhagen)

105. Introduction to African and Afro-American Studies—(Same as African and Afro-American Studies 105.) Introduces African and Afro-American Studies as an interdisciplinary field. Explores contrasting and contradictory interpretation of several key representative aspects of Africa and Afro-American social and cultural institutions. Topics: African survivals in the New World; New World slavery; the black family; the Afro-American as artist; and the Afro-American identity. Why interpretations developed at particular times and the relationship between African and Afro-American Studies and other disciplines. DR:3(*)
5 units, Win (Porter)

106. Afro-Latin American Peoples and Cultures—The historical development of Afro-Latin American communities. Themes: African origins, the slave trade, slavery and resistance, emancipation processes, race and class relations, systems of racial classifications, family life, and religion. Varying definitions and political and cultural significance of black identity. Contexts within which academic and popular interpretations on these topics emerged.
5 units, Win (Streicker)

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, Spr (Fox)

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: shifts in patterns of marriage and family life, the emergence of new classes, the impact of Islam and Christianity. DR:2(*) or DR:9(5*)
5 units (Gibbs) not given 1991-92

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, Argentina, and Chile. Corequisite: Dance 77 (lab). DR:7(2*)
2-4 units, Spr (Cashion)

111. Islamic Science and Technology—(Same as VTSS 142.) Interaction of Islam with science and technology. How has Islam encouraged and constrained development in science and technology through: doctrinal views of Islam on knowledge acquisition; need to reconcile scientific facts with divine revelation; imposition of moral and ethical standards; and the development or adaptation of technologies to serve needs specific to the Islamic community? Emphasis on contemporary movement of Islamic scholars in the U.S. and abroad to "Islamize" all fields of science and technology.
4-5 units, Spr (Nabti)

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 1991-92

116. Anthropological Perspectives on American Culture—(See Anthropology 15.)
3-5 units, Spr (G. and L. Spindler)
117. Traditional Chinese Society—The society, culture, family, and political economy of late traditional China to 1949. The nature of social change in this premodern agrarian civilization. DR:2†(⁎) or DR:9†(5*)

5 units, not given 1991-92

118. Contemporary Chinese Culture—Emphasizes the interdependence of political, economic, and cultural forms during the Cultural Revolution, the New Economic Reforms, and the Democracy Movement. Contrasts the roles of state policy, media image, and popular practice in the making of modern China.

5 units, Win (Goldings)

119. Chinese Systems of Authority and Dissent—Seminar examining authority systems and patterns of dissent in China in pre-Qing, Imperial, and contemporary times.

5 units, Spr (Hardie)


5 units, Win (Mancall) MTWTh 10


5 units, Spr (Mancall) MTWTh 9

121. Introduction to Japanese Society and Culture—Historical/anthropological examination of Japan's modern and postmodern conditions. The production of national culture and identity, invention, and use of tradition; gender and sexuality; minorities; issues in education; social movements, labor and capitalism. Western representations of Japan. DR:2(⁎)

5 units, Win (Yoneyama)

122. Japanese Economic Organization—The social and cultural factors in Japanese economic organization and business management, the motivational basis for commitment to work, the relation of kinship to economic system, "industrialgradation" and its correlates. DR:2(⁎)

5 units (Befu) not given 1991-92

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 1991-92

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 recent ethnographies. Emphasizes issues associated with the region (honor and shame, public and private, sexual segregation, religion, and orientalism). DR:2f(⁎)

5 units (Delaney) not given 1991-92

SOCIAL AND CULTURAL ANTHROPOLOGY

127. Art and Aesthetics in Anthropological Perspective—Surveys topics in the anthropology of art. Interpretive approaches, emphasizing non-Western and material culture. Also, political, ethical, and development issues.

5 units, Aut (Jones)

128. Ethnographic Film—Nature of the ethnographic film as a documentary form is examined through viewing and analysis of classical and current films. Uses of film and video tapes as a tool for understanding and presenting cognitive, social, and kinesic aspects of culture and as a vehicle for anthropological research. Recommended: 1.

5 units (Gibbs) not given 1991-92

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. These historical trends are related to changes in African-Americans' self-conceptions, in their status and power in American society, and in their overall American race relations and American popular culture, including the filmic media. DR:3

5 units (Gibbs) not given 1991-92

132. Language, Culture, and Education in Native North America—Interdisciplinary examination of communication and language in cross-cultural educational situations, including language, literacy, and inter-ethnic communication as they relate directly to native classrooms. Emphasis on the implications of social, cultural, and linguistic diversity for educational practice in native classrooms, along with various strategies for bridging
intercultural differences between schools and native communities.

5 units, Win (Nelson-Barber)

140. Aging: From Biology to Social Policy—
(Increased 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, Spr (Barnett)

141. Ethnic Conflicts and Nation-States in the Contemporary World: The Ethnic Question in Comparative Perspective—(Same as Latin American Studies 150, Political Science 127R.) Overview of major ethnic conflicts in the world: who is involved, what are the issues, how are they being handled. The reemergence of ethnic movements and the challenge to the nation-state. Principal theories accounting for ethnic conflicts and their critique. The question of individual and collective human rights. The international system (the UN and its specialized organs). Case studies from Eastern and Western Europe, Asia, Africa, Latin America, Canada, and the U.S.

5 units, Win (Stavenhagen)

145. Women in Cities: A Cross-Cultural Perspective—(Same as Feminist Studies 142.) Women's experiences in cities throughout the world and the determinants of their similarities and differences. Topics: women and migration, changing forms of the sexual division of labor, changing family and kinship structures, prostitution, and political activism. DR:9†(5)

5 units, Spr (Klimt)

146. Urban Problems in Anthropological Perspective—Issues from current urban problems examined from the cross-cultural perspective of anthropology. Topics: the social consequences of crowding, rural-urban migration, changing sex roles, changing family and kinship patterns, urban ethnic communities and inter-ethnic relations, urban poverty, stratification, crime, and prostitution. DR:9(5)

5 units (Staff)

alternate years, given 1992-93

149. Anthropology of Development—History of anthropology in development projects from the Colonial Period through WWII. The involvement of anthropologists at the community level, e.g., Vicos, Administration of Pacific Trust Territories; intervention in development projects and disillusionment with same, “Camelot;” the “trickle-down” paradigm, e.g., the Green Revolution; the “Bottom-up” paradigm, anthropologists in AID, local systems analysis, including on the farm research, small-scale fisheries, the rationality of peasant producers, and consideration of comparative research on diet, nutrition, and forms of exchange (implications of change from subsistence production to production for the market). Extensive use of case studies. Lectures/seminar discussion. Major paper.

5 units (Siegel) not given 1991-92

150. American Indian Ways of Knowing: 500 Years of Change and Continuity—Interdisciplinary introduction to contrasts and interaction between American Indian cultural systems (values, lifestyles, conceptualizations of the self) and Western traditions. Lectures/discussions on abstract culture theory, with concrete ethnographic examples. American Indian guest speakers provide students with opportunity to interact directly with and learn from native people. DR:3 or DR:9(5)

5 units, Spr (Nelson-Barber)

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, Spr (Rosaldo)

152. Symbolic Anthropology—For undergraduates. Symbolic analysis has developed on the premise that examination of cultural meaning and phenomenological experience is essential for anthropological understanding. Recent monographs have applied symbolic approaches to history, ethnicity, politics, ritual, and social structure. Seminar critically examines these applications and the questions they raise about the place of symbolic analysis in social inquiry. Prerequisite: introductory course in social or cultural anthropology, or consent of instructor. DR:8(3)

5 units (Delaney) not given 1991-92

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:8†(3)

5 units (Delaney) not given 1991-92
155. Food Production, Poverty, and Famines—
The widespread and long-lasting famine in Africa has dramatically brought home the point 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 1991-92

156. Law and Conflict Management—Seminar focusing on problems of order and conflict in society. Whether all societies have “law,” and the social settings of such dispute handling mechanisms as negotiation, mediation, arbitration, and adjudication. Readings in ethnographic accounts of conflict management in other societies and in modern American society.
5 units (J. Collier) not given 1991-92

158. The Sociology of Scientific Knowledge—
(Same as History of Science 155, History 133B, Philosophy 155, Sociology 140, VTSS 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, 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 1992-93

164. Ecological Anthropology—(Same as Human Biology 134.) The relationship between human populations and their environments. Examines theories on how environment influences human behavior and culture, and how human populations shape the environment. Case studies from Africa, Latin America, and America. Classical approaches within the field: cultural ecology, systems theory, optimization theory, and population dynamics. Current directions within ecological anthropology: political ecology, property theory, indigenous systems of natural resource management, and problems of conservation and development. DR:2(*) or DR:9(4*)
3-5 units, Spr (Charnley)

165. Psychological Anthropology—Introduction to contemporary themes in the anthropological study of cultural influences on psychological development and functioning. Topics: socialization, personality assessment, national and ethnic character, gender differences, abnormality and deviance, culture change, and the influence of personality on cultural institutions. Prerequisite: 1 or Psychology 1 or consent of instructor. DR:2(*) or DR:9(4*)
3 or 5 units (Gibbs) not given 1991-92

167. Ethnography of Communication—(Same as Linguistics 147.) Language use in situations, organizations, and by members of different cultures. Examination of 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 nonverbal communication.
4 units, Spr (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:9(5)
5 units, Aut (Barnett)

169. The Anthropology of Death—Proseminar exploring the complex relations between body, the individual, and society in classic and contemporary social theory and anthropological thinking about death.
5 units, Win (Kligman)

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:
4 units (Heath) not given 1991-92

172. Indigenous Languages of North and South America—Survey of Native American languages, their history, classification, structure, and possible Old World relationships. The relationship between Native American languages and the development of anthropological and linguistic theory. Native American writing systems. Problems of language, culture, and world view.
5 units (Fox) not given 1991-92

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 1991-92

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:9(4*)

4 units Win (Rickford)

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.

4 units, Aut (Garrett)

ARCHAEOLOGY AND BIOLOGICAL ANTHROPOLOGY

180. Current Topics in Hominid Evolution—Advanced seminar focusing on the earliest of the known hominids (australopithecines) who evolved in Africa from approximately five to one million years ago, and the emergence of the genus Homo about two million years ago. Current controversies on the morphology, taxonomy, and reconstruction of the social behaviors of these early hominids. Prerequisite: 6, or Human Biology 8, or consent of instructor.

5 units, Aut (Hager)

181. Evolutionary Anthropology—(Same as Human Biology 114.) Seminar on the relationship between genetic and cultural evolution in human populations. Reviews new works relating genes, culture, and human diversity, including sociobiology, cultural transmission theory, Darwinian culture theory, and co-evolution; emphasizes theory and supporting examples. Teams of students conduct original research projects and report to the class. Prerequisites: 2, the Human Biology Core, or consent of instructor.

4 units (Durham) not given 1991-92

182A. Archaeology and Education at Zuni Pueblo—Intensive experience in archaeological education in Zuni, N.M. Participants learn South-west archaeology and simultaneously work as teachers and tutors for Zuni H.S. 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.

3-9 units, Spr (Rick)

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 H.S. 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.

6-9 units (Barnett) given 1992-93

183. Women in Human Origins Research—(Same as Feminist Studies 147B.) Seminar on the role of women as agents of evolutionary change and as researchers in the field of paleoanthropology. Women in studies of fossils, the interpretation of early hominin social behaviors, and the earliest evidence of sexual division of labor in humans.

5 units, Win (Hager)

184. Archaeological Methods: Research Seminar—Methods of research and analysis of archaeological materials. Local stone tool materials serve as data within a class-developed research strategy. Data recording, computer entry, and statistical analysis are guided by instructor. Class produces a major report on prehistoric stone tool technology of Stanford area. Prerequisites: 3, 185, 187, or consent of instructor.

5 units, Win (Rick) not given 1991-92

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 1991-92

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 with consent of instructor.

1-4 units (Rick) not given 1991-92
GRADUATE AND ADVANCED
UNDERGRADUATE

200A,B,C. Other Anthropologies—Collectively run seminar on contributions of Latin American, Soviet, Indian, and other non-Western European thinkers to: transformation of peasantries, gender, popular culture, and religiosity. Enrollment limited to 20. Prerequisite: consent of instructors.
5 units, Aut, Win, Spr (G. Collier, Staff)

203A,B,C. Culture and Power in Contemporary Mesoamerica—Focuses on indigenous peoples, examining their articulation in contemporary states in relation to ethnic consciousness and cultural processes. Limited enrollment, consent of instructor. Prerequisite: Spanish reading literacy.
1-5 units (G. Collier) given 1992-93

207. Indigenous Peoples and the UN System—(Same as Latin American Studies 317, Political Science 317B.) The following issues are framed by reference to collective human rights, peoples’ rights, and the right to self-determination: the rights of indigenous peoples has become an issue before the UN; a Universal Declaration of Indigenous Rights is being drafted; the ILO has approved a new convention on the protection of indigenous peoples. The OAS system is beginning work along these lines, and indigenous social movements have recently made political impact in several regions, leading to constitutional changes. Seminar explores these issues and relates them to current theoretical concerns about social movements, the nation-state, and international relations.
5 units, Spr (Stavenhagen)

223. Seminar on Japanese Anthropology—Anthropological issues and problems on Japan; concentrating on identity (or identities) of the Japanese from perspectives of gender, region, group, nation, etc.
5 units, Spr (Befu)

228. State and Society: Eastern Europe in Transition—Seminar examines transitions in Eastern Europe with respect to changing characteristics and concepts of state and society.
5 units, Win (Kligman)

5 units (Gibbs) not given 1991-92

236. Romanticizing the People: Problems of Conceptualization—Explores such concepts as “folk,” “people,” “tradition,” and “popular culture” in European theory from the romantic nationalists to the Birmingham School.
5 units, Spr (Kligman)

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 is examined from an anthropological perspective using Japan and Indonesia as case studies. Topics: cultural transmission and traditionalism, the local translation of modernization efforts, nationalism and culture, bureaucratic cultures, and educational ideology as a global phenomenon.
5 units, Win (Rohlen) MW 1:15-3:05

240. Marxisms, Feminisms, Postmodernisms—(Same as Feminist Studies 240.) Examines current debates in the social sciences and humanities by setting up a three-way conversation between different strands of Marxism, feminism, and postmodernism. Focuses on Marxist and feminist appropriations and critiques of postmodernism by examining the literature on, and by, marginalized and repressed groups. Questions of identity, location, voice, exploitation, and political strategy highlighted. Enrollment limited to 20. Prerequisites: 244 and 262 (or equivalent course in feminist theory), or consent of instructors.
5 units (Gupta, Yanagisako) given 1992-93

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 1991-92

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, Win (Delaney)

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 1991-92
253. Religion—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 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 relation between religion, power, and gender? Prerequisite: consent of instructor.

5 units, Spr (Befu)

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 nations. Interplay of "ethnicity" of minority groups with national integration. Emphasis on cultural/symbolic processes rather than institutional/structural processes.

5 units, Win (Klimt)

259. Transnationalism in a Postmodern World—Considers ethnographic efforts to come to terms with an increasingly hybrid, mobile, and interconnected world. Topics: migration, identity, and transnational communities; tourism and cultural self-representation; developments in mass media and communications; and consumerism and international markets.

5 units, Win (Klimt)

262. Topics in Political Economy—Introduction to selected themes in political economy, particularly approaches that derive from the work of Marx. Topics: the development and articulation of capitalism, imperialism, colonialism, dependency, world systems, state formation, domination, resistance and class consciousness, the nature of late capitalism, postmodernism, the political economy of race, popular culture and sport, and the discourse of development. Emphasis on ethnographic material that employs these theories to examine specific socio-historical contexts.

5 units (Gupta) not given 1991-92

264. Advanced Ecological Anthropology—Seminar on role of ecological models in the analysis of culture and social systems. Major monographs review early efforts linking environments and social systems (multilinear evolution, neo-functionalism, adaptive radiation), and evaluate current theory and research trends. Case studies include 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 1991-92

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 (G. and L. Spindler) not given 1991-92

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)

273. Seminar in Advanced Medical Anthropology—Students work on a previously chosen research problem of their choice in medical anthropology and present their work as it progresses for supportive discussion and assistance. Prerequisite: 168 or consent of instructor.

5 units, Win (Barnett)

276. Advanced Cognitive Anthropology—Seminar on how people give meaning to behavior and other events they experience from the anthropological side of the intersection of anthropology, linguistics, cognitive psychology, and sociology. Presents a cross-cultural perspective on the relations among knowledge, language, and social behavior.

5 units (McDermott) not given 1991-92

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) given 1992-93

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, Spr (Fox)

280. Training Seminar: Ethnography of Schooling—(Same as Education 280.) How to learn about culture and to analyze education-relevant
situations such as the multicultural 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, Sum (G. and L. Spindler)

289. Anthropological Methods—Helps students critically evaluate anthropological methods and their own fieldwork strategies. Explores ethnographic fieldwork and methods through an analysis of the nature of social practice as it is reflected in the anthropological literature.

5 units, Win (Mahar)

290. History of Anthropological Theory: The 19th Century—Comparative analysis of the work of major 19th-century social theorists (Darwin, Marx, Morgan, Tylor, Weber, Freud, and Boas, etc.) and a historical examination of the origins of their contributions.

5 units, Aut (Starrett)

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)

292. Dissertation Seminar—For graduate students in the process of writing dissertations and preparing for professional employment.

5 units, Aut, Win, Spr (J. Collier)

by arrangement

293. Internship.

any quarter (Staff) by arrangement

294. Design of Field Research—Seminar treating research design and the research process, emphasizing the interrelation of theory and method. Also, problems of preparing dissertation proposals and applications for research grants. Limited enrollment. Prerequisite: consent of instructor.

5 units, Spr (G. Collier)

295. First Year Paper.

2 units, Win, Spr (J. Collier) by arrangement

296. Research Apprenticeship—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 Apprenticeship—Supervised experience as assistant in one undergraduate course.

5 units, any quarter (Staff) by arrangement

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; (Professor of Research) H. John Shaw

Chair: Walter A. Harrison


Associate Professor: Aharon Kapitulnik (on leave Winter, Spring)

Assistant Professor: Martin M. Fejer

Professors (Research): Bertram A. Auld, Philip H. Scherrter, J. Cethyn Timothy, Helmut Wiedemann, Herman Winick

Courtesy Professor: Douglas D. Osheroff

Acting Assistant Professors: Christopher P. J. Barty, John D. Fox

Consulting Professors: Richard G. Brewer, Bernardo A. Huberman, Robert M. White

Affiliated Professors: Gordon S. Kino (Electrical Engineering), Anthony E. Siegman (Electrical Engineering), William E. Spicer (Electrical Engineering)

The program in 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 condensed matter physics, superconductivity, quantum electronics, space science, astrophysics, and physics of biological macromolecules. Student research is supervised by the faculty members listed above and also by various members of other
departments such as Physics, Materials Science and Engineering, and Electrical Engineering, who are engaged in related research fields. Research activities are carried out in the Department of Applied Physics, the Ginzton Laboratory, the Solid State Electronics Laboratory, the Center for Space Science and Astrophysics, the Center for Materials Research, and the Stanford Synchrotron Radiation Laboratory.

The number of graduate students admitted to Applied Physics is limited. Applications should be received by January 1, 1992. 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; Physics 210.
   b) Electrodynamics: two quarters, 6 units; Physics 220, 221, Electrical Engineering 241, 242.
   c) Quantum Mechanics: two quarters; Physics 230, 231.
3. Additional advanced courses in science and/or engineering, but not including Directed Study (Applied Physics 290), Dissertation Research (Applied Physics 390), and 1-unit seminar courses.
4. A final overall average letter grade indicator (LGI) of "B" is required for courses used to fulfill degree requirements.

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 departmental oral examination, a research progress report, a University oral examination, and a dissertation as follows:

1. Course work:
   a) Courses in physics and mathematics to overcome deficiencies, if any, in undergraduate preparation.
   b) Basic graduate courses.
      1) Advanced Mechanics—one quarter; Physics 210
      2) Statistical Physics—one quarter; Physics 212
      3) Electrodynamics—two quarters; Physics 220, 221, Electrical Engineering 241, 242
      4) Quantum Mechanics—two quarters; Physics 230, 231
   c) 24 units of additional advanced courses in science and/or engineering, not including Directed Study (Applied Physics 290), Dissertation Research (Applied Physics 390), and 1-unit seminar courses.
   d) A final average overall letter grade indicator (LGI) of "B" is required for courses used to fulfill degree requirements.
2. Research: may be conducted under the supervision of a member of the Applied Physics faculty, or appropriate faculty from other departments.
3. Departmental Oral 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, (1.b) requirements may be totally or partly satisfied with equivalent courses taken elsewhere and (1.c) 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. **The Nature of the Universe**—For undergraduates without scientific background. The structure, origin, and evolution of the universe and our growing knowledge of the objects which make up galaxies, stars, planets, etc. Discussion of some enigmas of modern astronomy, such as quasars, x-ray sources, black holes, and pulsars. Presentation is non-mathematical. DR:5(7)

3 units, Win (Walker) TTh 2:15-3:30
plus 1 hour discussion by arrangement

15A. **Cosmic Horizons**—(Enroll in Physics 15.)

3 units, Spr (Bloom)

25. **Evolution of the Cosmos**—Similar to 15A in its subject matter, but at a higher level; intended for more advanced students and students majoring in science or engineering. Origin and evolution of astronomical objects, planets, stars, galaxies, and the universe at large, emphasizing modern developments 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. Recommended: 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**—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 14-inch Cassegrain telescope are supplemented by lectures/discussion of basic observational techniques, astronomical catalogs and coordinate systems, and the relation of observations to astrophysical models. Limited enrollment. DR:5(7)

3 units, Aut, Sum (Walker) M 4:15
lab by arrangement

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 2-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 concurrent registration in Physics 25, 57, or 63; and consent of instructor. DR:5(7)

4 units, Spr (Walker) M 3:15-5
lab by arrangement

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)

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 Physics 50 series or equivalent.

3 units, Win (Petrosian)


Aut, Win, Spr (Staff)

172. **Physics of Solids**—(Enroll in Physics 172.)

3 units, Spr (Beasley)

181. **Intermediate Optics**—(Enroll in Physics 181.)

3 units, Aut (Little)

192. **Introductory Biophysics**—For undergraduate and graduate students who wish to learn about the physical basis underlying selected topics in contemporary molecular biology. Three-dimensional structure of macromolecules: x-ray diffraction and electron microscopy. Elementary statistical mechanics of conformational changes in biopolymers: proteins and lipids. Kinetic theory: mobility, diffusion, enzyme reactions. Passive and active transport through membranes: ionophores, channels, and receptors. Physics of nerve impulse propagation. Prerequisites: Biol-
ogy 21, Chemistry 30 series, Physics 50 series, or equivalents.

3 units (Doniach)

alternate years, given 1992-93


207. 3 units, Win (Fox)
208. 3 units, Spr (Fox)

210. Advanced Particle and Continuum Mechanics—(Enroll in Physics 210.)

3 units, Aut (Wagoner)

211. Fluids and Nonlinear Mechanics—(Enroll in Physics 211.)

3 units, Win (Wagoner)

212. Statistical Mechanics—(Enroll in Physics 212.)

3 units, Spr (Doniach)


3 units, Aut (Auld) MWF 10

alternate years, given 1992-93

220,221. Classical Electrodynamics—(Enroll in Physics 220, 221.)

220. 3 units, Aut (Susskind)
221. 3 units, Win (Susskind)


230. 3 units, Aut (Theodorakis)
231. 3 units, Win (Theodorakis)
232. 3 units, Spr (Theodorakis)

271. Electrical and Magnetic Properties of Solids—(Enroll in Electrical Engineering 238.)

3 units, Win (Helms)


3 units, Spr (Harrison) MWF 10


3 units, Aut (Harrison) MWF 10


3 units, Win (Harrison) MWF 10


3 units, given 1992-93

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

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.

3 units (Walker)

alternate years, given 1992-93

304. Lasers Laboratory—Laser theory and practice. Lectures on the theoretical and descriptive
background for the lab experiments, detectors and noise, the helium neon laser, laser beams and resonators, argon ion laser, cw dye laser, semiconductor diode laser, carbon dioxide infrared laser, and the Nd:YAG laser. Measurements of laser threshold, gain, saturation, and output power levels. Laser transverse and axial modes, linewidth, and tuning. Q-switching and modelocking. Limited enrollment. Prerequisites: Electrical Engineering 231 and 232, or consent of instructor.

3 units, Win (Fejer)

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 (Fejer)

307. Microstructures Fabrication Laboratory—(Enroll in Electrical Engineering 357.)

3 units, Sum (Bloom, Khuri-Yakub)

308. Wave Measurement Techniques—(Enroll in Electrical Engineering 245.)

3 units, Spr (Kino)

309. Guided Wave Optics Laboratory—Theory and practice of integrated optic and fiber optic waveguides. Lectures emphasize simple physical models of phenomena underlying practical applications. Detectors and sources, waveguide properties, characterization of waveguides, linear and nonlinear propagation effects, coupled mode theory, waveguide couplers, periodic structures, amplification, second and third order nonlinear phenomena, applications to communications, sensors, and nonlinear devices. Prerequisite: consent of instructor.

3 units, Aut (Fejer) MWF 8

312,313. Basic Plasma Physics I and II—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, collisionless shock waves, particle acceleration, and radiation processes. Prerequisites: Physics 210 and 220, or Electrical Engineering 356, or consent of the instructor.

3 units (Sturrock) alternate years, given 1992-93

314. Crystal Physics—Systematic development from a phenomenological viewpoint of the material properties of crystals; a background for research in crystals and their applications. Point, space, and magnetic symmetries. Reciprocal lattices and x-ray orientation. Tensor and matrix notation. Thermodynamic principles. Representation surfaces. Application to electric, magnetic, elastic, thermal, piezo, and optical properties of crystals. Prerequisite: Physics 172 or equivalent.

3 units, Aut (Addl) alternate years, not given 1992-93

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)

320. Quantum Optics and Selected Topics in Atomic Physics—(Enroll in Physics 320.)

3 units, Win (Chu) alternate years, not given 1992-93

321. Laser Spectroscopy—(Enroll in Physics 321.)

3 units (Staff) given 1992-93

323. Applications of Quantum Theory—(Enroll in Electrical Engineering 324.)

3 units, Spr (Pantell) alternate years, not given 1992-93

324. Physics of Particle Accelerators—General introduction to particle accelerators and beam dynamics in beam transport systems, accelerators and storage rings; fundamentals of charged particle beam optics; matrix formalism; transverse and longitudinal beam stability; concept of phase stability; particle beams in phase space; characterization of beam; closed orbit; tolerances; resonances; synchrotron radiation and quantum effects; beam lifetime; electron accelerators as synchrotron radiation sources. Prerequisites: Physics 220 and 221, or consent of instructor.

3 units, Win (Wiedemann)

326. Beam Dynamics in Storage Rings—Theory, simulation, and observation of beams in storage rings. Topics: single particle motion and the effects of magnetic field non-linearities, beam
generated signals and diagnostics, wake fields, coherent motion, instabilities, and the beam-beam interaction. Emphasis on phenomenology from an experimental viewpoint.

3 units, Spr (Siemann)

330,331,332. Quantum Field Theory—(Enroll in Physics 330, 331, 332.)

330. 3 units, Aut (Lynn)
331. 3 units, Win (Lynn)
332. 3 units, Spr (Lynn)

334. Superconducting Electronics—(Enroll in Electrical Engineering 334.)

3 units, Win (Beasley)

360. Stellar Physics—Astronomical data on stars and star clusters; classification, Hertz-Spring-Russell diagram. Equations of hydrostatic equilibrium and energy transport, equation of state for normal and degenerate matter, opacity, nuclear, and neutrino processes. Stellar evolution from main sequence to white dwarfs, neutron stars and black holes. Prerequisite: Physics 220 or equivalent, or consent of instructor. Recommended: Physics 132.

3 units, Spr (Petrosian)

alternate years, not given 1992-93

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 remnants; in pulsars, binary x-ray sources, gamma ray bursts and active galactic nuclei or quasars. Prerequisites: Physics 132 or 221, or equivalents.

3 units (Staff)

alternate years, given 1992-93

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, Aut (Sturrock)

alternate years, not given 1992-93

364. Gravitation—(Enroll in Physics 364.)

3 units, (Staff)

alternate years, given 1992-93

365. Extragalactic Astrophysics and Cosmology—Basic observational data and theories of the structure and evolution of the universe, emphasizing the physical processes in the early phases of the big bang universe. Observational properties and theoretical models of galaxies and galactic activity, and of quasars emphasizing nonthermal processes. Prerequisite: Physics 221 or equivalent.

3 units (Staff)

alternate years, given 1992-93

370. Theory of Many-Particle Systems—(Enroll in Physics 370.)

3 units, Aut (Fetter)

376. Phase Transitions and Critical Phenomena—(Enroll in Physics 376.)

3 units (Laughlin)

alternate years, given 1992-93

380,381. Lasers I and II—(Enroll in Electrical Engineering 231, 232.)

380. 3 units, Aut (Barty)
381. 3 units, Win (Barty)

382. Introduction to Nonlinear Optics—(Enroll in Electrical Engineering 346.)

3 units, Spr (Harris)


3 units (Harris)

alternate years, given 1992-93

384. The Fourier Transform and Its Applications—(Enroll in Electrical Engineering 261.)

3 units, Aut (Inan)
Win (Nishimura)
Spr (Gray)

385. Introduction to Fourier Optics—(Enroll in Electrical Engineering 366.)

3 units, Win (Hesselink)

386. Two Dimensional Imaging—(Enroll in Electrical Engineering 262.)

3 units, Win (Staff)


any quarter (Staff) by arrangement

460. Astrophysics Seminar—Discussion of current research and literature in astrophysics offered by faculty, students, and outside specialists.

1 unit, Aut, Win, Spr (Petrosian) Th 4

463. Special Topics in Astrophysics—Research level discussions of current topics in astrophysics. Content varies each quarter and year, depending on the interests of staff and students. Course may be repeated. Offered on an occasional basis.

470. Condensed Matter Seminar—Discussion of current research and literature in condensed
matter physics offered by faculty, students, and outside specialists.

1 unit, Aut (Kapitulnik) Th 4
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 on an occasional basis.

473A. Dynamics of Computation—Microscopic aspects and fundamental limits. Macroscopic approach. Distributed computation. Emergent phenomena. Open systems. 1 unit, Win (Huberman)

473B. Physics of Localization—Microscopic physics: quantum effects in one-dimensional metals at low temperature, quantum interference in magnetic fields, conductivity fluctuations; two- and three-dimensional localization, metal-insulator transition in disordered semiconductors; two-dimensional superconductors, Kosterlitz-Thouless transition, Josephson junction arrays, superconductor-insulator transition; vortex lattice melting in three-dimensions, effects of pinning, vortex glass, vortex kinetics. 3 units, Aut (Doniach)

473C. Theory and Applications of Tunneling—Emphasis on topics of contemporary interest including resonant tunneling, inelastic tunneling, coulomb blockade, tunneling through systems with strong electronic or magnetic correlations, tunneling spectroscopy of superconductors. 3 units, Aut (Beasley)

473D. Cooperative Phenomena II—Introduction to random systems, spin glasses, random fields, percolation, and localization. Topics: fluctuations, critical phenomena, and renormalization groups. Prerequisite: background in statistical physics, or consent of instructor. 3 units, Aut (Kapitulnik)

483. Current Topics in Optics and Electronics—Weekly presentations and discussions of current research topics in lasers, quantum electronics, optics, and photonics by faculty, students, and invited speakers. 1 unit, Aut Win, Spr (Staff) M 4:15
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

The department offers a program leading to honors in Art History. Students accepted into this program, in addition to completing all the requirements for the degree in art history and maintaining a 3.5 letter grade indicator (LGI) both in the major and overall, will write a scholarly essay.

At the invitation of a faculty member, a student may propose a topic of research for a theses. The proposal should be approximately five pages in length, represent an original line of inquiry, and have the approval of both the adviser and the Art History Faculty Committee on Theses. Along with the proposal, the student should submit a paper demonstrating the writing ability and intellectual capacity of the candidate. This application can be submitted as early as the Winter Quarter, but no later than the third week of the Spring Quarter of the junior year.

While working on the scholarly essay, the student registers for 8-12 units of Art 240, Individual Work: Art History. These units are in addition to the 48 required for the major. The student’s adviser assigns grades for the academic units; the faculty committee will decide whether the student graduates with honors. While it normally takes three quarters to complete the work, the scholarly essay may be turned in as early as the Winter Quarter, but no later than the first day of Spring Quarter, of the senior year.

MASTER OF ARTS

The Department of Art offers A.M. and the 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 transcripts and records, and a meeting
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 of Asian art are required to demonstrate competence in one Asian language (equivalent to three years of study) and reading knowledge of a second.
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 history, literature, classics, anthropology, 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. 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.

JOINT Ph.D. IN ART HISTORY
AND HUMANITIES

The department participates in the Graduate Program in Humanities leading to the joint Ph.D. in Art History and Humanities. For a description
of this program, see the "Humanities Special Programs" section of this bulletin.

**PRACTICE OF ART (STUDIO)**

**BACHELOR OF ARTS**

The major program in the Studio area must total 65 units. Students may major in one of four areas: painting/drawing, sculpture, design, or photography.

**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.
12 or more units of the modern art series (Art 120A through 121B).
Total units required: 49.

**REQUIREMENTS FOR SCULPTURE**

Art 40, 50 or 53, 60, 70.
Art 140, 141, 142 (two quarters required).
18 units of sculpture courses.
12 units of modern art series.
Total units required: 50.

**REQUIREMENTS FOR DESIGN**

Art 40, 50 or 53, 60, 70.
Art I plus two additional art history courses.
Mechanical Engineering 101 plus one other Mechanical Engineering course at or above the 101 level.
Art 160, 161, 162, 164, 166, 167 (intermediate design).
Art 261, 268 (advanced design).
Art 140, 145, or 150 (one quarter required).
Total units required: 60.

**REQUIREMENTS FOR PHOTOGRAPHY**

Art 40, 50 or 53, 60, 70.
Art 140, 141, or 142 (one quarter required).
Art 148.
15 units of photography courses.
12 or more units of the modern art series (Art 120A through 121B).
Total units required: 47.

The above area requirements for a major are part of the total of 65 units. A major in studio may take Satisfactory/No Credit units in courses outside the 65 units required for the major area of interest.

Students are required to meet with both their adviser and the department's undergraduate curriculum adviser during the first two weeks of each quarter to have course work approved and to make certain they are meeting degree requirements. Failure to do so will result in the withholding of registration for that quarter.

**Overseas Campus Credit for Studio Art Courses**—A minimum of 52 of the 65 units required for the studio art major must be taken at the Stanford campus. This allows a student to take art courses at an overseas campus, but still requires that the bulk of the work be done under the guidance of an adviser and an approved curriculum. In all cases, a student should meet with his or her adviser prior to planning an overseas campus program.

**Transfer Credit Evaluation**—Upon declaring a studio art major, a student transferring from another school must have his or her work evaluated by a Department of Art adviser. A maximum of 13 transfer units are applied toward the 65 total units required for the studio art major. This allows a student to receive some credit for course work completed elsewhere, but still requires that the bulk of the work be done under the guidance of an adviser and an approved curriculum. A student wishing to have more than 13 units applied toward the major must submit a petition to the adviser and then have his or her work reviewed by a studio committee.

**MASTER OF FINE ARTS**

Programs for the M.F.A. degree are offered in painting, sculpture, photography, and product or graphic design.

**Graduate Program in Painting, Sculpture, and Photography**—Provides an environment sympathetic to the needs of advanced students who are ready to involve themselves fully in these areas. Participants are chosen for the program on the basis of work which shows artistic individuality, motivated by the students' own goals and principles, and which indicates an ability to work without close faculty supervision.

**Admission**—Admission to the M.F.A. degree program 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:
   a) **Painting and Sculpture**: six or more slides of paintings or sculpture and six or more of drawings. 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 applicants 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 36 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. Participation in a weekly seminar in which their work is criticized and discussed in detail.
4. As a part of the 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.
5. Participation in the M.F.A. exhibition at the end of the second year.

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 this University.
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 be included indicating the size, date, and medium of each work; otherwise, slides should be labeled with the same information and sent in the standard cardboard box received from processing. If applicants want portfolios returned, a stamped, self-addressed container must be included.

Requirements for the Degree—The requirements for the M.F.A. degree in Design are:

1. Completion of a minimum of two years (six full quarters) of graduate work in residence or its equivalent at this University.
2. Completion in 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

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, Aut, Spr (Lewis, Nova)

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, sculpture of the Orient, and in such art forms as garden design. DR:7(2*)

3. Introduction to the History of Architecture—Selective survey of Western architecture from antiquity to the 20th century. In each period, specific buildings and historical issues, and general principles relevant to the study of architecture are examined. DR:7(2)

4 units, Win (Vinograd)

10. Introduction to Art, Renaissance to Modern: Important Events, Issues, and Personalities in European Art—Main currents in the history of Western art from the Renaissance to the present. DR:7(2)

4 units, Win (Miller)

11. Introduction to Ancient Art—Survey of the arts of Greece and Rome emphasizing architecture, sculpture, and painting, and the broader cultural context in which they flourished. DR:7(2)

4 units (Maxmin) not given 1991-92

12. Theme and Style in Japanese Art—Selected topics, presented chronologically, illuminating central artistic movements, monuments, and issues in their cultural context from prehistoric times to the 19th century.

4 units (Takeuchi) not given 1991-92

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 1991-92

The emphasis in 20, 21, and 22 is upon the international relationships between the various kingdoms and empires of Asia. The dynamic interchange of ideas and styles begetting in turn reactions or modifications indicate the rich intercultural nature of Asian art.

There are no prerequisites for these courses. Although there is an advantage to taking them in sequence, it is not required.

20. Introduction to the Art of Asia (to 600 A.D.)—India, China, and Japan from the beginnings of civilization through the 6th century. DR:7(2*)

4 units, Aut (La Plante)

21. Introduction to the Art of Asia (7th Century-13th Century)—The art of India, South-east Asia, China, and Japan from the 7th century A.D. to the Mongol invasion in the 13th century. DR:7(2*)

4 units, Win (La Plante)

22. Introduction to the Art of Asia (14th Century to the Present)—Moguls, Mongols, and Shoguns; the art of Asia from the 14th century onward. DR:7(2*)

4 units, Spr (La Plante)
105/205. Age of the Crusades—Romanesque art and architecture in Western Europe from c. 1095 to 1200 developed to meet the expansionist demands of such movements and events as the Crusades, the Pilgrimage Roads, the Norman Conquest, and 12th-century humanism in the schools. How spatial environments are built and systems of visual discourse are designed within the ideological contexts generated by monastic and feudal institutions in centers such as Chuy, Citeaux, Moissac, Mont Saint-Michel, Vézelay, Winchester, Canterbury, Durham, Santiago de Compostela, and Monreale.

4 units (Lewis) not given 1991-92

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 1991-92

108/208. Age of Realism: 15th-Century 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 enterpreneurial art markets and the new position of the artist in society, within the unstable ideological contexts of late medieval optimism, disillusionment, and premodern spiritual crisis on the Eve of the Reformation.

4 units, Spr (Lewis)

109/209. Early Russian Art and Architecture, 1050-1725—(Same as Slavic Languages 143/243.) 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. DR:7(2)

4 units, Aut (J. Kollmann)

109A/209A. The Art and Architecture of Imperial and Soviet Russia—(Same as Slavic Languages 144/244.)

4 units (J. Kollmann) not given 1991-92

109B/209B. Abstract Art in Russia, 1900-1925—(Same as Slavic Languages 141.) The history of abstract art from its beginnings in Western Europe to its wide adoption and development in Russia. Artists studied: Kandinsky, Kupka, Mondrian, Larionov, Malevich, and Tatlin.

4 units, Win (Kolesnikov)

109C/209C. From Suprematism to Constructivism in Russian Avant-Garde Theater—(Same as Slavic Languages 142, Drama 166.) Theatrical innovation in Russia during the first decades of the 20th century, examining the works of directors such as Meyerhold, Tairov, Vakhtangov, and Kurbas; choreographers such as Golievsky and Foreiger; and artists such as Kandinsky, Tatlin, Exter, Malevich and Lissitsky. The importance of the artist in the theater, the so-called "artist's theater," and the development of two-dimensional painted sets to three-dimensional stage constructions.

4 units, Spr (Kolesnikov)

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 (Nova)

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)

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)

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 (Miller) not given 1991-92
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, Aut (Miller)

116/216. Six Great Artists of the Baroque Age: Caravaggio, Bernini, Rubens, Rembrandt, Poussin, Velazquez—An in-depth study of their artistic personalities. 4 units (Miller)

116A/216A. Art and Architecture in the Age of the Baroque—DR:7(2) 4 units, Spr (Miller)

120A/220A. 18th-Century Art in Europe, 1715-1780—Survey of the major developments in painting and sculpture on the continent from the death of Louis XIV to the eve of the French Revolution. Artists: the Tiepolos, Giordano, Batoni and Mengs; Ricci, Pellegrini and Thornhill; Gainsborough, Watteau and Boucher; Chardin and Longhi; Reynolds and West; Hogarth and Greuze; Vien and the early David. DR:7(2) 4 units, Win (Marrinan)

120B/220B. Painting in the Age of Revolution, 1780-1830—Survey of painting in Europe during the French Revolution and its aftermath. Lectures align ruptures in the traditions of representation with shifting social formations. Artists: David and his students; Gros and the painters of Napoleon; Géricault; Blake. Fuseli and Goya; Turner and Constable; Friedrich, Runge and the Nazarenes; Ingres and Delacroix. DR:7(2) 4 units, Spr (Marrinan)

120C/220C. The Age of Naturalism, 1830-1875—Survey of origins, development, and triumph of naturalist painting in Europe, emphasizing emerging tensions between the traditional ambitions of painting and problems posed by new subjects and 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. 4 units (Marrinan) not given 1991-92

120D/220D. Alternatives to Impressionism: European Art, 1880-1900—Cezanne, VanGogh, Seurat, Gauguin, Symbolism, Lautrec, Ensor, Munch. DR:7(2) 4 units (Elsen) not given 1991-92

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 1991-92

121B/221B. 20th-Century Painting, 1920-1960—Dada, Surrealism, and Abstract Expressionism. 4 units (Elsen) not given 1991-92

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, Aut (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, Spr (Elsen)

123C/223C. Modern Sculpture in Europe and America—Thematic approach stresses the animating ideas and formal daring of the most important artists including Rodin, Matisse, Brancusi, Picasso, Lipchitz, Gabo, Arp, Giacometti, Moore, Gonzalez, Noguchi, D. Smith, Segal, Oldenberg, and Christo. Films, field trips, and use of the University's collections are planned. 4 units (Elsen) not given 1991-92

124/224. Picasso—Lectures cover Picasso's work in all media. 4 units (Elsen) not given 1991-92

125A/225A. Indian Painting—The major expressions of painting in India beginning with the Buddhist period as seen in the wall paintings of the Ajanta Cave Temples. Traces the changes in style until the introduction of papermaking in the 16th century, which permitted the full bloom of the Moghul and Rajput schools of the 16th through the 18th centuries. 4 units (La Plante) not given 1991-92

125B/225B. The Art of India. 4 units (La Plante) not given 1991-92

125C/225C. The Art and Architecture of Moghul India. 4 units (La Plante) not given 1991-92

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 1991-92
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, Spr (Vinograd)

126C/226C. Styles and Systems in Later Chinese Painting—Issues of style, theory, and interpretation in Chinese painting of the Yuan, Ming, and Ch'ing dynasties. Focuses on the social and cultural environments of the literati, court artists, individualists, and urban painters of later Imperial China.

4 units (Vinograd) not given 1991-92

128A/228A. Ritual Bronzes of Ancient China.

4 units (La Plante) not given 1991-92

128B/228B. Chinese Ceramics.

4 units (La Plante) not given 1991-92

128C/228C. Buddhist Art in Asia.

4 units, Win (La Plante)

128D/228D. Architecture and Gardens of Japan.

4 units (La Plante) not given 1991-92

128E/228E. Japanese Ceramics.

4 units (La Plante) not given 1991-92

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.

4 units (Takeuchi) not given 1991-92

129A/229A. Painting in Late Medieval and Early Modern Japan, 1500-1868—Investigation of the appearance, development, and interaction of the various courtly, military, and popular traditions of Japanese painting. Emphasis on questions of social meaning, patronage, and historical circumstance.

4 units (Takeuchi) not given 1991-92


4 units (W. Corn) not given 1991-92

130A/230A. American Art and Culture in the Gilded Age—Interdisciplinary study of the art, literature, patronage, and cultural institutions of the late 19th century. Covers aestheticism, conspicuous consumption, the grand tour, and the expatriate experience; also the period’s great artists, collectors and tastemakers, and the symbolic importance of world fairs, and expositions. DR:7(2)

4 units (W. Corn) not given 1991-92

130B/230B. Paris and New York: Transatlantic Exchange in Early Modernism—Enrollment limited to juniors and seniors. The artistic and cultural exchange between Paris and New York in the early decades of the 20th century. Franco-American circles around Gertrude Stein, Alfred Stieglitz, and Walter Arensberg, and movements such as Cubism, Expressionism, and Dada. DR:7(2)

5 units (W. Corn) not given 1991-92

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. DR:7(2)

4 units (W. Corn) not given 1991-92

130D/230D. American Art after World War II—Contemporary art as it developed in New York and on the West Coast after the war. The Abstract Expressionists and Pop artists in New York, and the Assemblagists, Bay Area figurative, and Funk artists on the West Coast.

4 units, Win (Jones)

130E/230E. The Poet and the Artist in American Modernism—Interdisciplinary study of the friendships, exchanges, and common concerns of writers and artists in the early modern period. Focuses on the writings of Pound, Williams, Stevens, Cummings, Crane, Anderson and the art of the Stieglitz circle, Joseph Stella, Demuth, Sheeler, and Murphy.

5 units (W. Corn, A. Gelpi) not given 1991-92

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, Aut (Leivick)

174/274. Baroque Architecture—Survey of European architecture in the 17th and 18th centuries. The transformation of Classical Forms by architects Bernini and Borromini in Italy, Mansart in France, and Wren in England. The crea-

4 units (Turner) not given 1991-92

175A,B/275A,B. Modern Architecture I, II—Two-quarter tracing of the developments, largely in Europe, which led to the present state of architecture and urbanism. Emphasis on the designer's responses to new materials, technology, and environmental conditions. DR:7(2)

4 units (Turner) not given 1991-92

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, Aut (Joncas, Solomonson)

190X. Readings in Art History—(Same as German 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—(Same as Classics 301.) 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 1991-92

202A. Seminar: Greek Vase Painting—For graduate students only. Prerequisite: 100A or 102.

4 units, Spr (Maxmin)

206A. 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 problematics: genres of texts, literacy and reader response, semiotics, pictorial exegetics, ownership and patronage, codicology, paleography, and the role of the artist vs. the designer of the book.

4 units (Lewis) not given 1991-92

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, economies, 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 1991-92

214A. Seminar: Mannerism.

4 units (Nova) not given 1991-92

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 great German scholar, Aby Warburg. Students read/discuss books written by art and cultural historians associated with the institute: Saxl, Sezne, F. Panofsky, Yates, Gombrich and Baxandall.

4 units (Nova) not given 1991-92

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 1991-92

214D. Seminar: Italian Renaissance Drawings—Function, Form, and Collecting—Prerequisite 110A, B, or C.

4 units, Win (Nova)

217. Connoisseurship in 17th-Century Italian Drawing.

4 units (Miller) not given 1991-92

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 1991-92

219. Colloquium on Political Ideology in 17th-Century European Art in Court and Church—Monarchical eulogy and related political allegory; the art of religious propaganda of the age of the Counter-Reformation.

4 units, Spr (Miller)

219A. Colloquium: The Bolognese School of Painting, 16th-18th Centuries.

4 units (Miller) not given 1991-92

219B. Colloquium on the History of Printmaking.

4 units (Miller) not given 1991-92

221. Graduate Seminar: Problems in European Art c. 1800.

4 units (Eitner) not given 1991-92

221C. Seminar: Aspects of Realism in 19th-Century Painting.

4 units (Marrinan) not given 1991-92

221D. Undergraduate Colloquium: Construction of the 19th-Century Masterpiece.

4 units (Marrinan) not given 1991-92
221E. Seminar: The Vision of Art History.
4 units, Aut (Marrinan)

221F. Seminar: Seurat.
4 units, Spr (Marrinan)

223C. Seminar on Late 19th-Century Art:
Rodin.
4 units (Elsen) not given 1991-92

223D. Colloquium: Modern Sculpture in
Europe and America.
4 units (Elsen) not given 1991-92

224A. Seminar: Picasso—Prerequisites: 224 and
consent of instructor.
4 units (Elsen) not given 1991-92

226E. Colloquium: Across Cultures—En-
counters 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 1991-92

226F. Colloquium: Psychological and Psycho-
analytic Approaches to the Visual Arts—Issues
of perception, illusions, representation, and inter-
pretation presented in theory and as related to
case studies of major monuments and artists.
4 units (Vinograd) not given 1991-92

227A. Seminar: Painting and Theory in the
Sung Dynasty—Studies of the diverse social and
institutional contexts of painting in the Five Dy-
nasties and Sung periods, against the background
of developing art theory and criticism. Court,
Buddhist, and scholarly modes of painting are
considered in relation to issues of representation,
genre, evaluation, and program.
4 units (Vinograd) not given 1991-92

227B. Seminar: Studies on 18th- and 19th-Cen-
tury Chinese Painting—Investigation of newly
important pictorial genres, antiquarian and popu-
lar taste, and the changing social role of urban
painters in 18th- and 19th-century Yangzhou and
Shanghai.
4 units (Vinograd) not given 1991-92

227C. Colloquium: Chinese Individualist
Painters of the 17th Century—Issues of artistic
systematization, political significance, popular
culture, psychobiography, self-portrayal, and tex-
tuality in the art and writing of major painters
active in 17th-century China.
4 units (Vinograd) not given 1991-92

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, Win, Spr (Vinograd)

229D. Seminar: Problems in Japanese Paint-
ing—Graduate seminar on selected aspects of
Japanese painting; topic to be determined ac-
cording 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 Japa-
nese genre painting. Includes training in use of
Japanese dictionaries, bibliographies, and other
reference tools. Prerequisite: consent of instruc-
tor.
4 units (Takeuchi) not given 1991-92

229E. Colloquium: Japanese Woodblock
Prints—Technical, social, thematic, and connois-
seurial aspects of "images of the floating world"
in 18th- and 19th-century Japan. Prerequisites:
12, 129, 129A.
4 units (Takeuchi) not given 1991-92

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; and the historical, social, ideological,
and economic factors behind the artistic fertility
of this unprecedented period of productivity in
Japanese painting. Prerequisites: 12, 129, 129A.
4 units (Takeuchi) not given 1991-92

231A. Undergraduate Seminar: Photographs as
Historical Documents—(Same as History 230S.)
5 units (J. Corn, W. Corn) not given 1991-92

232. Seminar: Film Theory, Feminism, and the
History of Art.
4 units (W. Corn) not given 1991-92

233. Colloquium on the History of Photogra-
phy—Readings on the history and criticism of
photography combined with a close study of
works in Bay Area collections. Enrollment lim-
ited.
4 units, Spr (Jones)

235. Seminar on Art Historical Methodology—
Introduction to the major methods and ap-
proaches developed in the modern praxis of art
history through discussion and analysis of se-
lected readings.
4 units, Win (Lewis)

235A. Seminar on Art History: Ideas and Ideol-
ogy—Readings/discussion of contemporary art
history and art criticism, dealing with the prob-
lematics of post-structuralism, feminism and is-
suess of gender, the new Marxism, reception the-
ory, semiotics, and deconstruction.
4 units (Lewis) not given 1991-92

236. Art History Bibliography and Library
Methods—Introduction to reference works and
library techniques essential to the study of art
history and architectural history. Sources of art-
istic, historical, and cultural information are cov-
ered in their printed and automated forms. 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.

4 units (Bowen, Ross)

4 units (Elsen) not given 1991-92

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. Undergraduate senior art history majors prerequisite: consent of the instructor.
2-3 units (Elsen, Merryman) not given 1991-92

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 1991-92

239A. Colloquium: The Western Artist in the 20th Century—For art history majors or graduates students. Readings/discussion. Topics: the artist as a political and social critic, censorship, artists' rights, the art world, and self-imposed limits on artistic freedom.
4 units, Win (Elsen)

any quarter (Staff) by arrangement

277. Seminar: Le Corbusier and Problems in Modern Architecture—Prerequisite: consent of instructor.
4 units (Turner) not given 1991-92

278. Seminar: The Design of the American College Campus—Prerequisite: consent of instructor.
4 units, Aut (Turner)

279. Seminar: Frank Lloyd Wright and Problems in American Architecture—Prerequisite: consent of instructor.
4 units (Turner) not given 1991-92

4 units, Win (Stout, Turner)

295. Teaching and Professional Work Experience.
4 units, Aut, Win Spr (Staff) by arrangement

any quarter (Staff) by arrangement

any quarter (Staff) by arrangement

RELATED TOPICS
Topography and Monuments of Greece—(See Classics 108.)
Classical Athletics—(See Classics 14.)

PRACTICE OF ART
SPECIAL SEMINARS

These courses are designed for non-majors in studio art. No prerequisites.

14. Special Seminar in Drawing.
2 units, Aut, Win (Staff)

15. Special Seminar in Printmaking.
2 units

2 units, Spr (Staff)

17. Special Seminar in Photography.
2 units, Win (Staff)

BASIC

40. Basic Drawing—Basic drawing concepts introduced through charcoal.
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)

60K. Basic Design—Introduction to visual language and media, and their applications to communication and environment. Two- and three-dimensional projects.
4 units, Aut, Win, Spr (Kahn)

70. Photography I—Introduction to basic camera and lab techniques. Class lecture and discussion, viewing of slides, and field work. Viewing sessions in the Stanford Museum and Art Gallery scheduled according to current exhibitions. 35mm camera required.
4 units, Aut, Win, Spr (Leivick, Volkerding)

INTERMEDIATE

117. The History and Philosophy of Design—(Same as Mechanical Engineering 117, VTSS

4 units, Aut (Katz)

140. Drawing I—Fundamentals of composition in black and white. Emphasis on the visual aspects of specific subjects which include still-life, model, landscape using charcoal, pencil, pen and ink, and pastel. Recommended as the beginning drawing class for studio art majors.

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—Beginning/intermediate painting. Extended problems in pictorial organization and content, with stress on oil painting. May be repeated for credit. Prerequisite: 40 or 140, 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 many 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, Aut, Win, Spr (Staff)

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)

160K,L. Design I: 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, Aut, Spr (Kahn)

161. Design II: Type and Symbol Design—Introduction to the principles of type and symbol design, emphasizing conceptual thinking. Prerequisite: 60.

3 units

162. Design III: Typographic Design—Introduction to typography, emphasizing the expressive use of type. Prerequisite: 161.

3 units

164. 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

166. Silkscreen Process/Textiles—Design projects in pattern as it applies to cloth, paper, and other surface materials. Production emphasis is on the silkscreen printing process. Prerequisite: 160 or 161.

3 or more units

167. Metalsmithing—Projects in jewelry and small, fine objects. Emphasis on design and craftsmanship in metal construction and lost wax casting. Prerequisite: 160.

4 or more units (Kahn) not given 1991-92

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. A 5-week term urban design problem summarizes principles discussed in the readings, seminars, and workshops.

5 units, Win (Cast)

168B. Urban Design Studio—A 10-week comprehensive urban and architectural design project taken from a current problem in San Francisco. A systematic understanding of the urban design process and problem solving methods. Graphic, diagrammatic, and other visual tools of analysis and communication are used in the study project. Enrollment limited to 14. Recommended: Urban Studies 170.

5 units, Spr (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 (Kahn)

170. **Photography II**—Students individually pursue a topic of their own definition. Class sessions meet for individual and group critiques, lab demonstration, and discussions.

3 units, Win, Spr (Volkerding)

172. **Alternative Processes**—Concerned primarily with technical procedures and the uses of primitive and hand-made photographic emulations. Prerequisites: 70, 170, 270, or consent of instructor. Enrollment limited to 10; priority is given to advanced students.

3 units, Aut (Leivick)

173. **Photography Abroad**—Students may register for 1, 2, or 3 units of photography while enrolled in an overseas program. Additional units may be taken for lab work upon return to Stanford campus. Consent of instructor required prior to going overseas.

Aut, Win, Spr (Leivick, Volkerding)

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**ADVANCED UNDERGRADUATE AND GRADUATE**

241. **Advanced Drawing and Painting Criticism I**—Prerequisites: at least two quarters of painting or drawing and consent of instructor.

Aut, Win, Spr (Oliveira) 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. **Advanced Design I: Advanced Graphic Design**—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

262. **Advanced Design II: Graphic Organization**—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

268. **Design Synthesis**—Mature semi-elective problems in composite and multi-media design areas. Prerequisites: any two design courses above 160.

4 or more units, Spr (Kahn)

269. **Advanced Creative Studies**—Evening seminar based upon elective design projects in areas of individual specialization. Prerequisite: consent of instructor.

3 or more units, Aut, Win (Kahn)

270. **Photography III**—

Aut, Win, Spr (Leivick, Volkerding) by arrangement

271. **Directed Advanced Photography: The View Camera, Its Uses and Techniques**—Designed for the serious student of photography who wishes 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**—

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)

281. **Concepts of Text**—(Same as Computer Science 273.) What every literate person should know about the basic principles of the visual organization of text. Subjects: handwriting, typewriting, typography, and computerized documents. Perceptual, linguistic, and semiological issues are discussed. Consists primarily of visual exercises.

3 units, Spr (Bigelow)

340. **M.F.A. Seminar: Studio**—

Aut, Win, Spr (Staff) by arrangement
342. M.F.A Project: Studio. 
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 advisers on campus which courses would best meet their educational needs. Course descriptions can be found in the “Overseas Section” section of this bulletin or in the Overseas Studies Program office, 126 Sweet Hall.

111A. Tuscan Art from Giotto to Leonardo—Florence. DR:7(2) 
4 units, Aut, Spr (Todorow)

111B. High Renaissance and Mannerism in Florence, Rome, and Venice—Florence. DR:7(2) 
4 units, Win (Todorow)

120X. New Ways of Seeing—Berlin. DR:7(2) 
4 units, Win (Neckenig)

123X. German Art in the Weimar Republic and the Nazi Period—Berlin. DR:7(2) 
4 units, Spr (Neckenig)

ASIAN LANGUAGES

Emeriti: (Professors) David S. Nivison, Frederic Spiegelberg 
Chair: Makoto Ueda 
Professors: Albert E. Dien, Makoto Ueda, John C. Y. Wang 
Associate Professors: Thomas W. Hare, William A. Lyell, Susan K. Matsioff 
Assistant Professors: Chaofen Sun, Steven Van Zoeren (on leave 1991-92) 
Senior Lecturers: Kazuko M. Busbin, Yin Chuang, Hiroyasu Kubota, Kimie Nishimura Nebrig, Hiroshi Sakamoto, Dorothy Shou (Asian Languages) 
Lecturers: Fumiko Arao (Asian Languages), Young-Mee Cho (Asian Languages), Yu-hwa Liao Rozelle (Asian Languages), Yasuo Yagi (Asian Languages) 
Visiting Professors: Shou-hsin Teng (Taipei Program), Ann Waswo (History, Spring only) 
Visiting Assistant Professor: Youqin Wang (Asian Languages)

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 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 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 China and Japan. Assignment is made through the regular undergraduate 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, 25, and 105 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.

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 291; 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 or 221-223, 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 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 before completing the A.M. degree.
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 following: Chinese literature, Chinese history, Chinese philosophy, Chinese linguistics, Chinese religion, Chinese art, Chinese anthropology, Japanese literature, Japanese history, Japanese religion, Japanese art, and Japanese anthropology.

**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 Division Special Programs" section in this bulletin.

### STUDYING ABROAD

Students interested in a serious study of Japanese language, history, culture, and social organization can 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 in 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.

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:8(3*)

4 units, Win (Ivanooh) MWF 10

91. **Traditional East Asian Civilization: China**—Introduction to Chinese culture in a historical context. DR:2 or 7(2*)

5 units (Van Zoeren) not given 1991-92

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 (Hare) MWThF 10

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, Lee 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 (Ivanooh) MWF 10

131. **Chinese Poetry in Translation**—Readings in traditional poetry and poetics emphasizing genre, theme, and style. DR:7(2*)

4 units (Van Zoeren) not given 1991-92

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 (Wang) MWF 11

133. **Modern Chinese Literature in Translation**—Readings in representative 20th-century works of fiction, drama, and poetry. DR:7(2*)

4 units, Spr (Lyell) MWF 11
135. Japanese Drama in Translation—The development of drama from early religious ritual forms through noh, puppet theater, and kabuki. Plays are analyzed as dramatic literature and in terms of performance. Video tapes supplement lectures. DR:7(2*)
4 units, Aut (Hare) TTh 11-12:15

136. Japanese Poetry in Translation—Introduction to the Japanese poetic tradition, from the Man’yōshū through renga and haikai. DR:7(2*)
4 units (Staff) not given 1991-92

137. Japanese Fiction in Translation—Introduction to major works of prose narrative from pre-modern Japan (7th through mid-19th centuries), read in English translation, emphasizing the historical, intellectual, and cultural context in which they were written. Works vary each year; course may be repeated for credit with the instructor’s permission. DR:7(2*)
4 units (Hare) given 1992-93

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 (Ueda) given 1992-93

142. Person, Number, Gender—(Same as Comparative Literature 142.) Overlooked elements of grammar and linguistic structure (e.g., person, number, and gender of the title) often carry philosophical and epistemological weight in literary discourse. Readings of central texts from India, China, Japan, and ancient Egypt focus on detailed consideration of passages in the original languages of the texts (prior knowledge of the languages not required).
4 units, Spr (Hare) TTh 2:15-4:05

152. Nomad Empires of Inner Asia—(Same as History 195.) Inner Asia as an arena of conflict between agricultural and nomadic societies and the traces of cultural diffusion. DR:2(*)
4-5 units, Win (Dien) MTWThF 2:15

153. Science and Technology in Traditional China—(Same as History 193, History of Science 153.) Technological achievements and scientific undertakings of traditional China and the ideological and social factors which aided or hindered such enterprises. DR:2(*)
5 units (Dien) given 1992-93

156. China from Earliest Times to the 9th Century—(Same as History 192A.) Geo-historical origins to the Tang period: the first 4,000 years of social formations and historical transformations of ancient and early medieval China. DR:2(*)
5 units, Aut (Dien) MTWThF 11

169. Who’s Speaking? The Positioning of the Speaking Subject in Western and Chinese Poetry—(Same as Comparative Literature 169.) Where does the spoken voice come from? How is it constituted? Why is it formulated in certain ways? Where does it derive its stability from, or is stability impossible, despite efforts to the contrary? Focus is on the issue of poetic persona, the occupation of the space of the Other from which to speak. Readings: poems from the English, French, and classical Chinese traditions; and critical and theoretical works (Empson’s work on the pastoral, and Burke’s work on rhetoric).
5 units, Aut (Palumbo-Liu) MW 11-12:30

181. Japanese Women Writers—Survey of works in translation by women novelists and poets from the Meiji period to the present. Focuses on women’s response to their marginal role in Japanese society and the literary establishment. DR:7(2*)
4 units, Spr (Staff) MW 3:15-4:35

3 units (Ueda) not given 1991-92

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 11 or 1:15
2. 5 units, Win (Shou) MTWThF 11 or 1:15
3. 5 units, Spr (Shou) MTWThF 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 to improving conversation.
1B. 3 units, Aut (Rozelle) MWF 10 or 2:15
2B. 3 units, Win (Rozelle) MWF 10 or 2:15
3B. 3 units, Spr (Rozelle) MWF 10 or 2:15

5. Intensive First-Year Modern Chinese—Equivalent to 1, 2, and 3 combined.
12 units, Sum (Staff) MTWThF 8-12
7.8. Beginning Conversational Chinese—Two-quarter sequence to equip students with basic language skills in Mandarin to function abroad.
2 units, Win (Rozelle) TTh 2:15
2 units, Spr (Rozelle) 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 (Chuang) MTWThF 9
22. 5 units, Win (Chuang) MTWThF 9
23. 5 units, Spr (Chuang) MTWThF 9

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 3:15
22B. 3 units, Win (Y. Wang) MWF 3:15
23B. 3 units, Spr (Y. Wang) MWF 3:15

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 (Show) TTh 2:15
28. 2 units, Win (Show) TTh 2:15
29. 2 units, Spr (Show) TTh 2:15

51. Chinese Calligraphy—Practice in writing Chinese characters with a brush and learning different scripts. Limited enrollment. Prerequisite: 3 or equivalent.
1-2 units, 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 (Sun) TTh 2:15-4:05

121,122,123. Advanced Chinese Conversation—Prerequisite: 23 or equivalent.
121. 2 units, Aut (Chuang) W 2:15-4:05
122. 2 units, Win (Chuang) W 2:15-4:05
123. 2 units, Spr (Chuang) W 2:15-4:05

131. 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 (Dien) W 2:15-4:05

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 (Y. Wang) by arrangement
212. 5 units, Win (Y. Wang) by arrangement
213. 5 units, Spr (Y. Wang) by arrangement

221,222,223. Advanced Classical Chinese—Prerequisite: 113 or equivalent.

221. Philosophical Texts.
5 units, Aut (Staff) MWF 1:15

222. Historical Narration.
5 units, Win (Staff) MWF 1:15

223. Literary Essays.
5 units, Spr (J. Wang) 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, Win (Ivanhoe) MW 2:15-4:05

231. Neo-Confucianism—(Same as Religious Studies 119A.) Introduction to later Confucian thought as represented in the Song through Qing dynasties. Brief introduction to Buddhist con-
cepts which provided some of the theoretical foundations for the 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: Religious Studies 55 or consent of instructor.

3 units (Ivanhoe) not given 1991-92

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: reading knowledge of Classical Chinese.

5 units, Aut (Ivanhoe) MW 2:15-4:05


241. The Short Story.
5 units (Lyell) given 1992-93

5 units, Win (Chuang) MWF 11

243. The Novel.
5 units, Aut (Lyell) MWF 9

260. Introduction to Chinese Poetry—Introduction to the basic assumptions, techniques, and genres of Chinese poetry. Prerequisites: 223 or consent of instructor.

4 units (Van Zoeren) not given 1991-92

261. Shih-ch'ing and Ch'u-tz'u—Selected readings in the two earliest anthologies of Chinese poetry. Prerequisite: 260 or consent of instructor.

4 units (Van Zoeren) not given 1991-92

263. Lyric (shih) I—Selected readings in the early history of the lyric (shih), Han through Sui dynasties. Prerequisite: 260 or consent of instructor.

4 units (Van Zoeren) not given 1991-92

264. Lyric (shih) II—Selected readings in the Tang dynasty lyric (shih). Prerequisite: 260 or consent of instructor.

4 units (Van Zoeren) not given 1991-92

266. Songs and san-ch'ü—Selected readings of songs (tsu) and san-ch'ü, Tang through Ming. Prerequisite: 260 or consent of instructor.

4 units (Van Zoeren) not given 1991-92

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) given 1992-93

272. 4 units (J. Wang) given 1992-93

273. Chinese Drama—Selected readings in dramatic works of the Yüan, Ming, and Ch'ing periods emphasizing literary, not theatrical qualities. Prerequisite: 113 or consent of instructor.

4 units (J. Wang) not given 1991-92

288. Teaching Asian Languages—(Same as Asian Languages/Japanese 288, Korean 288; Linguistics 188.) Workshop studying the theoretical and practical problems involved in teaching Chinese, Japanese, or Korean as a second language.

1 unit, Spr (Staff) by arrangement

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 sanhdi rules and syntactic structure discussed. Prerequisite: good knowledge of Chinese or consent of instructor.

4 units, Win (Sun) by arrangement

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

351. Seminar in Chinese Traditional Historiography—May be repeated for credit.

5 units, Spr (Dien) Th 2:15-4:05

371. Seminar in Chinese Literary Criticism—Readings/discussion of Chinese critical texts vis-à-vis relevant literary theories in the West. May be repeated for credit. Prerequisite: 233 or consent of instructor.

5 units, Win (J. Wang) T 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. Offered on a Satisfactory/No Credit basis.

15 units per quarter (Staff)

JAPANESE

Students registering for the first time in a first- or second-year course must take a placement test if they have had any training in Japanese before entering Stanford.

1,2,3. First-Year Modern Japanese—Basic conversation, grammar, reading, elementary compo-
sition. Daily sections may be set at the beginning of the quarter to suit schedule requirements.

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 the five quarters of Japanese for Professionals, the equivalent of Japanese 1 and 2.

7/107. 3 units, Aut (Busbin) MWF 9, 10, or 11  
8/108. 3 units, Win (Busbin) MWF 9, 10, or 11  
9/109. 3 units, Spr (Busbin) MWF 9, 10, or 11

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 11  
18/118. 3 units, Win (Yagi) MWF 11  
19/119. 3 units, Spr (Yagi) MWF 11

21, 22, 23. Second-Year Modern Japanese—Further instruction and practice in conversation, grammar, reading, and composition. Prerequisite: 3 or equivalent.

21. 5 units, Aut (Nebrig, Sakamoto, Arao)  
   MTWThF 9, 11, or 1:15

22. 5 units, Win (Nebrig, Sakamoto, Arao)  
   MTWThF 9, 11, or 1:15

23. 5 units, Spr (Nebrig, Sakamoto, Arao)  
   MTWThF 9, 11, or 1:15

   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 (Kubota) TTh 1:15 or 2:15

28. 2 units, Win (Kubota) TTh 1:15 or 2:15

29. 2 units, Spr (Kubota) TTh 1:15 or 2:15

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 fine grammar points, idiomatic usage, advanced vocabulary. Sequence course. Prerequisite: 23 or equivalent.

101. 5 units, Aut (Kubota) MWF 11-12.20

102. 5 units, Win (Kubota) MWF 11-12.20

103. 5 units, Spr (Kubota) 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. 3 units, Aut (Kubota) MW 2:15-3:30

112. 3 units, Win (Kubota) MW 2:15-3:30

113. 3 units, Spr (Kubota) MW 2:15-3:30

114. Japanese for Business—Five-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.

   2 units, Sum (Kubota) MW 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 (Kubota) TTh 11

122. 2 units, Win (Kubota) TTh 11

123. 2 units, Spr (Kubota) TTh 11

199. Individual Reading in Japanese—Asian Languages majors only. Prerequisite: 103 or consent of instructor.

   4 units, Aut, Win, Spr (Staff) 
   by arrangement

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) Th 2:15-4:05
211, 212, 213. Advanced Modern Japanese—
Students become functional speakers, readers, and writers of modern Japanese. Resource materials include newspapers, magazines, and other media. Prerequisite: 103 or equivalent.

211. 5 units, Aut (Arao) TTh 11-12:15
212. 5 units, Win (Arao) TTh 11-12:15
213. 5 units, Spr (Arao) TTh 11-12:15

221, 222, 223. Readings in Modern Japanese—
Readings in modern Japanese scholarly, journalistic, and literary prose. Each quarter may be taken separately. Prerequisite: 103 or equivalent.

221. Essays and Scholarly Articles.
5 units (Staff) not given 1991-92
222. Newspaper Articles.
5 units (Ueda) not given 1991-92
223. Fiction.
5 units (Matisoff) not given 1991-92

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, Win (Matisoff) by arrangement
248. 5 units (Hare) given 1992-93

250. Introduction to Kambun—
Selected readings from a variety of Japanese works written in Kambun, ranging from Kaifūsō to Yoshida Shōin’s diary. Offered when there is sufficient demand.

4 units (Ueda) not given 1991-92

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) W 2:15-4:05

256. Readings in Japanese Culture—

4 units (Ueda) not given 1991-92

258. Japanese Buddhist Texts—
(Same as Religious Studies 258.) Readings in medieval Japanese Buddhist materials. Prerequisite: background in Japanese and/or Chinese.

5 units (Bielefeldt) not given 1991-92

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 1991-92

280. Medieval Japanese Narrative and Dramatic Literature—
Reading/discussion of selected works of the Muromachi through early Edo periods. Prerequisite: 247, 248, or equivalent.

4 units (Matisoff) not given 1991-92

(Same as Linguistics 278, Korean 285.) Word structure in Japanese and Korean, focusing on recent theoretical proposals and innovations; derivational morphology, inflectional morphology, complex predicates, and interface between syntax and morphology.

4 units, Aut (Sells) by arrangement

288. Teaching Asian Languages—
(Same as Asian Languages/Chinese 288, Korean 288; Linguistics 188.) Workshop studying the theoretical and practical problems involved in teaching Chinese, Japanese, or Korean as a second language.

1 unit, Spr (Staff) by arrangement

294. Major Haiku Poets—
Reading/discussion of selected haiku by Bashō Buson, Issa, and others. Prerequisite: 103 or equivalent.

4 units (Ueda) not given 1991-92

296. Readings in Modern Japanese Literature—
Reading/discussion of works selected from contemporary authors. Prerequisite: 213 or equivalent. May be repeated for credit.

4 units, Aut (Ueda) MW 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 1991-92

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 re-
ception. Students complete a major paper. Prerequisite: 247 or 248.

5 units, Win (Hare) T 1:15-3:05

333. Seminar in Japanese Classical Drama—Advanced work in traditional dramatic forms, focusing on Noh drama and emphasizing the relationship between Zeami's dramatic theory and selected plays of the modern repertory. Also, issues of performance, contemporary and historical. Students complete a major paper. Prerequisite: 246.

5 units (Hare) not given 1991-92

396. Seminar in Modern Japanese Literature—May be repeated for credit.

5 units, Spr (Ueda) T 2:15-4:05


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. Satisfactory/No Credit basis only.

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

5. Intensive First-Year Modern Korean—Equivalent to 1, 2, and 3 combined.

12 units, Sum (Cho) MTWThF 8-12

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

200. Directed Reading in Korean—Prerequisite: 103 or consent of instructor.

units by arrangement, Aut, Win, Spr (Cho) by arrangement


4 units (Cho) not given 1991-92


4 units, Aut (Sells) by arrangement

ASTRONOMY COURSE PROGRAM

Committee in Charge: Vahé Petrosian (Chair), Ronald N. Bracewell, Von R. Eshleman, Peter A. Sturrock, Robert V. Wagoner, Arthur B. C. Walker, Jr.


Assistant Professors: Peter F. Michelson (Physics), Roger W. Romani

Professors (Research): Philip H. Scherrer, J. Gethyn Timothy, G. Leonard Tyler (Electrical Engineering)

Although Stanford University does not have a degree program in Astronomy or Space Science, teaching and research in various branches of these disciplines is an ongoing activity in the Departments of Aeronautics and Astronautics, Applied Physics, Electrical Engineering, and Physics. For the convenience of students interested in the general areas of astronomy, astrophysics, cosmology, and space science, 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; 160, Introduction to Stellar and Galactic Astrophysics; 161, Extragalactic Astrophysics and Cosmology; 163, Planetary Exploration; 167, Essential General Relativity. Students planning study in astronomy beyond the B.S. are urged to consider an undergraduate thesis (Astro- nomy 169).

**GRADUATE PROGRAMS**

Graduate programs in astronomy and astrophysics and related topics are carried out in the Departments of Aeronautics and Astronautics, 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, 313, Basic Plasma Physics I and II; 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 involving spacecraft studies of the planets, their satellites, and their near-space environments should consider the following courses: 195, Physics of Planetary Interiors; 227, Atmospheric and Space Physics; 279A, Space Mechanics; 279B, Advanced Space Mechanics; 279C, Optimal Space Trajectories; 348, Ionospheric Processes; 350, Radioscience Seminar; 352, Wave Propagation in the Ionosphere and Magnetosphere; 354, Introduction to Radio Wave Scattering.

**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 Applied 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, Win (Walker) TTh 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 (Bloom) MW 2:15-3:30

25. **Evolution of the Cosmos**—(Enroll in Applied Physics 25.) Similar to 15 in its subject matter but at a slightly higher level; intended for more advanced students and students majoring in science or engineering. 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. 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 Applied 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 supple-
mented 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 units, Aut, Sun (Walker) lecture M 4:15
lab by arrangement

100. Introduction to Observational and Laboratory Astronomy—(Enroll in Applied 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 2-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 concurrent registration in Physics 25, 57, or 63; consent of instructor. DR:5(7)

4 units, Spr (Walker) M 3:14-5
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 catastrophies (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:6(8)

3 units, Spr (Eshleman) MWF 9

161. Introduction to Extragalactic Astrophysics and Cosmology—(Enroll in Applied 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 3 quarters, the sequence below suggests the format most projects are expected to follow. Projects may commence in any quarter.

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


3 units, Spr (Sleep) TTh 10-11:30

227. Atmospheric and Space Physics—(Enroll in Aeronautics and Astronautics 227, Mechanical Engineering 246.)

3 units, Aut (Spreiter) TTh 2:45-4

49. Introduction to Space, Telecommunications, and Radioscience—(Enroll in Electrical Engineering 249.)

3 units, alternate years, given 1992-93

262. Introduction to Gravitation and Astrophysics—(Enroll in Physics 262.)

3 units, Win (Michelson) TTh 9:30-10:50

279A. Space Mechanics—(Enroll in Aeronautics and Astronautics 279A.)

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

279B. Advanced Space Mechanics—(Enroll in Aeronautics and Astronautics 279B.)

3 units (Staff)
alternate years, given 1992-93
279C. Optimal Space Trajectories—(Enroll in Aeronautics and Astronautics 279C.)
3 units (Staff)
alternate years, given 1992-93

301. Astrophysics Laboratory—(Enroll in Applied Physics 301.)
3 units (Walker)
alternate years, given 1992-93

312. Basic Plasma Physics—(Enroll in Applied Physics 312)
3 units (Sturrock)
alternate years, given 1992-93

350. Radioscience Seminar—(Enroll in Electrical Engineering 350.)
1 unit, Aut (Peterson)
Win (Inan)
Spr (Tyler)

352. Electromagnetic Waves in the Ionosphere and Magnetosphere—(Enroll in Electrical Engineering 352.)
3 units, alternate years, given 1992-93

354. Introduction to Radio Wave Scattering—
(Enroll in Electrical Engineering 354.)
3 units, alternate years, given 1992-93

360. Stellar Physics—(Enroll in Applied Physics 360.)
3 units, Spr (Petrosian)
alternate years, not given 1992-93

3 units (Staff)
alternate years, given 1992-93

3 units, Aut (Sturrock)
alternate years, not given 1992-93

364. Gravitation—(Enroll in Physics 364.)
3 units (Staff)
alternate years, given 1992-93

365. Extragalactic Astrophysics and Cosmology—(Enroll in Applied Physics 365.)
3 units (Staff)
alternate years, given 1992-93

450. Early Universe—(Enroll in Physics 450.)
3 units, Aut (Linde)

451. Inflation—(Enroll in Physics 451.)
3 units, Win (Linde)

460. Astrophysics Seminar—(Enroll in Applied 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 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 on occasional basis.

ATHLETICS, PHYSICAL EDUCATION, AND RECREATION

Emeriti: (Professors) Wesley K. Ruff; (Associate Professors) Miriam B. Lidster; (Director of Intramurals) William P. Fehring; (Athletic Director) Joseph H. Ruetz; (Associate Director) Robert C. Young
Director: Ted Leland
Assistant to the Director: Sue LemMon
Senior Associate Director: Alan A. Cummings
Associate Director, Intercollegiate Services: Thomas Beckett
Associate Director: Cheryl Levick
Associate Director, Development: Christopher Ritrievi
Director, Major Gifts: John R. Kates
Director, Annual Giving: Jon Denney
Assistant Director, Financial Planning: Karen Bennett
Assistant Director, Marketing and Promotions: Jim Brungard
Assistant Director, Club Sports, Recreation, and Education Programs: Shirley H. Schoof
Director, Physical Education: Elizabeth P. Weeks
Chair of Dance Division: Susan Cashion
Senior Lecturers: Susan Cashion, Carroll Diaz, Sharon Donovan, Anne Gould, Tony Morris-Kramer, Elizabeth Weeks
Lecturers: Halifu Osumare, Janice Ross, Gwendolyn Watson
Sports Directors: Berhane Andeberhan (Soccer, women), Tim Baldwin (Golf, women), Frank Brennan (Tennis, women), Wendy Davis (Crew, women), Dante Dettamanti (Water Polo), Wallace Goodwin (Golf, men), Richard Gould (Tennis, men), Dennis Green (Football), Breck Greenwood (Gymnastics, women), Sadao Hamada (Gymnastics, men), Chris Horpel (Wrestling), Brooks Johnson (Cross Country, Track and Field), Skip Kenney (Swimming, men), Wieslaw Kujda (Crew, men), Colin Lindores (Soccer, men), Mark Marguess (Baseball), Blake Middleton (Sailing, Director and Head Coach), Mike Montgomery (Basketball, men), Ruben Nieves (Volleyball, men), Sherry Posthumus (Fencing, women), Richard Quick (Swimming, women), Richard Schavone (Diving), Don Shaw (Vol
Sport Assistant Coaches: Brian Billick (Football),
Scott Chism (Track and Field), Denise Corlett (Volleyball, women),
David Esquer (Baseball), Chris Foerster (Football), Lele Forood (Tennis, women),
Ross Gerry (Swimming, men), Jed Goldfried (Track and Field),
Brian Heery (Gymnastics, men), Ted Knapp (Swimming, men), John Kosty (Volleyball, men),
Lisa Mizel-Itzi (Gymnastics, women), Mike Nelson (Football), Doug Oliver (Basketball, men),
Julie Plank (Basketball, women), Betsy Riccardi (Track and Field), Scott Schuhmann (Football),
Steve Seandel (Basketball, men), Willie Shaw (Football), Dean Stotz (Baseball),
Dave Tipton (Football), Michael Tolleson (Football), Amy Tucker (Basketball, women),
Ron Turner (Football), John Whitlinger (Tennis, men), Tyrone Willingham (Football),
Willis Wilson (Basketball, men)
Teaching Specialists: Kate Coughlin, (Aerobics),
Standley Scott (Athletic Training)

From the founding of the University, Stanford's leaders have believed physical activity is valuable for its own sake and complementary to the educational purpose of the University. The mission of the Department of Athletics, Physical Education, and Recreation is to offer the widest possible range of quality programs for athletic participation and physical fitness at all levels of skill and interest. Within the limitations of its resources, the department is expected to provide a broad range of instructional, recreational, and competitive programs for all who wish to participate. The intrinsic value to the participant is the primary criterion by which the worth of the programs should be judged.

The goals of the instructional programs are to promote understanding of the value and role of physical activity as an important dimension of the human condition, to develop performance skills in dance and sport, to develop the participation habit, and to provide leadership opportunities in aquatics, dance, sports and other physical activities. To this end, the program encompasses a diversity of learning and participating opportunities which extend from informal recreation through organized intramural competition, basic instructional classes, and theoretical study to, and including, intercollegiate athletic competition and dance performance.

PROGRAMS

ACADEMIC DEGREES

No degrees are offered in Physical Education. The Master of Arts degree in Education: Dance Specialization is offered through the School of Education either as a coterminal degree or as a post-bachelor's degree program. 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 an aspect of human behavior. 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.

Modern dance technique, choreography, and improvisation are the core of the program. Students can also receive extensive experience in ballet, jazz, social, and non-Western forms through practical work in the classroom and in performance.

Dancers are encouraged to develop their own creative potential through 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 as well as the Dunai International Folk Ensemble 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 co-terminal 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 graduate program awards the Master of Arts in Education: Dance Specialization, and is designed for students preparing to continue professionally as dance educators. 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.

Graduate students are expected to develop a proficiency in teaching, research, choreography, or performing with either a modern or ethnic dance emphasis. Attainment of these skills is demonstrated through an individually designed creative project, completion of a teaching apprenticeship, and acceptance of a research paper. For further information about the Dance Division, contact Susan Cashion, Chair for Dance.
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: baseball, basketball, crew, cross country, fencing, football, golf, gymnastics, sailing, soccer, swimming and diving, tennis, track and field, volleyball, water polo and wrestling; for women: basketball, crew, cross country, fencing, field hockey, golf, gymnastics, sailing, soccer, softball, swimming and 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 through their campus residences from the IM Director, Howard Dallmar. 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 (room 354, Encina Gym) 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, Spring, and Summer 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, weight training facilities, an outdoor swimming pool, 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 Encina Gym weight room, many intramural fields, outdoor volleyball courts, and tennis courts. Multi-purpose rooms for volleyball, basketball, badminton, aerobics, martial arts, gymnastics, 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 enroll-
ment. 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 still record enrollment on the Official Study List and indicate 00 units. Zero-unit enrollment is allowed on a space-available basis, after enrollment for credit and by consent of instructor. The End Quarter Grade Report and student transcript record enrollment and grade.

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 badminton, horsemanship, fencing, golf, martial arts, sailing, SCUBA, windsurfing, and Club Sports classes.

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 week of classes and request a refund at that time. Half refund is given to students who drop a class during the second week 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 equipment for badminton (racket), tennis (racket and balls), and SCUBA (see course descriptions). Specific information on equipment and recommended class attire is available from the department and on the first day of class instruction.

Lockers—Lockers are available for students, without charge, from the equipment managers at Encina and Roble Gyms. Roble Gym students not enrolled in a class must wait until the second week of each quarter for locker assignment. The fee is $10 a quarter or $20 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**

All courses/classes are coeducational. Only courses with PE:X notation 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.)

**INTRODUCTORY**

Open to all students. No previous dance experience is needed.

61. Modern Dance I—Technical and creative principles of modern dance designed to develop the body as an articulate instrument.

  1 unit, Aut, Win, Spr (Kramer)

62. Dance Lab: Abdominal Workout and Stretch—Exercises designed to strengthen abdominal muscles. Thorough stretches to increase flexibility for dancers, athletes, and others.

  1 unit, Aut, Win (Delmar)

64. Movement for Actors—(Same as Drama 27A.) Exercises and improvisations for those concentrating on developing freedom and spontaneity in stage movement. Emphasis on development of characterization through movement and an examination of physical realization of scripted scenes. (PE:X)

  2 units, Aut (Morris-Kramer)

65. Musical Theater Workshop—(Same as Drama 27B.) Dance performance skills and choreography appropriate for musical theater. (PE:X)

  2 units, Win (Cashion)

66. Movement and Music for Actors—(Same as Drama 27C.) Introduction to movement skill in conjunction with knowledge of music that is useful to the actor. Attention to voice and body training in development of characterization. (PE:X)

  2 units, Spr (Morris-Kramer)

71. Ballet I—Emphasis on fundamentals of classical technique: alignment, basic barre exercises, and movement sequences in the center and across the floor.

  1 unit, Aut, Win, Spr (Delmar)
284 SCHOOL OF HUMANITIES AND SCIENCES

75. Mexican Dance and Folklore I—Three forms of Mexican dance: regional, popular/social, and religious. Taught for technical and cultural understanding. Designed for the novice dancer. (PE:X)
   2 units, Aut (Cushion)

77. Dances of Latin America—Selected dances of Latin America, specifically Mexico, Cuba, Brazil, Argentina, and Chile. Dances in relation to their cultural context. (PE:X)
   1 unit, Spr (Cushion)

   1 unit, Aut, Win, Spr (Morris-Kramer)

94. Dance of the Philippines—Overview of traditional Philippine dance.
   1 unit, Win (Panis)

96. Social and Folk Dance Forms of North America I—Sampling of dances found in the popular dance culture of N. America including waltz, swing, contra, round, square, and other social forms.
   1 unit, Aut, Win, Spr (Duke, Isaacs)

INTERMEDIATE

160A. Dance History and Philosophy—(Same as Drama 127A.) Historical lecture survey of the lives and works of key figures in Western theatrical dance, from the Renaissance to the present, through films, videos, and discussions. Topics: public attitudes and perceptions and the Romantic ideal in ballet, the changing image of the birth of abstraction in dance, the male dancer, and the pioneering matriarchs of modern dance. All are discussed against the social and cultural background of the time. (PE:X) DR:7f(2)
   3-4 units, Win (Ross)

   3-4 units, Spr (Ross)

162. Modern Dance II—Intermediate technique. Emphasis on using improvisation and composition in directed studies. Prerequisite: two quarters of 61 or equivalent. (PE:X)
   2 units, Aut, Win, Spr (Morris-Kramer)

   2 units, Win, Spr (Staff)

165. Dance Heritage: History and Styles—Workshop/seminar on the origins of movement forms that have influenced Western contemporary dance, e.g., Duncan, Graham, Horton, Limón, Aliley, Cunningham. Specific approaches and techniques utilize cross-cultural and historical perspectives; studio work is amplified by lectures, films, and readings. (PE:X)
   3 units, Aut, Win (Ross, Staff)

167. Chamber Music: Improvisation—(Same as Music 171.) Open to any student with sufficient vocal skills or technical ability to play in small combinations of string, wind, keyboard, and percussion instruments. Development of skills in the accompaniment of dance in performance. (PE:X)
   1 unit, Aut (Watson)

168. Performance Workshop: Public Performance—Workshop designed to explore and develop performance skills. Includes public performance in faculty and/or student-directed productions. (PE:X)
   1 unit, Aut, Win, Spr (Morris-Kramer)

169. Faculty Choreography—Rehearsal and performance of faculty choreography. Selection by audition. (PE:X)
   1 unit (Staff) by arrangement

172. Ballet II—Intermediate level. Continuation of 71, repeating the fundamentals with increased complexity and introducing additional movement vocabulary. Prerequisite: 71 or equivalent.
   1 unit, Aut, Win, Spr (Delmar)

173. Ballet III—Stresses accuracy and facility with fundamental classical vocabulary. Attention to movement shape and line, spatial concepts, musicality, and phrasing. Prerequisite: 172 or equivalent.
   1 unit (Delmar) not given 1991-1992

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 (Cushion)

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 Mexico, Cuba, Brazil, Haiti, Argentina, and Chile. DR:7(2*) (PE:X)
   2-4 units, Spr (Cushion)

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)

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)


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 creative process for the craft of choreography, emphasizing concepts of design, form, and content. (PE:X)

2 units, Aut, Win (Staff)

191. Stanford International Folk Dance Ensemble—Training in stylistic versatility and mastery of traditional folk dance forms. Advanced folk dances are taught in rehearsal-like format to prepare for several performances each quarter. (PE:X)

2 units, Aut, Win, Spr (Duke)

196. Social and Folk Dance Forms of North America II—Continuation of 96. Prerequisite: 96 or equivalent.

1 unit, Aut, Win, Spr (Duke, Isaacs)

ADvanced

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

260. Labanotation—Introduction to the principles and tools for the analysis and recording of movement based on the Laban system of notation. (PE:X)

2-3 units, alternate years, not given 1992-93

266. Dance Education in the Community—The role of dance in education, i.e., parks and recreation, cultural centers, and dance for children. Weekly theory discussions and technique sessions; lab session within local community center. (PE:X)

3 units, Aut (Joyce) alternate years, not given 1992-93

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, Win (Watson, Weiss)

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) TTh 1:15-3:05 alternate years, not given 1992-93

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.

23. CPR/Standard First Aid Instructor—Designed for those wishing to teach Red Cross CPR and Standard First Aid. Includes learning the skills in CPR and first aid. Also, ICT, teaching methodology, and practice teaching. Red Cross certifications upon successful completion. (PE:X)

3 units, Win (Donovan) MTW 3:15-5:15

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, Spr (Weeks) TTh 9-10.50
192. Athletic Training—For students intending a physical therapy, athletic training, or sports medicine career. Includes the spectrum of prevention, care, and rehabilitation of injuries associated with sports activities. Prerequisites: consent of instructor and course in human anatomy or analysis of human movement. (PE:X)
3 units, Win (Scott) TTh 9-10:50
alternate years, not given 1991-92

194. Classical Athletics—(Same as Classics 14.) Origins and history of competitive sport in the ancient world, from the funeral games for Patroclus (Homer) to the chariot races in the Hippodrome of Constantinople, based on the literary and monumental evidence. Attention to the spirit of competition apart from athletics. Lectures (illustrated) and discussion groups. (PE:X) DR:9(5)
2-4 or 5 units, Win (Raubitschek)

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

82. Manager: Intramural Sports—For student managers of IM sports and competitive organizations. Prerequisite: consent of instructor.
1 unit, Aut, Win, Spr (Dallmar)
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—Priority to those with summer jobs requiring certification (particularly Spring Quarter); bring letter from employer to first class meeting. 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. Fee for books. Prerequisites: pass swim test; see instructor for details.
2 units, Aut, Win, Spr (Donovan, 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, Spr (Middleton)

109. Sailing: Advanced—Refinement of heavy weather sailing skills, with emphasis on racing. Fee. Prerequisite: 108 or consent of instructor.
1 unit, Spr (Middleton)

113. SCUBA: Open Water I—Lectures, skill sessions, and three field trips. NAUI Openwater I certification upon successful completion. Student supplies mask, fins, snorkel, boots, gloves, depth gauge, underwater watch, and compass (to be discussed in class). Priority to students accepted for study at Hopkins Marine Station. Pick up information sheet at Roble Gym. Fee. Prerequisites: swim test, medical clearance, consent of instructor. (PE:X)
3 units, Aut, Spr (Donovan)

114. SCUBA: Open Water II—Open water program developing confidence beyond basic levels. Weekly lecture/discussion and three diving field trips. Emphasis on navigation, skill review, dive planning. NAUI Openwater II upon successful completion. Student must provide gear for dives including depth gauge, compass, watch, power inflator, and alternate air sources. Information sheet available at Roble Gym. Prerequisites:
SCUBA certification, medical clearance, and consent of instructor. Fee. (PE:X)
1-3 units, Aut (Donovan)

130. Swimming I: Beginning—For non-swimmers or those who can swim about 10 yards but are not comfortable in deep water. Includes instruction in safety skills, front crawl, and a back stroke. Additional strokes introduced as ability warrants.
1 unit, Aut, Spr (Donovan, Dettamanti)

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, Donovan)

132. Swimming III: Intermediate—Continued work on crawl, elementary backstroke, and backstroke. Safety skill work as needed. Introduction to or review of breaststroke and sidestroke. Conditioning as ability permits. Prerequisites: a fair crawl, elementary backstroke, backstroke, and some sidestroke; ability to swim approximately 100-200 yards continuously by mixing strokes.
1 unit, Aut, Win, Spr (Weeks, Donovan)

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 (Weeks, Donovan, Kenney)

134. Swim Conditioning—For students wanting to improve cardiovascular and respiratory endurance through directed swimming workouts. Prerequisite: advanced swimmer.
1 unit, Aut, Win, Spr (Weeks, Donovan, Dettamanti, Quick, Knapp)

135. 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—Introduction to and refinement of skills used in water polo.
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, at least Red Cross swimmer level (pass test), and current Emergency Water Safety or Lifeguard Training Certificate (pass water safety written test). (PE:X)
3 units, Spr (Donovan)

1 unit, Spr (Middleton)
Concentration on developing high level of ability and on strategic skills practiced in a competitive atmosphere. Fee.

1 unit, Aut, Win, Spr (Schacone, 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 (B. Johnson, Andeberhan, Chisam)


1 unit, Aut, Win, Spr (Posthumus)

39. Fencing: Intermediate—Continuation of 38; introduction of electrical foil fencing. Fee. Prerequisite: 38 or consent of instructor.

1 unit, Aut, Win, Spr (Tulum)

40. Fencing: Advanced—Continuation of intermediate fencing with the introduction of saber and épée. Consent of instructor. Fee.

1 unit, Aut, Win, Spr (Tulum)

42. Fencing Officiating—Supervised bouting with application of rules and officiating technique. Prerequisite: 40 or consent of instructor.

1 unit, Spr (Posthumus)

52. Golf: Beginning—Fundamentals of golf swing, use of various clubs, golf etiquette, and knowledge of rules to enable a beginner to play a round of golf. Fee.

1 unit, Aut, Win, Spr (Diaz, Stotz, Baldwin, Hamada)

54. Golf: Intermediate—Improvement and perfection of previously learned fundamentals. Utilization of these skills in the game. Fee. Prerequisite: 52 or the equivalent.

1 unit, Aut, Win, Spr (Diaz, Stotz, Bridges)

55. Golf: Advanced—Understanding of and refining the golf swing and increasing power and distance. Fee. Prerequisites: ability to hit with relative accuracy and distance, and swing with good form.

1 unit, Aut, Win, Spr (Diaz, Bridges)

56. Golf: Tournament—Advanced drills and practice on golf course for experienced players of near-varsity-level ability. Instruction and participation in medal and match play events. Fee. Prerequisites: advanced golf or previous tournament play, consent of instructor.

1 unit, Win (Goodwin)

59. Gymnastics: Beginning—Fundamental gymnastics movement for men and for women, including various flexibility and strength exercises taught on mats and on the Olympic apparatus.

1 unit, Aut, Win, Spr (Hamada, Heery)

60. Gymnastics: Intermediate/Advanced—For students with background in gymnastics. Emphasis on tumbling and somersaulting. Group instruction and individualized work for men and women to enable some specialization on the various pieces of apparatus.

1 unit, Aut, Win, Spr (Greenwood)

65. Horsemanship: Beginning Riding—No background or very little. Includes walk, trot, and canter. Fee.

1 unit, Aut, Win, Spr (Saxe, Staff)


1 unit, Aut, Win, Spr (Saxe, Staff)


1 unit, Aut, Win, Spr (Saxe, Staff)


1 unit, Aut, Win, Spr (Saxe, Staff)

69. Horsemanship: Advanced Riding—For those who have developed good control over the horse. Includes more advanced movements and jumping more demanding courses. Fee.

1 unit, Aut, Win, Spr (Saxe, Staff)

101. Posture—Individual posture evaluation; exercises for proper body alignment emphasizing flexibility and balance of muscle strength development; techniques for correct body mechanics; some nutrition, relaxation, and weight management; group and individualized exercise program.

1 unit, Aut, Win, Spr (Weeks, Coughlin)

121. Soccer: Beginning—Introduction to soccer. Includes skills of passing, shooting, control, dribbling and general offensive and defensive tactics and rules.

1 unit, Aut, Win, Spr (Andeberhar, Lindores)

122. Soccer: Intermediate/Advanced—Review of the basic skills and rules. More in-depth work on offensive and defensive tactics. Includes work and scrimmage time.

1 unit, Aut, Win, Spr (Andeberhar, Lindores)

123. Soccer: Advanced for Women—Technique under pressure, group and team tactics, introduction of modern systems of play.

1 unit, Win, Spr (Andeberhan)
148. Tennis: Beginning—Covers fundamental strokes (forehand, backhand, service, and net play), rules, and scoring.
   1 unit, Aut, Win, Spr (A. Gould, D. Gould, Posthumus, 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. Prerequisite: beginning-level class or knowledge of rules and scoring and average ability in fundamental strokes.
   1 unit, Aut, Win, Spr (A. Gould)

150. Tennis: Intermediate—Fundamental stroke review and increased emphasis on singles and doubles tactics. Prerequisite: low intermediate class or average ability in fundamental strokes and regular playing experience.
   1 unit, Aut, Win, Spr (A. Gould, Posthumus, Schavone, Horpel, Whitlinger, 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. Prerequisite: well above average stroking and game playing ability.
   1 unit, Aut, Win, Spr (Brennan, A. Gould, Horpel, Schavone, 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.
   1 unit, Aut, Win, Spr (Brennan, A. Gould, Horpel, Schavone, Forood)

154. Tennis: Computennis Scoring Techniques—Use of computer for analyzing tennis matches. Assist players and coaches by collecting data on player performance. Background in computers and statistics helpful but not necessary. Prerequisite: consent of instructor. Recommended: excellent knowledge of tennis.
   2 units, Aut, Win, Spr (Brennan, D. Gould, Whitlinger)

   1 unit, Aut, Win, Spr (Shaw)

161. Volleyball: Intermediate—Drills to improve skills and game playing strategy. As ability indicates, more emphasis on team play and strategy.
   1 unit, Aut, Win, Spr (Shaw)

162. Volleyball: Advanced—Refinement of all skills emphasizing offensive and defensive team play. Prerequisites: strong skills and general knowledge of team concepts.
   1 unit, Aut, Win, Spr (Nieves)

   1 unit, Aut, Win, Spr (Staff)

175. Weight Training: Intermediate—Review of basic exercises and techniques. Emphasis on individualized programs. Further discussion on exercise physiology. Prerequisite: 174 or thorough knowledge of basic weight training principles.
   1 unit, Aut, Win, Spr (Staff)

176. Weight Training: Advanced—Designed around Olympic-style lifting (cleanes, jerks, snatchs, high pulls) and power lifts. Prerequisites: intermediate weight training or equivalent and consent of instructor.
   1 unit, Aut, Win, Spr (Goldfried, Montes, Schulz)

177. 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.
   1 unit, Aut, Win, Spr (Riccardi, Mitzel-Izzi, Andeberhan, Posthumus)

183. Wrestling: Beginning/Intermediate—Introduces intercollegiate wrestling. Includes conditioning and cultivates the spirit of one-on-one competition. Basic skills as well as 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)

87. JKA Shotokan Karatedo—Training in traditional Japanese karate. Development of speed and power derived from perfection of form and


90. **Kenpo Karate: Beginning**—Fundamental stretching and conditioning. Introduction to basic moves, self-defense techniques, forms, light sparring. Emphasis on physical/mental control. Simple effective combinations of hands and feet. Physical size has no advantage or disadvantage. Fee.

1 unit, Aut, Win, Spr (Haramoto)


1 unit, Aut, Win, Spr (Schnoor)

93. **Self Defense**—Practical self-defense methods against single and multiple attackers, restraining arts, striking, and blocking methods. Instruction available through advanced black belt level in jujitsu. Fee.

1 unit, Aut, Win, Spr (Moses)

94. **Shotokan Karate**—A weaponless Japanese martial art with roots in Okinawa and China. Cultivates mental strength, physical suppleness and self-defense skills. Techniques and behavior taught according to traditional methods. All instructors ranked by Shotokan Karate of America, under Tsutomu Ohshima. Periodic training sessions with other SKA collegiate groups. All levels. Fee.

1 unit, Aut, Win, Spr (Blair)

95. **Tae Kwon Do**—Fundamentals of the 2,000-year-old Korean martial art. Stretching, forms, kicking, free sparring and self-defense techniques. Fee.

1 unit, Aut, Win, Spr (Kim)

96. **Tai Chi Chuan: Beginning**—Trains one in mental tranquility and physical relaxation, improving strength, concentration, body awareness, and unification of action between mind and body. Basic stretching and warm-up exercises plus 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.

1 unit, Aut, Win, Spr (Chuck)

98. **Tai Chi Chuan: Advanced**—Refine and study in greater detail the postures of the Slow Yang style of Tai Chi Chuan learned in 12 and 12A. Related Tai Chi practices such as Fast-Tai Chi, Tai Chi Sword, and Tai Chi Broadsword. Fee.

1 unit, Aut, Win, Spr (Chuck)

**INTERCOLLEGIATE ATHLETIC TEAMS**

All classes below are subject to the 12-unit limitation policy.

Varsity men’s and women’s teams in PAC-10 are for the highly talented and motivated undergraduate student. Unless specified, team tryouts are open to men and women students.

14V. **Baseball: Varsity (men’s team).**

1-2 units, Aut, Win, Spr

MTWTThF 1:30-4:30 (Marquess, Stotz)

17V. **Basketball: Varsity (men’s and women’s teams).**

1-2 units (Montgomery, Staff) men’s team

Aut, MTWTThF 3:30-6:30

Win, MTWTThF 12:30-3:30

1-2 units (Van Derveer, Staff) women’s team

Aut, MTWTThF 12:45-3:30

Win, Spr, MTWTThF 3:30-6

26V. **Crew: Varsity (men’s and women’s teams).**

1-2 units (Kujda) men’s team

Aut, MTWTThF 3:15-6, F 6-8

Win, Spr, MTWTThF 3:15-6, F 6-8, S 7-10

1-2 units (Davis) women’s team

Aut, MTWTThF 3:15-6

Win, MTWTThF 6-8:30, S 7-10

Spr, MTWTThF 6-8:30, S 7-10

29V. **Cross Country: Varsity (men’s and women’s teams).**

1-2 units, Aut (B. Johnson, Staff)

MTWTThF 3:30

35V. **Diving: Varsity (men’s and women’s teams).**

1-2 units (Schavone)

Aut, Win, MWF 1-5, TTh 2-5

Spr, MTWTThF 2-5

41V. **Fencing: Varsity**—Men’s foil, épée, and saber teams and women’s foil team.

1-2 units (Tulum, Posthumus)

Aut, MWF 3-5:30, TTh 7:30-10 p.m.

Win, MW 3-5:30, TTh 7:30-10 p.m.

Spr, TTh 7:30-10 p.m.

46V. **Field Hockey: Varsity (women’s team).**

1-2 units (S. Johnson)

Aut, MTWTThF 3-5:30

Win, TTh 7-9

Spr, M-Th 3:30-5:30
49V. Football: Varsity (men’s team).
1-2 units (Green, Staff)
Aut, TWTh 4-6, F 4-4:30
Win, MTThF 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, MTWThFS 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, SuMTWThFS 2-5:30

110V. Sailing: Varsity (men’s and women’s teams).
1-2 units (Middleton)
Aut, Spr, TThF 2:30-6
Win, MWF 2:30-6

124V. Soccer: Varsity (men’s and women’s teams).
1-2 units (Lindores) men’s team
Aut, MTWThF 3:30-5:30
Win, Spr, TWTh 3:30-5:15
1-2 units (Andeberhan) women’s team
Aut, Win, Spr, MTWThF 3:15-5:15

127V. Softball: Varsity (women’s teams).
1-2 units, Aut, Win, Spr (Wallis)
MTWThF 3-5

137V. Swimming: Varsity (men’s and women’s teams).
1-2 units, Aut, Win, Spr
(Kenney) men’s team
MTWThF 6-8, 2:15-5:30, S 7-10
(Quick) women’s team
MTWThF 6-8, 2:15-5:30, S 7-10

153V. Tennis: Varsity (men’s and women’s teams).
1-2 units, Aut, Win, Spr
(Gould) men’s team
MTWThF 2:30-5:30
(Brennan) women’s team
MTWThF 2:15-5:15

157V. Track and Field: Varsity (men’s and women’s teams).
1-2 units, Aut, Win, Spr (B. Johnson, Staff)
MTWThF 2-5

163V. Volleyball: Varsity (men’s and women’s teams).
1-2 units (Nieves) men’s team
Aut, MTWThF 1-4
Win, Spr, MTWThF 4-7

1-2 units (Shaw) women’s team
Aut, MTWThF 4-7
Win, Spr, MTWThF 1-4

168V. Water Polo: Varsity (men’s team).
1-2 units (Dettamanti)
Aut, MTWThF 2:30-5
Win, MTWTh 3:30-5:30
Spr, MTWTh 3-5:30

184V. Wrestling: Varsity (men’s team).
1-2 units (Horpel)
Aut, MTWThF 3:15-5:30, S 10-12
Win, MTWThF 3:15-5:30, M 10-11 p.m.,
W 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 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

70C. Horse Polo Club Team.
1 unit, Aut, Win, Spr

72C. Ice Hockey Club Team (men).
1 unit, Aut, Win

88C. Judo Club Team.
1 unit, Aut, Win, Spr

75C. Lacrosse Club Teams (men’s and women’s teams).
1 unit, Aut, Win

104C. Rugby Club Teams (men’s and women’s teams).
1 unit, Aut, Win

118C. Ski Club Team.
1 unit, Win

136C. Synchronized Swimming Club Team (women).
1 unit, Aut, Win

Additional clubs (Bowling, Cricket, Equestrian, Men’s Field Hockey, Racquetball, Squash, Ultimate Frisbee, and Women’s Water Polo) schedule activities each quarter for no credit.
BIOLOGICAL SCIENCES

Emeriti: (Professors) Isabella A. Abbott, Arthur C. Giese, Daniel Mazza, David D. Perkins, Colin S. Pittendrigh, John H. Phillips, Jr., David C. Regnery; (by courtesy) C. Stacy French

Chair: Robert D. Simoni
Associate Chair: Patricia P. Jones


Associate Professors: Mark W. Denny, William F. Gilly, Sharon R. Long, Stuart H. Thompson; (by courtesy) Richard Scheller

Assistant Professors: Deborah M. Gordon, Ron R. Kopito, Paul M. Macdonald, Susan K. McConnell, Robert Sapsky; (by courtesy) Neil S. Hoffman

Senior Lecturer: Charles H. Baxter

Lecturers: Sara Fultz, Barbara Snapp, Fran Thomas, Melanie Yelton

Directors of Systematic Collections: Paul R. Ehrlich (Entomological Collections), John H. Thomas (Dudley Herbarium)

Librarian: Joseph G. Wible

The facilities and personnel of the Department of Biological Sciences are housed in Herrin Laboratories, Herrin Hall, Keck Science Building, 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 A.B. degree; (3) a co-terminal program leading to the M.S. degree; and (4) 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, eligibility of courses as electives, and necessity for petition. The Bachelor of Science Handbook, which delineates policies and requirements, is also available.

The BioBridge is operated by undergraduates as an adjunct to departmental advising. Its staff members provide advice on choosing an adviser and courses, organize departmental functions and activities such as the weekly noon lecture series (Biology 2) and new majors orientation, and are also available for informal, drop-in counseling in Gilbert 108.

Each declared major in Biological Sciences is required to select a departmental adviser at the time of declaring. The resultant continuity of academic advice is likely to be particularly advantageous to students who anticipate applying to medical school or graduate school, enrolling in the honors or co-terminal program, taking courses at Hopkins Marine Station, or attending one of the overseas campuses.
COURSE REQUIREMENTS

Candidates for the B.S. degree must complete:

1. Core Courses
   - Biology 31: 5 units
   - Biology 32: 5 units
   - Biology 33: 5 units
   - Biology 44X: 4 units
   - Biology 44Y (may be replaced by 3 units of 175H): 3 units
   Total: 22 units

2. Elective Courses
   - Electives: 21 units

3. Cognate Courses
   - Required courses in cognate fields include:
     a) 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 100-level or above, may be substituted for 130 or 132 upon petition.
     b) General Physics: Physics 21, 22, 23, 24; or 51, 53, 55.
     c) Mathematics through calculus: Math. 19, 20, 21; or 41, 42.
     d) One additional course in mathematics, statistics, or computer science: Math. 43 or beyond; Biology 141, or Psychology 60, or Electrical Engineering 221; or Statistics 60 or beyond; or Computer Science 106A.

   Electives must be 100-level or above and selected from the offerings in the Department of Biological Sciences or from the list of approved out-of-department electives. This list may be obtained from the Student Services office. Biology majors who are in the class of 1992 and beyond and who are completing the elective course requirement must take approved elective courses from at least three different Stanford faculty members, of whom at least two must be faculty in the Department of Biological Sciences.

   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, highly recommended for the class of 1992 and required 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:

I. Molecular
   - Biochemistry: Biochem. 200 Cell Biology: Bio. 121
   - Molecular Biology: Bio. 119
   - Genetics: Bio. 118 (may be used to satisfy either area I or II requirement):

II. Cell/Developmental
   - Developmental Biology: Bio. 208

III. Organismal
   - General Botany: Bio. 120
   - Evolutionary Genetics: Bio. 111
   - Introduction to the Nervous System: Bio. 153
   - Viruses: Bio. 213 or Bio. 181

IV. Population
   - Microbiology: Microbio. & Immunology 101
   - Introductory Microbiology: Microbio. & Immunology 101
   - Problems in Marine Biology: Bio. 175f

For the class of 1992 and beyond, no more than 6 units from any combination of individual instruction courses (175H, 195, 198, 199, 290, or 291) may be applied toward the total number of elective units.

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 for detailed advice on particular 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 taking the 15-unit research course at Hopkins Marine Station during Spring Quarter (175H), or going overseas, fulfillment of as many University distribution requirements as possible in the first two years is recommended. Note that 175H may count toward the departmental requirement as 6 biology elective units if it also is used to substitute for 44Y.

Careful schedule planning will guarantee free quarters during the junior and senior years for those courses.
TYPICAL SCHEDULE FOR A
FOUR-YEAR MINIMUM PROGRAM

FIRST YEAR
Course No. and Subject  Qtr. & Units  A  W  S  
Chem. 31, 33, 35, 36  4 4 7  
Math. 19, 20, 21. Calculus and Analytic Geometry  3 3 3  
Freshman Requirements or Electives  8 8 6  
Totals ........................................... 15 15 16

SECOND YEAR

Biology 31. Principles of Biology  5  
Biology 32. Principles of Biology  5  
Biology 33. Principles of Biology  5  
Biology 44. Core Experimental Laboratory  4 3  
Chem. 130 or 132; 131; 135 (or 171) Organic and Physical Chemistry  8 3  
Distribution Requirements or Electives  3 5 8  
Totals ........................................... 16 17 16

THIRD YEAR

Physics 21, 22, 23, 24 Introductory Physics  4 4  
Distribution Requirements or Electives  11 11 15  
Totals ........................................... 15 15 15

FOURTH YEAR

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 Herrin R-211 during Transfer Orientation Week 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 taken 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 17 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 Undergraduate Research Coordinator, Herrin T-252.

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, at least one of which should be from a faculty member 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 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 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 Credential Administrator, 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 apply directly to the department. 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 15-20 percent of 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, and to consult their financial aid officers for information and applications.

Students who have had their undergraduate training in biology at Stanford are ordinarily encouraged to undertake graduate study elsewhere to ensure breadth of experience. Some printed information on graduate schools is available in the Student Services office (Gilbert 108), while a more extensive collection is available at the Undergraduate Advising Center in Sweet Hall.

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 (44X, 44Y) courses 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. 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 of each research proposal topic 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. However, because of family and childbearing responsibilities, military or alternative service obligations, or other personal reasons, students may wish at various times to interrupt their graduate education or to pursue their studies on a half-time basis. The department is willing to undertake such arrangements, which can include partial stipends if the student is being supported from departmental funds.

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

2. Current Research Topics in Biological Sciences—Primarily for sophomores. Enrollment limited to prospective and declared biological sciences majors. Weekly seminars by faculty on current research in biological sciences. Molecular biology and genetics; theory and mathematics in biology; ecology, physiology, and the environment; molecular and cellular aspects of neurobiology, immunology and developmental biology; biological chemistry; behavioral biology; evolution. Prerequisite: prior or concurrent enrollment in Biology core, or consent of instructor.

1 unit, Aut, Win, Spr (Snapp, Staff) Th 12:15
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. Students who have taken all or part of the Biology core 40
series should see the Student Services office for information.

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 (Long, Simoni) MTWThF 10

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 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 (Walbot, Sapolsky) MTWThF 10

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 (Walbot, Watt) MTWThF 10

44X,Y. Core Experimental Laboratory—Two quarters of lab projects provide students 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 is a writing focus class as part of the Writing Across the Curriculum Program. Satisfactory/No Credit only. 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 (Watt, Yelton)

44Y. 3 units, Spr (Watt, Yelton)

45. Research Biology—Designed for those who have taken 44X and 44Y to pursue specific experiments in greater detail. Also, a possible entry into an honors project.

3 units, Aut (Woodward) discussion

Th 2-4 or by arrangement

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.

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

4 units, Spr (Watt, Yelton)

67/167. Biological and Social Perspectives on Tobacco—(Same as Human Biology 122; undergraduate Biological Sciences majors enroll in 67, law and graduate students in 167; not an upper division elective course for the Biological Sciences major.) Tobacco as an instructive example of how biology and culture interact. Tobacco and tobacco use from the perspectives of biology, medicine, history, economics, psychology, and law. Enrollment limited to 50.

3 units (Long, Greely) not given 1991-92

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. Satisfactory/No Credit only. 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

102. Biology of Marine Communities—Treats a set of marine communities by considering physical environment, resident species, their biology and interactions, population and community structure and dynamics, and selected topics related to those communities. Emphasis on local coastal communities. Provides a background in the natural history of marine systems and the issues confronted by marine research. Prerequisite: 33, or equivalent.

3 units (Baxter)

alternate years, given 1992-93
105. Biological Circadian Rhythms—Biological clocks that sense daily cycles are analyzed in a variety of organisms. Physiological, genetic, and biochemical approaches to understanding mechanisms of the oscillator and its blue light photoreceptor. Learning how organisms track time. Prerequisite: Biology or Human Biology core.
3 units (Woodward) alternate years, given 1992-93

105H. Subtidal Communities—For course description, see Hopkins Marine Station section.
6 units, Sun (Staff)

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 (Feldman, Watt, Ehrlich) MWF 9 plus discussion section, not given 1992-93

112. Human Physiology—(Same as Human Biology 111.) The functioning of organ systems, emphasizing mechanisms of control and regulation. Topics: structure and function of endocrine and central nervous systems, cardiovascular physiology, respiration, salt and water balance, exercise and gastrointestinal physiology. Lectures/discussion. Prerequisite: Biology or Human Biology core.
4 units (Heller, Staff) not given 1991-92

113H. Introduction to Oceanic Biology—For course description, see Hopkins Marine Station section.
6 units, Sum (Staff)

114. Scientific Philosophy and Bioethics—The philosophy of science analyzed from various perspectives (philosophy, science, politics, society), and treated from historical and contemporary considerations. Emphasis on analyses of bioethical controversies and how these relate to the philosophy and practice of science today. DR:8(3)
3 units, Aut (Woodward) MWF 1:15

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, Win (Boggs) MWF 1:15

117. Biology and Global Change—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. Genetics—Basic genetic principles as developed in and applied to eukaryotes and to prokaryotes and their viruses. Transmission of genetic factors, methods of genetic mapping, and recombination. Prerequisites: Biology core.
3 units, Aut (Campbell) TTh 11-12:30

119. 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, Spr (Schinke, Yanofsky) MWF 11

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) TTh 9-10:30 plus discussion section

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,Y, and consent of instructor.
5 units, Aut (Macdonald) MWF 1:15-5:05

124. Plant Adaptations—The physiological ecology of plants of diverse environments. Prerequisites: 32 and 33, or consent of instructor.
4 units, Win (Mooney, Berry, Field) TTh 11 alternate years, not given 1992-93
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 1992-93

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 1992-93

132. Seed Plants—Structure, development, and evolutionary relationships of seed plants. Lectures, lab, field trips. Prerequisites: 32, 33; or consent of instructor.
5 units, Aut (J. Thomas) TTh 1:15-2:05
lab TTh 2:15-5:05
alternate years, not given 1992-93

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. Prerequisite: Biology or Human Biology core, or consent of instructor. DR:4(6)
4-5 units (Feldman)

134. Replication of DNA—Modes of DNA replication and their control in prokaryotic and eukaryotic systems. Emphasis on experimental approaches and their limitations. Critical review of current literature in seminar format. Lectures and student reports on specialized topics. Prerequisite: 31 and/or consent of instructor.
3 units (Hanawalt)
alternate years, given 1992-93

136H. Cell Biology of Early Development—For course description, see Hopkins Marine Station section.
6 units, Sum (Epel, Mazia)

137. Maize Genetics—Modern techniques in maize genetics and of phenomena such as controlling elements, paramutation, and cytoplasmic inheritance. Practical experience in setting up a field experiment, planting seed, tagging plants, and plant maintenance. Field projects may be continued over the summer as 199 or 300. Prerequisites: Biology core, 118, or consent of instructor.
2-3 units (Walbot)
alternate years, given 1992-93

138H. Biomechanics of Intertidal Organisms—For course description, see Hopkins Marine Station section.
6 units (Denny)
alternate years, given 1992-93

141. Biostatistics—Introduction to the statistical analysis of biological data. Lectures, discussion, and student exercises. DR:4(6)
4-5 units (Feldman)

149. Neural Basis of Sleep and Circadian Rhythms—(Same as Human Biology 124.) Review of current research. The phenomenon of sleep from neurophysiological, neurochemical, and neuroendocrinological aspects. The pathology of sleep, thermoregulation and sleep, hibernation, and the interactions between sleep pattern and circadian rhythms. Enrollment limited to 20. Prerequisite: 32, Human Biology 4A, or equivalent.
3 units, Aut (Heller) MWF 9-10:30

153. Introduction to the Nervous System: Cell Signaling and Behavior—(Same as Psychology 107.) Survey of neural mechanisms and interactions underlying behavior. 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 photosynthate 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, Briggs) MWF 10
plus discussion section
alternate years, not given 1992-93

157. Plant Biochemistry—Biochemical basis of plant structure and function: mechanisms of photosynthesis and plant respiration; mineral metabolism, including N₂ fixation; special features of plant nuclear and organelle genomes; cell wall polymers; protein and polysaccharide biosynthesis and its regulation; formation and mobilization of storage reserves; biosynthetic pathways for hormones, pigments, and other secondary products. Prerequisite: Biology core or consent
instructor. Recommended: 120, and Biochemistry 200.

3 units (Long, Ray, Grossman, Berry)  
alternate years, given 1992-93

158/258. Developmental Neurobiology—  
(Graduate students enroll in 258; same as Neurobiology 219.) Lecture seminar for advanced undergraduates and graduate students. Principles of nervous systems development from the molecular control of development and the role of cell-cell interactions and trophic factors, to the level of neural systems 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, Neurobiology 200, or consent of instructors.

3 units (McConnell, Shatz)  
alternate years, given 1992-93

158H. Problems in Marine Ecology—For course description, see Hopkins Marine Station section.

6 units (Baxter) by arrangement

163/263. Human Behavioral Biology—(Graduate students enroll in 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 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) MWF 1-2:30  
alternate years, not given 1992-93

165. Animal Behavior: Ecological and Evolutionary Aspects—Comparative survey of principles and patterns of animal behavior stressing their evolution and adaptive significance. Emphasis on vertebrates. Lecture/discussion. Prerequisite: 33 or Human Biology 2A, or consent of instructor. DR:5(7)

3 units, Aut (Staff) MWF 10  
and discussion section F 12

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 1992-93

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, phase, interference, and polarized 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, Win (Green, S. Smith) TTh 1:15

175H. Problems in Marine Biology—For course description, see Hopkins Marine Station section.

15 units, Spr (Baxter,enny, Epel, Gilly, Powers, S. Thompson)


3 units (Roughgarden) given 1992-93


4 units, Spr (Gordon, 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, Spr (Boggs, Launer) MWF 10

181/281. Behavioral Ecology—Graduate students register for 281. The interaction of animal behavior with the ecology and evolution of populations. Topics: foraging, territoriality, reproductive behavior, and social structures. Behavior of individuals and of social groups. Lecture-seminar format; seminars cover discussion and presentation of journal, articles and student field projects. Prerequisite: Biology core, Human Biology core, or consent of instructor.

3 units, Win (Gordon) TTh 10

183. Colloquium on Population Studies—(Same as Food Research 188/288, Human Biology 60.) Series of talks by distinguished speakers introducing a variety of topics in population studies.

1 unit, Win (Feldman, Arthur) W 4:10-5:30

184. Biology of Insects—Introduction to the functional biology of insects. Insect anatomy, biochemistry, behavior, ecology, physiology and systematics, and more specialized topics illustrating
or emphasizing unusual features of insects which make them attractive as objects of research. Prerequisite: Biology core or consent of instructor.

3-5 units Spr (Watt) MWF 11
  plus lab T 1:15-5:05
  alternate years, not given 1992-93

188. Ecosystems of the Tropics—Tropical ecosystems ranging from lowland rainforest to savanna, from shifting cultivation to high-elevation ecosystems. Emphasis on regulation of ecosystem structure and function. Half lecture, half seminar; specific content depends in part upon student participation. Prerequisite: Biology, Human Biology, or Engineering cores.
  2-3 units (Vitousek)
  alternate years, given 1992-93

189. Biology of Birds—The ways birds interact with their environments and each other; emphasis on studies that had broad impact in the fields of population biology, community ecology, and evolution. Field trips introduce students to local bird communities and emphasize bird identification and behavior. One-hour lecture and a three-hour lecture/field trip per week. Enrollment limited to 20. Prerequisites: 33 or equivalent, and consent of instructor.
  3 units (Ehrlich)
  alternate years, given 1992-93

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 1992-93

191. Research in Bird Biology—Semi-independent field research in ornithology, emphasizing ecological relationships. Projects complement on-going 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

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, Ehrlich, Field, Vitousek) by arrangement

198. Directed Instruction/Reading—May be taken as a prelude to research for one quarter only 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. (See Undergraduate Research Coordinator before enrolling.)

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. (See Undergraduate Research Coordinator before enrolling.) Completion of 10 units of 199 required for graduation with departmental honors. See description of honors program above.

199H. Research—For undergraduate research done under supervision of Hopkins Marine Station faculty.

**PRIMARILY FOR GRADUATE STUDENTS**

205. DNA Repair and Mutagenesis—(Same as Biophysics 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 to mutagenesis and carcinogenesis. Prerequisites: 31, 118, and 119, or consent of instructor.
  3 units (Hanawalt)
  alternate years, given 1992-93

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 tech-
niques and experimental rationales of molecular biology, biochemistry, and genetics.

5 units, Spr (Baker, Clayton, Fuller, Hogness, Kaiser, Kim, Nusse, Scott, Shapiro, Spudich, Weissman) MWF 9-11

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 Herrin T252 and Herrin R07). Satisfactory/No Credit only. 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


3 units, Win (Campbell) MWF 9

(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 9-11

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. Prerequisite: Biology core or substantial equivalent.

3 units, Aut (Watt) TTh

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. Prerequisite for undergraduates: Biology core or consent of instructor.

4 units, Aut (Jones) MWF 10


4 units, Win (Schimke) TTh 4
plus discussion section alternate years, not given 1992-93

250H. Video Microscopy and Image Processing—For course description, see Hopkins Marine Station section.

6 units, Sum (Thompson)
by arrangement

252. Gene Action—Seminar on aspects of gene structure and function, and regulation of gene expression in microorganisms. Prerequisite: Biochemistry 201 or equivalent.

3 units (Yanojfsky) alternate years, given 1992-93


3-4 units, Win (F. Thomas)
by arrangement


3 units (Karlin, Feldman) not given 1991-92

283. Theoretical Population Genetics—Detailed survey of models in population genetics. Includes aspects of selection, random drift, gene linkage, migration and inbreeding. The influence of these on evolution of gene frequencies and chromosome structure is analyzed and some data evaluated. Prerequisite: consent of instructor.

3 units, Aut (Feldman) TTh 9-10:30 alternate years, not given 1992-93
286. Seminar in Theoretical Ecology—(Same as Geophysics 185Y/385Y.) 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 election and evolution of sex; remote sensing and population dynamics; dynamics of spatially distributed populations; niche theory and coevolution of competing species.

2 units, Spr (Roughgarden) by arrangement

290. Teaching of Biological Science—Open to upper division and graduate students. Practical experience in teaching laboratory biology or serving as an assistant in a lecture course.

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. Satisfactory/No Credit only. Prerequisite: selection by instructor.

2 units, Aut, Win (Watt, Yelton) TTh 3-5

300. Research—Individual research at the graduate level taken by arrangement with in-department or out-of-department instructors. For coterminal master's students: credit for work with out-of-department instructors requires a departmental petition be approved (available from Undergraduate Research Coordinator).

1 unit, Aut, Win (Watt, Yelton) TTh 3-5

300H. Research—For course description, see Hopkins Marine Station section.

6 units, Sum (Gilly) 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 and mammalian cells. Prerequisite: consent of instructor.

1-3 units, Aut, 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, Aut, Win, Spr (Watt) by arrangement

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 (Jones) M 12:15


3 units (Green, Walbot) alternate years, given 1992-93

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, Long, Ray, Vitousek, Walbot) T5

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, Long, Grossman) MWF 1:15 alternate years, not given 1992-93

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, Long, Simon, Walbot, Woodward, 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) T 12

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 advanced undergraduates and 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. Prerequisite: 158/258, or Neurobiology 200, or Neurobiology 219.

1 unit, Aut, Win, Spr (McConnell) Th 4-5

381. Seminar in Behavioral Ecology—Discussion of research papers on the evolution of behavior in changing environments. Prerequisite: consent of instructor.

1-3 units (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—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, Aut, Win, Spr (Roughgarden) by arrangement

SUMMER PROGRAM

The summer program is open to all advanced undergraduate, graduate, postdoctoral students, and teachers whose biological backgrounds, teaching, or research activities can benefit from a summer's study of marine life. Application blanks and further information may be obtained by writing to Hopkins Marine Station, Pacific Grove, CA 93950. Completed applications should be submitted by March 31. Applications received later are considered if space is still available.

The Summer Quarter is divided into two terms of five weeks each. It is possible to register for either term, or for the full quarter. Registration is possible for only one course during each five-week session.

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. See the pamphlet, Hopkins Marine Station. Prerequisites: junior or senior standing in biology, and consent of instructors.

15 units, Spr (Baxter, Denny, Epel, Gilly, 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 Coterminal 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:

C. Baxter: Marine Ecology—ecology and physiological ecology of marine invertebrates; subtidal ecology.
M. Denny: Biomechanics—the mechanical properties of biological materials and their consequences for animal size, shape, and performance.

D. Epel: Developmental Biology—physiology and regulation of early embryonic development.

W. Gilly: membrane physiology of nerve and muscle cells; control of sodium and calcium ion channels and of excitation-contraction coupling. Comparative neuromuscular physiology of marine invertebrates.

D. Mazia: Cell Reproduction—mitosis, cell division, and cell cycles in eggs of marine invertebrates.

D. Powers: Adaptational Biochemistry and Molecular Evolution.


S. Thompson: Neurophysiology—Neuronal control of behavior and mechanisms of ion permeation in membranes.

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 and Molecular Biology of Early Development—Post-graduate level course; advanced undergraduates encouraged to apply. Five-week workshop on cellular phenomena seen during early embryonic development, properties of sperm and egg, fertilization, mitosis and cell division, early morphogenesis of the embryo, and determination and polarity. Gametes of marine organisms are utilized; emphasis on experimentation and observation of living cells, including their microscopy, micromanipulation, and chemistry.

6 units (Epel, Mazia) by arrangement

138H. Biomechanics of Intertidal Organisms—Introduction to the mechanical design of wave-swept organisms emphasizing the ecological implications of wave forces. The basic theories of water waves, fluid dynamics and solid mechanics, and the applications of theory to understanding the design of materials, structures, whole organisms, and communities. Lab work on the various techniques of intertidal biomechanics. 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 1992-93

142H. Ecophysiology and Molecular Biology of Marine Macrophytes—The rich marine environments at Hopkins Marine Station introduce taxonomy and distribution of marine algae and seagrasses; characteristics of the intertidal and subtidal regions; and physiological, cellular, and molecular bases of adaptation by marine macrophytes. Individuals or teams conduct and report results of research during the last two weeks.

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.)

SECOND TERM

158H. Problems in Marine Ecology—Group and individual research projects dealing with local marine habitats. Focus varies each summer to exploit current opportunities or interests. Students develop background and research interests during 105H or 113H or have equivalent experience, and plan and carry out research in interaction with faculty.

6 units (Baxter) 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. Emphasis on biophysical analysis of channel gating, identification of channel subtypes and routes to their production, and spatial localization of channels on living cells.

6 units (Gilly) by arrangement
BIOPHYSICS PROGRAM

Committee on Biophysics: Steven G. Boxer, Chair (Professor of Chemistry); Robert Baldwin (Professor of Biochemistry); Michael Levitt (Professor of Cell Biology); Harden M. McConnell (Professor of Chemistry); Robert D. Simoni (Professor of Biological Sciences)

Professors: Richard W. Aldrich (Neurobiology), Robert L. Baldwin (Biochemistry), Martin J. Brown (Radiation Oncology), Steven Chu (Physics and Applied Physics), David A. Clayton (Developmental Biology), Sebastian Doniach (Applied Physics), Philip C. Hanawalt (Biological Sciences), Daniel Herschlog (Biochemistry), Keith O. Hodgson (Chemistry), Wray H. Huestis (Chemistry), Oleg Jardetzky (Pharmacology), Jon Kopito (Professor of Cell Biology), Roger D. Kornberg (Cell Biology), Michael Levitt (Cell Biology), Harden M. McConnell (Chemistry), David B. McKay (Cell Biology), Robert Pecora (Chemistry), John Ross (Chemistry), Robert D. Simoni (Biological Sciences), Ed Solomon (Professor of Chemistry), James A. Spudich (Cell Biology), Lubert Stryer (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

205. 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 heredity deficiencies in DNA repair. Relationship of DNA repair and mutagenesis to carcinogenesis.

3 units (Hanawalt) given 1992-93

216. Ion Channels and Membrane Physiology—(Same as Neurobiology 216.) Reading/discussion of original research papers, emphasizing concepts, quantitative analysis of experimental results, and critical evaluation of evidence. Topics: gating mechanisms in voltage- and chemosensitive ionic channels and ionic mechanisms in sensory transduction. Student presentations and small group discussions.

3 units (Aldrich, Baylor) given 1992-93

222. Signal Transduction Mechanisms—(Same as 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 reconstitution of functional transducing assemblies, and patch clamping and other electrophysiological methods. Emphasis on recurring motifs of excitation and adaptation, and transduction and their evolution.

3 units, Aut (Stryer)

225. Structure and Function of Molecular Motors—(Same as Cell Biology 225, Developmental Biology 225.) The molecular basis of energy transduction that leads to movements generated by microfilament-based and microtubule-based motors. Molecular motors include various 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 covered: 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. Prerequisite: knowledge of basic biochemistry and cell biology.

3 units (Spudich) not given 1991-92

233. Macromolecular Structure: Diffraction Methods and Diffraction Results—(Same as Cell Biology 232.) General methods and notable accomplishments of x-ray crystallography and solution scattering. Methodology topics: small-angle scattering, fiber diffraction, and x-ray crystallography at a level making current literature in the field understandable to non-practitioner. Discussion of results: protein folding patterns, enzymology, receptor-effector systems, proteins of the immune system, and membrane proteins. Prerequisite: knowledge of basic biochemistry.

3 units (McKay) not given 1991-92

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)

253. Advanced Inorganic Chemistry—(Same as Chemistry 255.) Structural inorganic chemistry and x-ray crystallography. Space groups and three dimensional symmetry, diffraction theory, structure solution and the phase problem, structural refinement and accuracy of results. Understanding of accuracy and limitations of crystallographic methods as applied to inorganic molecules and interpretation of material from structure reports. Lab portion includes x-ray crystallographic determination of unknown structure. Prerequisite: consent of instructor.

3 units, Win (Hodgson, Hedman)

277. Introduction to Magnetic Resonance—(Same as Chemistry 277.) Basic principles of magnetic resonance, relaxation mechanisms, chemical exchange, 2D-NMR, CIDNP, solid state NMR and multiple-quantum NMR. Applications to problems in biophysics stressed.

3 units (Boxer) not given 1991-92

300. Research.
(Staff) by arrangement

Biophysics courses in related departments:
Biochemistry 214; Cell Biology 225, 228, 229;
Chemistry 251, 257, 259, 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: Keith Archuleta (Black Community Service Center), Elena Becks (Committee on Black Performing Arts), Earl Black (African and Afro-American Studies), James Gibbs (Anthropology), Tanya Leake (Committee on Black Performing Arts), Halifu Osumare (Dance), Horace Porter (English, Afro and Afro-American Studies), Anna Deveare Smith (Drama). Also student representatives from different areas of the performing arts.

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.

5. Introduction to Black American Drama—(Enroll in Drama 5.) The development of Black drama in the U.S. from 1858 to the present.
   4 units, Aut (Elam)

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).
   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 (Osumare)

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. Topics: retained Africanisms, slavery, the Black family, Afro-American artists, and Afro-American identity. DR:3(*)
   5 units, Win (Porter)

122. Special Studies in Performance: Gender and Identity—(Enroll in Drama 122.)
   3 units (Smith) given 1992-1993

154. American Drama, 1920s-1960s—(Enroll in Drama 154N.) American drama and theater from the end of WWI to the start of the Vietnam War, focusing on the plays of O'Neill, Rice, Odets, Williams, Miller, Hansberry, Albee, and others, and on important theater companies and their practitioners. Emphasis on the impact of political and social movements upon theater during this period. DR:7(2)
   4 units, Win (Walker) TTh 10-11:50

155. American Drama 1960 to the Present—(Enroll in Drama 155.) Contemporary American drama from a multicultural perspective: plays by Asian American, Latin 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, 7, or 9 (2 or 5)
   4 units, Win (Elam) MWF 11

157. Contemporary Black Playwrights—(Enroll in Drama 157.) The dramaturgy (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. DR:7(2)
   4 units (Elam) given 1992-93

157V. History of the Black Performer in America: From Congo Square to Hollywood—(Enroll in Drama 157V.) The evolution and vicissitudes of African American performers from the 18th century to the present. Examinations of the artistic contribution of Black musicians, comedians, singers, dancers, filmmakers, and actors, and their struggle against social injustice and racism inside and outside the entertainment industry.
   4 units, Spr (Walker) TTh 10-11:50

161B. Afro-American Writing, 1970 to the Present—(Enroll in English 161B.) Readings: Toni Morrison, Alice Walker, Baraka, Ralph Ellison, Gloria Naylor, and Toni Cade Bambara. DR:7(2)
   5 units (Drake) not given 1991-92

166. Topics in Theater and Society: Gender and Identity—(Enroll in Drama 166.) Explores the role of gender and identity in the American character.
   3-5 units (Smith) given 1992-1993

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 the Dunham barre exercises and across-the-floor progressions. Traditional dances are taught as a part of the anthropological source material for the technique. Four lecture classes and reading materials are required.

2 units, Spr (Osumare)

CHEMISTRY*


Chair: Harden M. McConnell

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; (by Courtesy) Michael J. Boudart, Robert J. Madix

Assistant Professors: Wesley D. Allen, Dale G. Drueckhammer, Steven M. George, John H. Griffin, Lisa A. McElwee-White, T. Daniel P. Stack, Robert M. Waymouth

* The curriculum leading to the B.S. degree in Chemical Engineering is described in the "School of Engineering" section in this bulletin.

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, 43; or 41, 42, 43; Physics 51, 53, 54, 55, 56, 57, 58; Chemistry 31, 33, 35, 36, 131, 132, 133, 134, 151, 153, 171, 173, 175, 176, 178. 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>
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<tbody>
<tr>
<td>Chem. 31. Chemical Principles</td>
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<tr>
<td>Chem. 33. Structure and Reactivity</td>
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</tr>
<tr>
<td>Chem. 35. Monofunctional Compounds</td>
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</tr>
<tr>
<td>Chem. 36. Chemical Separations</td>
<td>3</td>
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SECOND YEAR

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<td>Chem. 132. Qualitative Organic Analysis</td>
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<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>
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<tr>
<td>Physics 51, 53-54. Mechanics, Sound, Electricity</td>
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<td>Electives (see note below)</td>
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THIRD YEAR

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<td>Chem. 151, 153. Inorganic Chemistry</td>
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<tr>
<td>Chem. 171, 173, 175 Physical Chemistry</td>
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<td>Chem. 176 Physical Chemistry Laboratory</td>
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<td>Physics 55-58</td>
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<td>Totals</td>
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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 advised to repeat them during the first week of the Winter
Quarter. All qualifying examinations are given September 20, 21, and 22, 1991 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 39 units of work as well as an M.S. thesis. Of the 39 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 under the “School of Education, Master of Arts in Teaching” section in this bulletin.

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 two of these courses must be taken in the Autumn Quarter of 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 a "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, Ephraim and Amelia Weiss 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 Card Scholarship and Eastman Kodak Scholarships are for undergraduates only.

Teaching assistantships and research assistantships are open to advanced students. Application forms for fellowships, scholarships, and teaching assistantships may be obtained from 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 9

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 (Waymouth, Stack)
lec 1 MWF 9; lec 2 MWF 11
Win (Boxer) MWF 10
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)

4 units, Aut (Collman, Zare) MWF 10

33. Structure and Reactivity—Organic chemistry, functional groups, hydrocarbons, stereochemistry, thermochemistry, 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, Trost)
lec (1) MWF 9; lec (2) MWF 11
one recitation by arrangement

35. Organic Monofunctional Compounds—Organic chemistry of oxygen, nitrogen aliphatic and aromatic compounds. Prerequisite: 33; pre-register in Department of Chemistry.

4 units, Aut (Kluge) MWF 1:15-2:30
Spr (Waymouth, Huestis)
lec (1) MWF 9; lec (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 (McElwee-White) lec T 1:15
lab T 2:15-6:05 or MWTh or F 1:15-5:05

130. Theory and Practice of Identification—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. For students in biomedicai sciences. (Chemistry majors take 132.) Prerequisites: 35, 36, and concurrent registration in 131.

4 units, Aut (Druickhammer) 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) lec TTh 11-12:15
Win (Griffin) TTh 1:15-2:30

132. Qualitative Organic Analysis—Required for 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 syn-
thesis and analysis of spectral data. Prerequisites: 35, 36, and concurrent registration in 131.
5 units, Aut (Drueckhammer) lec TTh 8
lab MW 1:15-5:05 or TTh 1:15-5:05

3 units, Win (McCarthy) lec MWF 11

5 units, Win (Stack) lec 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, electrolyte, chemical kinetics, macromolecular solutions, and colloidal dispersions. Prerequisites: 31 and calculus.
3 units, Win (Ross) TTh 11-12:15
Spr (Pecora) TTh 1:15-2:30

136. Synthesis Laboratory—Advanced synthetic methods in organic and inorganic laboratory chemistry.
3 units, Spr (Griffin) lab 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 and 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 and 173.
3 units, Spr (Hodgson) MW 1:15-2:30

171. Physical Chemistry—Chemical thermodynamics; fundamental principles, Gibbssian 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 (Pecora) MW 11-12:15

173. Physical Chemistry—Introduction to quantum chemistry: basic principles of wave mechanics, the harmonic oscillator, the rigid rotator, infrared and microwave spectroscopy, the hydrogen atom, atomic structure, molecular structure, valence theory.
3 units, Win (Zare) MWF 11

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

176. Physical Chemistry Laboratory—Use of chemical instrumentation to study fundamental areas of physical chemical concern with focus on 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 (Fayer) lec TTh 9
lab T or W 1:15-4:05

178. 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 (Allen) lec TTh 10-11:15
lab MW 2:35-5:25 or TF 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.

221. Advanced Organic Chemistry—Molecular orbital theory and orbital symmetry. Thermochemistry and thermochemical kinetics. Uni-
molecular reaction rate theory. Methods of determining organic reaction mechanisms from a theoretical and experimental point of view. Prerequisites: 133 and 175.

3 units, Aut (McElwee-White) 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) ThF 8:30-10

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) MW 10-12

227. Selected Topics in Organic Chemistry—May be repeated for credit. Possible topics: synthetic organic chemistry, photochemistry, inorganic-organic chemistry, bio-organic chemistry, reaction mechanisms, stereochemistry, structural chemistry of organic and biological molecules. Prerequisite: 225 or consent of instructor.

3 units, Aut, Spr (Staff) MWF 9

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

251. Selected Topics in Advanced Inorganic Chemistry—May be repeated for credit. Possible topics: synthetic organic chemistry, photochemistry, inorganic-organic chemistry, bio-organic chemistry, reaction mechanisms, stereochemistry, structural chemistry of organic and biological molecules. Prerequisite: one year of physical chemistry.

3 units, Aut, Win Spr (Hodgson, Hedman) TTh 9-10:30

253. Advanced Inorganic Chemistry—Physical-inorganic and bioinorganic chemistry for inorganic chemists. Introduction to metalloenzymes as unique inorganic complexes, review of ligand field theory and its applications to spectroscopic and magnetic field techniques, and an overview of 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 (Hodgson) MW 9:30-11


3 units, Spr (Hodgson, Hedman)

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) T 4

271. Advanced Physical Chemistry—Principles of quantum mechanics. General formulation, mathematical methods, and elementary applications of quantum theory to the structure of atoms and molecules, including variational procedures, perturbation theory, operator and matrix methods, theory of angular momentum, and elements of the electronic structure of atoms. Prerequisite: 175.

3 units, Aut (Payer) MWF 10

273. Advanced Physical Chemistry—Topics in advanced quantum mechanics: vibrations and rotations of polyatomic molecules (normal modes, anharmonicity, wavefunctions and energy levels of rigid rotations, vibration-rotation interaction), ab initio electronic structure theory (Hartree-Fock, configuration interaction, multiconfiguration self-consistent-field, and many-body perturbation theory techniques), angular momentum theory (operators and wavefunctions, Clebsch-Gordan coefficients, rotation matrices), time-dependent quantum mechanics (time evolution operator, Feynman path integrals, scattering theory, Born approximation, Lipmann-Schwinger equation, correlation functions), interaction of radiation and matter (semiclassical and quantum theories of radiation, transition probabilities, selection rules.) Prerequisite: 271 or Physics 230.

3 units, Win (Allen) MWF 10

275. Advanced Physical Chemistry—Basic principles and methods of statistical mechanics from the ensemble point of view, statistical thermodynamics, heat capacities of solids and polyatomic gases, chemical equilibria, equations of state of fluids, phase transitions. Prerequisite: 271.

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

277. Selected Topics in Physical Chemistry—(Same as Biophysics 277.) Possible topics: structure elucidation using diffraction techniques, ad-
advanced statistical mechanics, crystal field theory, advanced quantum mechanics, magnetic relaxation, advanced thermodynamics, chemical applications of group theory. May be repeated for credit. Prerequisite: 275 or consent of instructor.

3 units (Boxer) not given 1991-92

283. Research Proposals in Physical Chemistry—May be required of 2nd- and 3rd-year graduate students at the discretion of the research adviser. Students present research proposals and progress reports on their research in physical chemistry, using oral and written forms. Topics may be drawn from the student’s research of a related area in physical chemistry. Written form, oral presentation, and scientific merit is evaluated.

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

287. Biophysical Chemistry—The theoretical and experimental aspects of biophysical phenomena emphasizing membrane biophysics and membrane biology. Prerequisites: previous or concurrent registration in 171 and 173, or the equivalent.

3 units, Spr (Staff)

289. Biophysical Chemistry—Experimental methods in biophysics. Emphasis on spectroscopic techniques including magnetic resonance and optical methods. Prerequisite: 287.

3 units, Win (Staff)

291. Biophysical Chemistry—Special topics in biophysical chemistry. Prerequisites: previous or concurrent registration in 171 and 173, or the equivalent.

3 units, Win (Staff)

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 (Hodgson)

297. Biophysical Chemistry—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 (Solomon) MW 9:30-11

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 of the teaching staff. Corequisite: concurrent attendance in 300.

(Staff) by arrangement

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 FELLOWS PROGRAM

UNDERGRADUATE STUDIES ON MEXICAN SOCIETY AND CULTURE IN THE UNITED STATES

Visiting Professor: Cordelia Candelaria
Teaching Fellows: Ines M. Salazar, Maria Josefin Saldaña

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. Since 1971, by sponsoring the Chicano 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 a selected undergraduate scholar the opportunity to work closely with the graduate Teaching Fellows and the visiting professor to prepare a thesis in a Chicano-related field. 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.

As in the nine previous years, a scholar of outstanding national reputation will be appointed to teach three courses of special interest to students wanting 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.

COURSES

The 1991-92 Chicano Fellows Courses pamphlet may be obtained from the Program Administrator, Chicano Fellows Program, Bldg. 590, Rm. L (El Centro); telephone (415) 723-3091.

105. An Alternative Discourse of “Difference:” The Writings of Chicanas and African-American Women—(Same as Feminist Studies 165A.) Comparative examination of texts from a perspective of difference as a term of critical analysis rather than description. Emphasis is on placing writings in historical and social contexts, including the ways in which they respond to the Chicano Power and Black Power Movements of the late 1960s and early 70s and their exclusionary gender practices. What textual strategies do these women employ to give voice to the concerns of U.S. women of color, and how and to what extent do the concerns of Chicanas and African American women overlap? Ways in which these writings formulate resistance and cultural critique. Additional readings in feminist theory and cultural studies.

3 units, Spr (Salazar)

106. Mexican to Chicano/a: Identity and Change—Historical overview, beginning in 1848, of social movements rooted in Mexican origin populations in the southwest and northern urban centers in the U.S. Organized around the formation of political identity, it traces the evolution from an identification as Mexican-American to Chicano/a through social movements, focusing on the larger historical, social, and economic factors which influence the construction of these identities. Readings, historical writings, personal interviews, letters, manifestos, autobiography, fiction, theories of nationalism and subject formation.

3 units, Spr (Saldaña)

110. Introduction to Chicano Life and Culture—(Same as Anthropology 110, History 64.) 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 (Rosaldo) not given 1991-92

128. Mexican Visual Vernacular in the U.S.—(Same as Spanish 188.) From Frida Kahlo to Madonna, from Mexican easels to the walls of the Metropolitan Museum of Art, Mexican popular culture influences cultural sensibility in the U.S. How appropriated icons produce meaning in diverse communities. Films, magazines, plays, murals, and art exhibits that have crossed the border show how ideology migrates and is changed by new social contexts.

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

161. Study of Chicanas—(Same as English 162A, Feminist Studies 165, Spanish 286.) Develops and applies an integrative ethnocultural and feminist approach to study of Mexican American women. Chicana identity from a variety of perspectives; controversies surrounding culture, gender, class, and race for insight into problems and possibilities of a Chicana-identified ideology.

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

282. Chicano Poetry—(Same as Spanish 282.) Readings of lyrical and social Chicano/a poetry. Analyzes representative poetic works to discover how personal and social experiences are manifested through poetry. Readings: Alurista, Jimmy Santiago Baca, Gary Soto, Lucha Corpi, Juan Felipe Herrera, and Ana Castillo.

3-5 units, Spr (Leal)

283S. The Contemporary Chicano Novel—(Same as Spanish 283.) Textual analysis and critique of the contemporary Chicano novel (last two decades). Emphasis to works within the context of the social reality of the Chicano and his community. Readings: Tomás Rivera, Rudolfo Anaya, Miguel Méndez, Arturo Islas, and Ana Castillo.

3-5 units, Win (Leal)
362. Ethnopoetics—(Same as English 309F.)
Ethnopoetics is an approach to literature that considers material culture as part of the foreground of text. Sometimes perceived as an intersection of poetry and anthropology, ethnopoetics comprehends culture as extending to the myth and ritual of tribal societies. Uncovers the fundamental expression of ethnicity and “Otherness” in Antigone, Durrenmatt’s The Visit, Miller’s The Crucible, Valdez’s The Shrunken Head of Pancho Villa, Malamud’s The Natural, Morrison’s Song of Solomon, Castillo’s Sotogonia, Mendez’s Peregrinos de Aztlán, and Silko’s Ceremony.
5 units, Aut (Candelaria)

388. The Chicano Short Story—(Same as Spanish 388.)
Textual analysis and critique of the Chicano short story with discussions on the realities and the values presented on the Chicano/a personal and community experience. Readings: Tomás Rivera, Rudolfo Anaya, Rolando Hinojosa-Smith, Sandra Cisneros, and Denise Chávez.
3-5 units, Aut (Leal)

DEPARTMENTAL

ENGLISH

124B. Contemporary Chicano Narrative—
(Same as Spanish 187.)
5 units, Spr (Saldivar)

160E. Ethnic and Third World Literature.
5 units, Spr (Saldivar)

309J. Colloquium: Chicano Cultural Studies—
(Same as Spanish 386.)
5 units, Win (Saldivar)

SPANISH

11B. Second-Year Spanish for Bilingual Students—For students of Hispanic background. Intensive study of grammar with emphasis on written Spanish. Short readings by and about Hispanics in the U.S. Prerequisite: pass Bilingual Placement Test. DR:7(2) when taken in sequence with 12B and 13B.
5 units, Aut (Sandoval)

12B. Second-Year Spanish for Bilingual Students—Introduction to various Hispanic dialects, with emphasis on Chicano Spanish and bilingualism in speech and literature. DR:7(2) when taken in sequence with 11B and 13B.
5 units, Win (Sandoval)

13B. Second-Year Spanish for Bilingual Students—Applied Spanish for functional purposes. Emphasis on vocabulary development. Some grammar review. DR:7(2) when taken in sequence with 11B and 12B.
5 units, Spr (Sandoval)

131B. Hispanic American Cultural Perspectives—Includes selected grammatical problems with emphasis on oral expression. DR:7(2)
3-5 units, Win (Sandoval)

132B. Mexican and Chicano Cultural Perspectives. DR:7(2)
3-5 units, Spr (Sandoval)

CHILDREN AND SOCIETY CURRICULUM

Curriculum Committee: Roland Ciaranello (Psychiatry and Behavioral Sciences), Lee J. Cronbach (Education emeritus), Rafael M. Diaz (Education), Sanford M. Dornbusch (Human Biology, Sociology, Education), S. Shirley Feldman (Psychiatry, Human Biology), Anne Fernald (Psychology), Shirley B. Heath (English, Linguistics), Janet R. Johnston (Sociology), Michael W. Kirst (Education), Milbrey W. McLaughlin (Education), Fernando S. Mendoza (Pediatrics), Catherine H. Milton (Haas Center for Public Service), Roger G. Noll (Economics, Public Policy), Susan M. Okin (Political Science), Amado M. Padilla (Education), Denis C. Phillips (Education, Philosophy), Albert H. Siegel (Psychology, Psychiatry and Behavioral Sciences, Education), James Steyer (Education), Myra H. Strober (Education), 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 presently adding a commitment 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 experiences, 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 should select courses from those listed below which are consistent with their department or program requirements. Interested students should begin their study of Children and Society by taking some of the following classes, which will fit into a core sequence that is still being developed.

If a student declares an individually designed major (IDM) in Children and Society, it should be done according to the guidelines set out by the IDM program. Contact IDM program, Undergraduate Advising Center, Sweet Hall, (415) 723-2426.

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

Additional courses will be added to the Children and Society curriculum as the year progresses. Students are advised to check the Winter and Spring Time Schedules for updated listings.

EDUCATION


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

PUBLIC POLICY

173. Meeting the Needs of Children: The Roles of Family and Society—(Enroll in Public Policy 173.) Examines the status of children in American society. Issues: what rights should children have to care, protection, economic goods, and opportunity? Who should have responsibility for providing these goods to children? What values and assumptions underlie current social policies toward children and families? Should any of these values and assumptions be changed? Class discussion based on readings.

3 units, Spr (Wald)

SOCIOLOGY

125. Children and Society—(Enroll in Sociology 125.) Provides an integrated view of childhood, including international comparisons, historical images of childhood, and ethnic differences. Emphasizes theoretical issues, empirical studies, 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 sensitize students to the issues and problems of contemporary childhood.

5 units, Win (Dornbusch)

RELATED TOPICS

The following courses can be taken in conjunction with service and policy internships.

LINGUISTICS

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 doing a public service internship in an organization dealing with linguistic minorities or language-related issues, e.g., bilingual education or language rights. Students pursuing this option have one additional section meeting per week focusing on their field experience. DR:9(5)

4-6 units, Aut (Guy)

PUBLIC POLICY

182. Policy Making and Problem Solving at the Local and Regional Level—(Enroll in Public Policy 182.) Focuses on: public and nonprofit 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 local community (e.g., homelessness, toxic waste disposal, child care, land use planning). Opportunity to learn from local policymakers and community leaders.

4 units, Spr (Stanton)

CLASSICS

Chair: Marsh H. McCall, Jr
Professors: George Brown (English and, by courtesy, Classics), Edward Courtney, Andrew M. Devine, Kenneth J. Dover, Robert C. Gregg (Religious Studies and, by courtesy, Classics), Wilbur Knorr (Classics, Philosophy, and History of Science; on leave Autumn and Winter).
Marsh H. McCall, Jr., Julius Moravcsik (Philosophy and, by courtesy, Classics), Susan A. Stephens, Susan Treggiari (Classics and, by courtesy, History)

**Associate Professors:** Jody Maxmin (Art History and Classics), Michael Wigodsky

**Assistant Professors:** W. Martin Bloomer, Mark H. Munn, Andrea Wilson Nightingale, Daniel Selden

**Lecturers:** Robert Hamerton-Kelly, Mary Lou Munn, Evangelia Prionas

**Visiting Professor:** Victor Hanson

**Acting Assistant Professors:** Maud Gleason, Nancy Sultan

**Webster Visiting Professor:** P. E. Easterling

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 is generally required, and those with no previous knowledge of Latin or Greek should begin the 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 (141-9, 151-9, 161-9, 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, 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, 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 Classical Center at 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 art history. 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. Students planning to apply to the center should note that they are normally expected to have prepared themselves by taking at least one Roman history course. 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. Applicants to either program are required to take Classics 108 (Topography and Monuments of Greece) and, after acceptance, Classics 31 (Beginning Modern Greek). Students are encouraged to prepare themselves by taking other courses in Greek archaeology (especially Classics 127, Archaeological Practicum), Greek history, and Greek art. Those interested should see the chair of the Department of Classics early in the academic year.
GRADUATE PROGRAMS
MASTER OF ARTS

Students who have completed an undergraduate major in classics (Greek and/or Latin) or its equivalent may be accepted as candidates for the A.M. degree in Classics or A.M. in Classics, in the field of Greek or Latin, and may expect to complete the program in 12 months (usually three quarters of course work plus three months study for the thesis or examination). Students without an undergraduate major in classics may also be accepted as candidates, though they may require a longer period of study before completing the requirements for the degree. These requirements are:

1. Satisfactory demonstration of competence in Greek and/or Latin composition.
2. Attainment of a standard of scholarship such as would normally be reached by three quarters of study in the department after fulfilling the requirements for an undergraduate major in the department. This would normally mean the completion of at least 18 units of graduate courses and 18 units of work at the 140 level or above.
3. The satisfactory completion of one Greek course at the 100 level (if the undergraduate major has been Latin) or one Latin course at the 100 level (if the undergraduate major has been Greek).
4. The passing of an examination testing the candidate's ability to translate into English from a selected list of Greek and/or Latin authors.
5. The writing of a thesis, or the passing of an examination on a particular author or topic, or written work accepted by the graduate committee as an equivalent.
6. A reading knowledge of French or German.

DOCTOR OF PHILOSOPHY

University requirements for the Ph.D. are discussed in the "Degrees" section of this bulletin. 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 secretary), 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, and on two attaining areas, to be defined in consultation with the candidate.

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, the dissertation oral examination in the fourth year. 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 successfully 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 three 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.

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 year some Xenophon 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 (Sultan) MWFThF 9
2. First-Year Greek—Continuation of 1. 5 units, Win (Sultan) MWFThF 9
3. First-Year Greek—Continuation of 2. 5 units, Spr (Staff) MWFThF 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) MWFThF 51. First-Year Greek—Accelerated. 6 units, Win (Staff) MWFThF 1:15
52. First-Year Greek—Continuation of 51.
   6 units, Spr (Staff) MTWThF 1:15

55. Learning a 2nd Language: Contrastive Analysis of Greek and English—How language works and the ways in which languages differ from one another.
   2 units, Win (Devine) Th 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 in secondary school Greek qualifies a student for 101, three or four years for 111. 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 (Staff)

103. Second-Year Greek—Homer, Odyssey.
   5 units, Spr (Sultan)

   3 units, Aut (Hamerton-Kelly)

106. A New Testament Writing: Gospel of Mark—(See also Classics/General 106.) Text is treated as historical group's expression of philosophical, social, and religious thought. Prerequisite: one year of Greek language.
   5 units, Spr (Gregg)

111. Sophocles—One play.
   4 units, Aut (Staff)

113. Attic Prose.
   4 units, not given 1991-92

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, Spr (Hanson)

166. Aristophanes.
   4 units, Win (Hanson)

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.
   3 units, Win (Edwards)
   Spr (Raubitschek)

205. Greek Language and Style.
   4 units, Win (Dover)

The above courses are offered every year. Other courses alternate or vary each year. (See also seminars listed under Latin, literature, philosophy, ancient history, religion and mythology, art and archaeology, classical linguistics, and history of science.)

260. Directed Reading.
   by arrangement

310. Rhythm, Accent, and Intonation of Greek—Reconstruction of the prosody of ancient Greek via the integration of philological and crosslinguistic evidence.
   5 units, Aut (Devine)

   1-15 units, any quarter (Staff)
   by arrangement

370. Greek Prose or Verse Composition.
   by arrangement

433. Aeschylus and the Spirit of Tragedy—Oresteia is read from the perspective of mimetic anthropology. Recent critical works are discussed and evaluated in the same light.
   5 units, Win (Girard)

   5 units, Spr (Nightingale)

Some of the courses listed above may be continued in 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.

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 (Bloomer) MWThF 9

2. First-Year Latin—Continuation of 1.
   5 units, Win (Bloomer) MWThF 9

3. First-Year Latin—Continuation of 2.
   5 units, Spr (Staff) MWThF 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

55. Learning a 2nd Language: Contrastive Analysis of Latin and English—How language works and the ways in which languages differ from one another.
    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 in secondary school Latin qualifies a student for 101, three or four years for 111. New students should determine for which course they are best fitted by consultation with the department's undergraduate adviser.

    5 units, Aut (Courtney)

    5 units, Win (Selden)

103. Second-Year Latin—Selections from Virgil, Aeneid.
    5 units, Spr (Staff)

111. Horace, Odes.
    4 units, not given 1991-92

112. Latin Elegy.
    4 units, Aut (Edwards)

118. Post-Classical Latin—(Same as English 118.)
    4 units, not given 1991-92

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.

153. Roman Satire.
    4 units, Win (Courtney)

160. Individual Work—For department majors only.
    by arrangement

163. Tacitus.
    4 units, Spr (Wigodsky)

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, Win (Bloomer)

177. Introduction to Paleography and Codicology—(Same as English 209.)
    3 units, not given 1991-92
GRADUATE

3 units, Aut (Courtney)
Win (Wigodsky)

205. Latin Language and Style.
4 units, Spr (Courtney)

The above courses are offered every year. Other courses alternate or vary each year. (See also seminars listed under Greek, literature, philosophy, ancient history, religion and mythology, art and archaeology, classical linguistics, and history of science.)

260. Directed Reading.
1-15 units, by arrangement

1-15 units, any quarter (Staff)
by arrangement

370. Latin Prose or Verse Composition.
by arrangement

401. Vergil.
5 units, Spr (Courtney)

431. Lucretius—Seminar on problems of text, composition, sources; conflict or harmony between poetry and philosophy.
5 units, Win (Wigodsky)

432. Catullus—Seminar on textural analysis of select lyrics, and some epigrams, with respect to literary currents and theories of language in the late Republic.
5 units, Aut (Selden)

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 courses listings are followed by detailed descriptions of the 1991-92 offerings.

NON-LANGUAGE UNDERGRADUATE

CLASSICS, HISTORY (371)

102. Greek and Roman History from Alexander to Caesar.
103. History of the Roman Empire.
104. Early Christianity.
105. History and Culture of Egypt.
106. Art, Religion and Society in Late Antiquity.
117. Greek Religion and Society.
173. Greek Military History.
176. Athens in the Age of Demosthenes and Alexander.
178/378. Mycenaean Greece.
181. Roman Society in the Age of Cicero and Augustus.
182. Rebuilding the Republic.
183. Law and Life in Rome.
185. The Roman Army and Frontiers.
190. The Family, Sex, and Marriage in the Late Roman Republic and Principate.

CLASSICS, ART/ARCHAEOLOGY (372)

20. Introduction to Classical Archaeology.
100A Ancient Art I: Archaic and Early Classical.
100B. Ancient Art II: Classical and Hellenistic.
108. Topography and Monuments of Greece.
120. Greek Vase Painting.
127. Archaeological Practicum.
28. Archaeological Drawing.

CLASSICS, GENERAL (378)

3. Democracy and Imperialism.
8. Political Philosophy in Classical Antiquity.
11. Age of Heroes.
12. Greek Tragedy.
18. Greek Mythology.
21. Modern Greek Folklore and Ancient Greek Mythology.
65. Greek Philosophy.
100. Literature and the Institution of Literary Study.
115. Greek Attitudes, Values, Beliefs.
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.
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. History of Greece—Survey of the history of ancient Greece from the Bronze Age through the Age of Pericles to the death of Alexander the Great (323 B.C.).
  4-5 units, Aut (Hanson) MTWTh 1:15

102. Greek and Roman History from Alexander to Caesar—Survey of the Mediterranean world from Alexander the Great to Julius Caesar (ca. 340-30 B.C.), including earlier Roman history from the foundation of Rome (ca. 750 B.C.); emphasis on the Hellenistic monarchies and the Roman Republic.
  4-5 units, Win (Treggiari) MTWTh 1:15

103. History of the Roman Empire—Survey of the Roman Empire from its beginnings under Augustus through its consolidation and later crises, to its transformation under Constantine into the Christian Roman Empire of the early Middle Ages (ca. 30 B.C.-330 A.D.).
  4-5 units, Spr (Treggiari) MTWTh 1:15

107. Art, Religion, and Society in Late Antiquity (284-717AD)—(Same as History 113) Brutality and transcendence: the inner and outer reality of life in the late Roman Empire.
  5 units, Aut (Gleason) TTh 2:15-3:30

109. Ancient Historians and Classical Historiography—For readers from Erasmus to Jefferson and beyond, to study history has meant reading the texts of Greek and Roman historians for moral, military, and political paradigms. Traditional readings of the ancient historians are considered (our predecessors' images of antiquity), but the focus is on the ancient historians themselves and these texts as documents of social and cultural and not simply political or military history.
  3-4 units, Aut (Bloomer)

160. Individual Work in Ancient History.
  by arrangement

173. Greek Military History.
  3-4 units, Spr (Hanson)

178/378. Mycenaean Greece: Undergraduate and Graduate Colloquium in History and Archaeology—Examines rise, economic and administrative structure, and collapse of Mycenaean civilization in the Bronze Age Aegean.
  3-4 units, Spr (Munn)

190. The Family, Sex, and Marriage in the Late Roman Republic and Principate.
  3-4 units, Spr (Treggiari)

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

327A,B,C. Problems in Roman History.
  2 units each, Aut, Win, Spr (Treggiari)

331. Agrarianism and Greek History—Study of the Greek countryside from the Archaic Age to the end of the Classical Period.
  5 units, Aut (Hanson)

  1-15 units, any quarter (Staff)
  by arrangement

422. Roman Society: The Family—Seminar focuses on the period 100 BC to 235 AD, taking stock of current orthodoxies and controversies on relationships in the Roman family.
  5 units, Win (Treggiari)

ART AND ARCHAEOLOGY

Classical Art and Archaeology have department prefix 372.
See also Art 5, 100A,B.

14. Classical Athletics—(Same as Athletics, Recreation, and Physical Education 194.) Origins and history of competitive sport in the ancient world, from the funeral games for Patroclus (Homer) to chariot races in the Hippodrome of Constantinople, based on the literary and monumental evidence. Emphasis on the spirit of competition apart from athletics. Lectures (illustrated) and discussion groups. DR:9(5)
  2-4 units, Win (Raubitschek)

20. Introduction to Classical Archaeology—Slide-illustrated examination of the archaeology of Greece from the Stone Age through the Age of Alexander the Great. The great monuments and enduring art of ancient Greece. The discipline of archaeology. What does archaeology reveal about the prehistoric past of Greece? Do the heroic legends of the Greeks cloud or enrich our understanding of the Minoan and Mycenaean cultures? What does archaeology contribute to our understanding of Classical Greece, which is otherwise so eloquently preserved to us through its literature? Current archaeological research in Greece. DR:9(5)
  4 units, Aut (M. L. Munn)

100A. Ancient Art I: Archaic and Early Classical Greek—(Same as Art 100A.) DR:7(2)
  4 units, Aut (Maxmin)
100B. Ancient Art II: Classical and Hellenistic—(Same as Art 100B.) DR:7(2)
4 units, Win (Maxmin)

108. Topography and Monuments of Greece—
Survey of the principal cities, sanctuaries, and historical places from the Mycenaean era to the Roman period. Familiarizes students with the physical setting of Greek history and culture, and prepares students for travel and study in Greece.
3-4 units, Win (Munn)

120. Greek Vase Painting—(Same as Art 102/202.) 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, Aut (Maxmin)

128. Archaeological Drawing—Trains students to prepare technical drawings of archaeological artifacts, especially pottery profiles. Useful training for archaeological fieldwork, and as preparation for the Stanford-in-Greece archaeological project.
2 units, Spr (Munn)

160. Individual Work in Archaeology.
by arrangement

Courses at the 200 level are mainly for graduate students.

260. Individual Work in Archaeology.
by arrangement

301. Seminar: Political Iconography—(Same as Art 201.) 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 1991-92

1-15 units, any quarter (Staff)
by arrangement

HISTORY OF SCIENCE

The Department of Classics participates in the History of Science Program, described in that program's section in this bulletin.

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)

100. Literature and the Institution of Literary Study—(Same as Comparative Literature 100, English 100, German Studies 179D.) Overview of the emergence of the phenomenon of literature, of the institution of literary study in general, and of theoretical approaches to literature in particular. From ancient Greek rhetorical and poetical theory, tracks the changing shapes of ideas of chemical theory, together with speculative aspects in natural philosophy and theology.

138A. Ancient Period—DR:8(3); also satisfies Area 4(6) when taken in sequence with 138B or 138C.
4 units, given 1992-93

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 (Biagioli)

138C. Newton to Einstein—DR:8(3); also satisfies Area 4(6) when taken in sequence with 138A.
4 units, Spr (Staff)

INTERDISCIPLINARY

Courses in this area have department prefix 378.

306. 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.

310. Rhythm, Accent, and Intonation of Greek—Reconstruction of the prosody of ancient Greek via the integration of philological and crosslinguistic evidence.
5 units, Aut (Devine)

340. Introductory Sanskrit.
4 units, not given 1991-92

353. Comparative Grammar of Greek and Latin.
5 units, not given 1991-92

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)
literature and literary study from the Middle Ages through the present multicultural situation.

5 units, Win (Gumbrecht, Selden)

115. Greek Attitudes, Values, Beliefs—Focuses on Herodotus's *Histories* I; Sophocles's *Antigone*; Plato's *Republic* I. DR:8(3)

2-3 units, Win (Dover)

160. Individual Work—For department majors only.

by arrangement

176. Senior Seminar.

2 units, Spr, by arrangement

201. Introduction to Classical Scholarship.

1 unit each, Win, Spr (Wigodsky)

204. An Introduction to Modern Classical Scholarship—Major trends in post-modern discourse and their impact on classical studies. Begins critical writing early in graduate work. Reading: Wolf, Hegel, Nietzsche, Dodds, Nagy, Derrida, Bakhtin, Foucault, etc.

4 units, Aut (Stephens)

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, Aut (Jenks) MWF 1:15

165. Hellenistic Philosophy—Stoicism and Epicureanism as comprehensive systems of philosophy, attempting to base ethics on theories of nature; the skeptics' attack on those attempts. Recommended: previous course in earlier Greek philosophy.

3 units, Spr (Wigodsky)

169. Ancient Greek Ethics—(Same as Philosophy 118A.) Explores in depth the ethical philosophies of Socrates, Plato, and Aristotle; interprets them in their cultural/historical contexts. DR:8(3)

3-4 units, Win (Nightingale)

431. Lucretius—Seminar on problems of text, composition, sources; conflict or harmony between poetry and philosophy.

5 units, Win (Wigodsky)


5 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, Win (Sultan)

21. Modern Greek Folklore and Ancient Greek Mythology—Comparative, text-based study of recurrent images, motifs, and figures in Greek oral tradition through four millennia. Issues of orality and literacy, transmission, and questions of genre, meter, and music. Interaction between ancient and modern myth and ritual. Selected readings, in translation, of modern wonder tales, narrative songs, and examples from ancient poetry, tragedy, and prose. DR:7(2)

3-4 units, Spr (Sultan)

106. A New Testament Writing: Gospel of Mark—(See also Classics/Greek 106.) Text as historical group's expression of philosophical, social, and religious thought. Recommended: completion of CIV sequence.

5 units, Spr (Gregg)

118. Readings in Greco-Roman Religion—Texts present philosophical and religious thought and point towards activities of discrete groups. Seminar/discussion format; critical reading and participation in class sessions.

5 units, Aut (Gregg)

GRADUATE SEMINARS

Graduate seminars vary each year. The following are offered this year.

ANCIENT HISTORY (371)

327A,B,C. Problems in Roman History.

331. Agrarianism and Greek History.

422. Roman Society: The Family.

ART AND ARCHAEOLOGY (372)

302. Colloquium in Greek Painting.

CLASSICS, GENERAL (378)

118/218. Pyrrhonian Skepticism—(Enroll in Philosophy 118/218.)

204. An Introduction to Modern Classical Scholarship.

COMMUNICATION

GREEK (373)
310. Rhythm, Accent, and Intonation of Greek.
433. Aeschylus and the Spirit of Tragedy.

LATIN (375)
431. Lucretius.
432. Catullus.

COMMUNICATION
Emeriti: (Professors) Elie Abel, Nathan Maccoby, Lyle M. Nelson, William Rivers; (Professor Teaching) Ronald Alexander; (Adjunct Professor) Julian Blaustein; (Lecturer) Jules Dundes
Chair: Donald F. Roberts
Director, Institute for Communication Research: Byron B. Reeves
Director, John S. Knight Fellowships for Professional Journalists: James V. Risser
Director, Mass Media Institute: Henry Breitrose
Professors: Henry S. Breitrose, Steven H. Chafee, Byron B. Reeves, Donald F. Roberts; (by Courtesy) Richard A. Brody, Michael L. Ray, Eugene J. Webb
Associate Professors: Jeremy Cohen, Theodore L. Glasser
Assistant Professors: June Flora, Clifford Nass
Professors (Teaching): Jan Krawitz, Marion Lewenstein, James V. Risser, Kristine Samuelson (on leave)
Lecturer: James R. Bettinger, Gerald Lanson, Felicia Lowe, Carolyn Wakerman, Pam Walton

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 careers in journalism or documentary film. 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 Support Section of the Registrar’s Office.

The department requires that applications for graduate admission submit verbal and quantitative scores from the Graduate Record Examination.

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 programming. 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/videotape), 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. No more than 12 units of transfer credit or Summer Session credit may be applied to meet department requirements.

Communication majors must register for a letter grade for all communication courses unless offered only for Satisfactory/No Credit.

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, 117, 136, 150, 175, 177, 180.
Some courses are not given every year. Refer to courses listings and *Time Schedules* each quarter, noting individual course prerequisites.

**HONORS PROGRAM**

The honors program provides the opportunity to undertake a significant program of research. 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 or early in their senior years. The program represents the department's commitment to and recognition of the value of research and of the individual professor/student mentoring relationship in undergraduate education.

**GRADUATE PROGRAMS**

**MASTER OF ARTS**

The A.M. degree is awarded by the department in the fields of Journalism or Documentary Film Production. The A.M. programs are terminal degree programs designed to train practitioners. Students interested in the doctoral program are evaluated for admission on different criteria, and students who complete the A.M. degree and who desire application to the Ph.D. program must file a new application for admission. They are considered together with all other doctoral applicants.

Candidates must earn at least 42 units in graduate residence at Stanford, and they must maintain a high academic performance during the entire program of study. At least 35 of the 42 units must be in courses numbered 200 or higher. A master project under the direction of a major professor must be undertaken. A report of the project must be made to the professor directing the project. Completion of the entire program normally takes three to five quarters depending on the nature of the project, although it is typical that film students spend a longer time on complex projects. Master's students are expected to finish courses within one academic year (three quarters). Students who have completed the course and residence requirements may register in Terminal Graduate Registration (TGR) status to complete the project.

Students in the Documentary Film master's program are required to take Communication 223A,B,C and 224A,B,C. Additional courses in film aesthetics, history, and criticism are offered. Students may select other relevant courses, in consultation with their advisers, from within or outside the department.

**Note**—While the department maintains film production facilities for teaching and research purposes, the costs of supplies and processing services are the responsibility of the student.

These costs currently approximate $1,700 for the three quarters.

Students in the Journalism master's program are required to complete a minimum of 10 courses as follows:

204. Reporting and Writing News.
205. Editing the News.
216. Media Law.
225. Perspectives on Journalism.
275. Reporting of Public Affairs.
291. Graduate Journalism Seminar.

One of the following specialized writing courses:

236. Broadcast Journalism.
250. Magazine Writing.
277A. Opinion Writing.
277B. Science Writing.
277F. Feature and Analytical Writing.
280. Film Criticism.

One of the following communication theory courses:

208. Mass Communication Theory.
257. Public Information Programs.
260. Political Communication
270. Communication and Children.

Two additional courses in or outside of the department are selected in consultation with an academic adviser.

**DOCTOR OF PHILOSOPHY**

The department offers the Ph.D. in Communication Theory and Research. Students are required in their first year to complete a core program in communication theory and research, research methods, and statistics; these core courses are grounded in the social science literature. Following completion of the core program, students take advanced courses and seminars in communication and related departments. Each student builds several research specialties relating communication to the study of campaigns, children, ethics, health, law, organizations, politics and voting, psychological processing, and technology. Regardless of the area of specialization, the Ph.D. program is designed primarily for persons interested in teaching and research careers or policy formation positions.

The Ph.D. program is designed to encompass 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 two specialized
area examinations 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.
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 multidisciplinary 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. Generally, 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.

All Ph.D. students must fulfill all departmental course requirements, including courses in other departments.

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.

Finally, students must complete:
Communication 397, First Research Project
Communication 398, Pre-dissertation Research Project
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.
104S. Reporting and Writing the News—Workshop emphasizing spot news, news features, news interpretation, and analysis. 
6 units, Sum (Staff)

106. Communication Research Methods—(Graduate students register for 206.) Formulation of research problems, research design, sampling, data collection, and analysis. A variety of studies are critically evaluated. The class designs and conducts a small communication study. Prerequisites: 1; statistics, computer science.
4 units, Aut (Breitrose)

107S. Editing the News—Copy editing, headline writing, news displays, and picture cropping. Lab includes wire services, news evaluation, and page make-up.
3 units, Sum (Staff)

5 units, Spr (Reeves)

110. Communication and Law—(Graduate students register for 210.) The interactions among freedom of expression, communication, and law. Issues such as privacy and freedom of speech are used to introduce the application of communication research to law and policy formation. Students consider assumptions about communication found in law and the effects of law and communication on each other.
5 units, Spr (Cohen)

114. Introduction to Film and Video—Preparation of visual media from conceptualization to completion of various super-8 and video assignments. Written preproduction of media projects is emphasized in conjunction with the practical visual and aural techniques necessary for executing ideas on film and tape. Prerequisites: 1 and 104, or consent of instructor.
5 units, Aut (Wallon) 
Spr (Krawitz)

117. 16mm Film Production—A practical, hands-on course for those interested in a career in motion picture production. Provides thorough grounding through production of a short 16mm non-synchronous film with multiple soundtracks. Lab fee to be announced. Prerequisites: successful completion of 114 and consent of instructor.
5 units (Krawitz) not given 1991-92

120. Media, Policy, and Law—Introduction to legal issues relevant to journalists. Topics: privacy and libel law, newspaper joint operating agreements, broadcast licensing, the fairness doctrine, and cable regulation.
3 units, Sum

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 (Glasser)

125. Perspectives on Journalism—(Graduate students register for 225.) Survey of issues, ideas, and concepts in the development of American journalism, with emphasis on 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 given 1992-93

131. Press Ethics and Responsibility—(Graduate students register for 231.) The development of professionalism among American journalists, with emphasis on 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 (Glasser) given 1992-93

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, Spr (Staff)

138. Film Images of African-American Culture—(Same as Anthropology 130, Afro-American Studies 122.) The nature of images of African Americans and African American culture as portrayed on film. The sources of those images (including sources of African American culture itself), their variations, and how they have changed over time. Historical trends are related to changes in African Americans' self-conceptions, in their status and power in American society, in their role in the film industry, and changes in overall American race relations and American popular culture, including the film media. DR:3 5 units (Gibbs) not given 1991-92

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 on: 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.
4 units, Win (Lewenstein)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Units</th>
<th>Instructor(s)</th>
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<tr>
<td>140</td>
<td>History of American Journalism—(Graduate students register for 240.) Evolution of the democratic mass media in its social, political, economic, technological, and professional aspects.</td>
<td>4 units (Lewenstein) not given 1991-92</td>
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<tr>
<td>141</td>
<td>History of Film—(Graduate students register for 241.) Studies in the development of the motion picture as an art form and a means of communication. Lab. Screenings of films announced in class.</td>
<td>4 units, Win (Brettrose)</td>
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<tr>
<td>142</td>
<td>Broadcasting in America—(Graduate students register for 242.) The development of American broadcasting and its contemporary problems.</td>
<td>4 units, Win (Brettrose)</td>
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<tr>
<td>150</td>
<td>Magazine Writing—(Graduate students register for 250.) Practice in writing magazine articles, with emphasis on marketing manuscripts. Conferences. Prerequisite: 104.</td>
<td>4 units, Spr (Rivers)</td>
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<tr>
<td>157</td>
<td>Public Information Programs—(Graduate students register for 257.) Emphasizes health information programs and their effects on public knowledge, attitude, 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)</td>
<td>3 units, Spr (Flora)</td>
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<tr>
<td>160</td>
<td>Political Communication—(Graduate students register for 260.) Analysis of the role of mass media and other channels of communication in political and electoral processes.</td>
<td>4 units, Win (Chaffee)</td>
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<tr>
<td>163</td>
<td>Seminar: The President, the Press, the Public, and Politics—(Same as Political Science 191.) Enrollment preference given to seniors. The interactions between the President, the media, and the public in contemporary American politics. Standard and new conceptions of the sources of presidential power in policy making. Whether the evidence justifies the new conceptions of the role of President in the politics of policy making. Prerequisite: Political Science 101P or equivalent.</td>
<td>5 units, Win (Brody)</td>
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<tr>
<td>169</td>
<td>Communication, Technology, and Society—(Same as Sociology 149, VTSS 162; graduate students register for 269.) 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.</td>
<td>4 units, Spr (Nass)</td>
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<tr>
<td>170</td>
<td>Communication and Children I—(Graduate students register for 270.) Developmental approach to how children come to use the 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)</td>
<td>4 units (Roberts) given 1992-93</td>
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<tr>
<td>171</td>
<td>Communication and Children II—(Graduate students register for 271.) Research practicum; limited enrollment; consent of instructor. Prerequisite: 170.</td>
<td>3 units (Roberts) given 1992-93</td>
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<tr>
<td>172</td>
<td>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.</td>
<td>4 units, Aut (Reeves)</td>
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<tr>
<td>173</td>
<td>Communication and Health—(Graduate students register for 273.) Seminar on campaigns designed to change information attitudes and behavior, particularly health.</td>
<td>4 units (Flora) not given 1991-92</td>
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<td>175</td>
<td>Reporting of Public Affairs—(Graduate students register for 275.) Coverage of traditional news beats: police, city hall, education, courts, and issue-oriented coverage of policy area beats. Prerequisite: 104.</td>
<td>5 units (Risser) not given 1991-92</td>
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<td>176</td>
<td>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.</td>
<td>4 units, Spr (Wakeman)</td>
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<td>177</td>
<td>Specialized Workshops—One or more classes are offered in specializations such as science writing, sports writing, or other areas. Organized around writing projects oriented toward the field of specialization.</td>
<td>4 units, Spr (Lanson)</td>
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<tr>
<td>177F</td>
<td>Feature and Analytical Writing—(Graduate students register for 277F.)</td>
<td>4 units, Spr (Bettinger)</td>
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| 178        | Media Management—The management and financial aspects of media organization. | Top-
ies: 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.

4 units (Lewenstein) not given 1991-92

180. Film Criticism—(Graduate students register for 280.) A critical view of film. Readings/discussion consider models of artistic and literary criticism as points of comparison. The journalistic, psychoanalytical, Marxist, structuralist, and semiological approaches. Weekly reviews stress the meaning of the films and a lucid writing style. Prerequisites: 104, and 101 or 141.

4 units (Breitrose) not given 1991-92

185. Internship Experience—Professional experience in the media. Open only to Communication majors.

Aut, Win, Spr (Lewenstein) by arrangement

190. Senior Project—A 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 (Lewenstein) by arrangement


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.)

202. Graduate Colloquium in Film and Television—Topics in film and television focusing mainly on production-related issues. Enrollment limited to A.M. students in film and television program.

1 unit, Aut, Win, Spr (Staff)

204. Reporting and Writing and News—For graduate students. A reporting and writing course emphasizing various forms of journalism: news, interpretation, features. Detailed criticism of writing.

5 units, Aut (Lanson)

205. Editing the News—Copy editing, headline writing, news display, and photo cropping. Lab includes editing copy, Associated Press, news evaluation, and page make-up.

4 units, Aut (Staff)


9 units, Summer (Hale)

206. Communication Research Methods—(Graduate section; see 106.)

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 (Doolittle)

210. Communication and Law—(Graduate section. See 110.)


5 units, Win (Cohen)

220. Mass Media in Society—The nature and social responsibilities of the media, the structure of the industry, and problems and issues in the mass media. Does not substitute for 1.

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 (Lowe)

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 (Walton)

223C. Documentary Film/Video Directing III—For graduate students. Further examination of structure with emphasis on writing and
COMMUNICATION 335

directing the documentary. Practical training in fundraising and distribution. Taken concurrently with 224C. Prerequisite: 223B.

5 units, Spr (Staff)

224A. 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: concurrent registration in 223A.

5 units, Win (Krawitz)

224B. 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. 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 224B and concurrent registration in 223C.

5 units, Spr (Krawitz)

225. Perspectives on Journalism—(Graduate section; see 125.)

231. Press 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—(Graduate section; see 140.)

241. History of Film—(Graduate section; see 141.)

242. Broadcasting in America—(Graduate section; see 142.)


4 units (Breitrose) not given 1991-92

250. Magazine Writing—(Graduate section; see 150.)

4 units (Staff)

257. Public Information Programs—(Graduate section; see 157.)

260. Political Communication—(Graduate section; see 160.)

269. Communication, Technology, and Society—(Graduate section; see 169.)

270. Communication and Children I—(Graduate section; see 170.)

271. Communication and Children II—(Graduate section; see 171.)

272. Psychological Processing—(Graduate section; see 172.)

273. Communication and Health—(Graduate section; see 173.)

275. Reporting of Public Affairs—For graduate students. Coverage of traditional news beats, such as police, city hall, education, and courts as well as issue-oriented coverage of policy area beats. Prerequisite: 204.

5 units, Win (Risser)

276. International Communication—(Graduate section; see 176.)

277. Specialized Workshops—(Graduate sections; see 177.)

277B. Science Writing.

277F. Feature and Analytical Writing.

278. Media Management—(Graduate section; see 178.)

280. Film Criticism—(Graduate section; see 180.)

290. A.M. Project.

4-8 units, any quarter (Staff) by arrangement

291. Graduate Journalism Seminar—Required of all A.M. journalism students. Discussions are devoted to preparation for the A.M. project and to current issues in the practice and performance of the press. Meets throughout the academic year.

1-6 units, Aut, Win, Spr (Staff)

299. Individual Work.

1-4 units, any quarter (Staff) by arrangement

PRIMARILY FOR Ph.D. STUDENTS


1-3 units, Aut (Cohen)

306. Communication Research Methods—(Doctoral section, see 106)

311A. Theory of Communication—Required of all communication doctoral students. Approaches to communication theory; seminar and tutorial meetings; extensive reading and papers. Consent
of instructor required for anyone not a Communication Ph.D. student.
4-5 units, Aut (Chaffee, Roberts)

311B. Theory of Communication—Continuation of 311A with emphasis on communication theory. Prerequisite: 311A.
4-5 units, Win (Flora, Nass)

311C. Theory of Communication—Continuation of 311B. Prerequisites: 311A, 311B.
4-5 units, Spr (Cohen, Classer, Reeves)

313. Introduction to the Use of the Computer—Specifically for science data analysis. A brief discussion of computing concepts, followed by use of Wylbur and Edit, text editors on SCIP and LOTS systems; SPSS; and data storage.
1-3 units, Win (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. Previous or concurrent enrollment in statistics required.
4 units, Win (Classer, Staff)

318. Doctoral Research Methods II—Continuation of 317. Sampling questionnaire design, attitude scale construction, survey administration, computer analysis of data.
4 units, Spr (Chaffee, Reeves)

319. Doctoral Research Methods III—Continuation of 318. Project-oriented approach to relationship between theory and data analysis; advanced topics in data analysis.
4 units, Spr (Chaffee, Reeves)

370. Advanced Communication Theory and Method Seminar I—May be repeated for credit. Topic and instructor change each year. Prerequisites: 311A, 319.
3 units, Aut (Chaffee)

371. Advanced Communication Theory and Method Seminar II—May be repeated for credit. Topic and instructor change each year. Prerequisites: 311A, 319.
3 units, Win, sec. 1 (Glasser) sec. 2 (Reeves)

372. Advanced Communication Theory and Method Seminar III—May be repeated for credit. Topic and instructor change each year. Prerequisites: 311A, 319.
3 units, Spr (Roberts)

373. Topics in Communication, Technology, and Society—Interdisciplinary seminar discussing the relationship between dimensions of technology and the economy, work and organizations, mass society, culture, and the self. Emphasis on classic books rather than recent papers.
4 units, Spr (Nass)

374. Structure and Control of Communication—Analysis of the political economy of mass media, emphasizing the social, cultural, and political implications of contemporary patterns of ownership, organization, and control of the major media industries in the U.S. and elsewhere.
4 units (Classer) not given 1991-92

375. Communication Theory Review Seminar—Limited to Ph.D. students. Prerequisites: 311A, 311B.
3 units, Spr (Staff) by arrangement

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. Individual Work.
1-8 units, Aut, Win, Spr (Staff)

400. Dissertation Research.
6-10 units, Aut, Win, Spr (Staff) by arrangement

COMPARATIVE LITERATURE

Emeritus: (Professor) Joseph Frank (Slavic Languages and Comparative Literature)
Chair: Hans Ulrich Gumbrecht
Professors: John Bender (English and Comparative Literature), Russell Berman (German Studies and Comparative Literature), John Freccero (Italian and Comparative Literature), Rene 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)

Associate Professors: Thomas Hare (Japanese and Comparative Literature), Jeffrey T. Schnapp (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 requirements on schedule. No student may declare a major 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 complete 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 Humanities 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 language. 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 literature, and English as the second literature (three courses), the student is still required to take at least one advanced course, preferably a literature course, in a second foreign language.
5. Course distribution should also provide a background (at least three courses) in a second national literature read in the original language. This requirement pertains whether the main literature (section 4) is English or foreign.

6. One literature course, not necessarily in the original language, drawn from a cultural tradition distant from that of the student's main areas of interest.
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, Autumn Quarter, and 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.
9. Two courses related to the student's total program, but drawn from disciplines outside literature.

GRADUATE PROGRAM
DOCTOR OF PHILOSOPHY

The Ph.D. program is designed for a small group of students whose linguistic background, breadth of interest in literature, and curiosity about the problems of literary scholarship and theory (including the relation of literature to other disciplines) make this program more appropriate to their needs than the Ph.D. in one of the individual literatures. Students take courses in at least three literatures (one 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, students should have completed an undergraduate program with a strong background in one literature and some work in a second literature studied.
in the original language. Since the program demands an advanced knowledge of two foreign languages and a reading knowledge of a third foreign language, 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 Literature Fellows under a plan which attempts to integrate financial support and completion of residence requirements with their training as prospective university teachers. Tenure as a fellow, assuming satisfactory academic progress, is for a maximum of four years. Graduate-level work in literature completed elsewhere being counted as part of this four-year period. The teaching requirement is the same regardless of financial support. (For specific teaching requirements, see below.) Although financial support is limited to four years, the timetable for the completion of requirements allows work to 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. One of the three languages must be French or German, and one of the other two must be Latin (for which Greek, Chinese, or Japanese may be substituted when appropriate) if the period in which the student concentrates is earlier than the Romantic period. 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 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.

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 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. 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.

5. Introduction to Black American Drama—(Enroll in Drama 5.) The development of Black drama in the U.S. from 1858 to the present.
   4 units, Aut (Elam)

30. The Novel—(Enroll in English 30; if taking 5 units register for 130.) Introduction to the novel through a close sympathetic reading of a variety of major novels, focusing on their construction, narrative technique, and expression of human values. DR:7(2)
   3 units, Spr (Packer)

50. 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 units, Aut (Lindenberger)

50G. Poetry and Poetics—(Enroll in English 50G/150G, Feminist Studies 164.) Introduction to the study of poetic techniques and genres (narrative, lyric, elegy, satire), emphasizing texts in which representations of gender difference play a significant role. Ovid's Metamorphoses, Renaissance love lyrics, satiric verse from Alexander Pope to Queen Latifah, and contemporary American poetry that engages in dialogue with conventional notions of masculinity and femininity. DR:7t(2)
   3 or 5 units, Spr (Middlebrook)

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.

61. The Ancient Near East, Greece, and Rome—(Enroll in Humanities 61.) (DR:1; three-quarter sequence.)
   5 units, Aut (Edwards, Staff) MTW 11
   plus 2 hours by arrangement

62. The Middle Ages and the Renaissance—(Enroll in Humanities 62.) (DR:1; three-quarter sequence.)
   5 units, Win (Andersson, Brooks, Wack, Staff) MTW 11
   plus 2 hours by arrangement

63. The Enlightenment to the Present—(Enroll in Humanities 63.) (DR:1; three-quarter sequence.)
   5 units, Spr (Lyons, Staff) MTW 11
   plus two hours by arrangement

90. Introduction to the Humanities Honors Program—(Enroll in Humanities 90.) 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)
   Win (Rayner)
   Spr (Brooks)

100. Literature and the Institution of Literary Study—(Same as Classics 100, English 100, German Studies 179D.) Overview of the emergence of literature as a phenomenon specific to Western culture, of the academic literary disciplines in general, and of theoretical approaches to literature in particular. From ancient Greek Rhetoric and Poetics, tracks the development of ideas of literature and literary study from the Middle Ages through the present multicultural situation. Topics: the material culture of literary study and production (e.g., scribal vs. print vs. media cultures) and the emergence of key concepts of the Western tradition, e.g., "text" and "authorship" and the institutionalizations they underwent.
   5 units, Win (Gumbrecht, Selden)
   TTh 1:15-3:05

110. Representations of India in Western Philosophical Texts—Overview of the selection and representation of elements of Indian thought from the early Greeks. "India" from classical antiquity, through the Romantic period, to the present. Emphasizes ambiguities concerning the global processes of "Westernization."
   5 units, Spr (Dhillon) MW 3:15-4:45

116. Autobiography: Versions and Conversions of the Self from Augustine to Rousseau—(Enroll in Classics 116.) Close reading of five genetically linked self-portraits which have determined the
dominant tradition of self-representation in the West: Augustine, Dante, Petrarch, Montaigne, Rousseau. Topics: classical sources for modern concepts of the self, autobiography as a genre, narrative strategies for the depiction of identity, the interplay between discursive operations (language, reading, writing) and lived experience, the policing of the body, sexual difference as a basis for self-determination.

3-4 units, Aut (Selden)


5 units, Spr (Wald)

138. Female Saints—(Enroll in French 138.) 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). Taught in English, readings from medieval poems in English translation. DR:8(3)

4 units, Win (Cazelles)

142. Person, Number, Gender—(Same as Asian Languages 142.) Overlooked elements of grammar and linguistic structure (e.g., person, number, and gender of the title) often carry philosophical and epistemological weight in literary discourse. Readings of central texts from India, China, Japan, and Ancient Egypt focus on detailed consideration of passages in the original languages of the texts (prior knowledge of the languages not required).

4 units, Spr (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, Spr (Frank)

160D. Cinema and Literature—(Enroll in English 160D.) The two-way relationship of literature and cinema from 1900, primarily in the U.S. and England. The modes of narration and the development of genres in both media. Topics: the role of the novel in the rise of classical narrative cinema, and early theorization of film by Russian director Sergei Eisenstein and others; the "Victorian Sensibility" of silent American cinema, particularly films of D. W. Griffith; Dickens and the idea of an English national cinema; F. Scott Fitzgerald, Rudolf Valentino, and the birth of the "star," film noir and hard-boiled fiction—a cross-media post-war aesthetic; Chaplin and Beckett—slapstick as high art; constructing the horror genre in novel and film. Mandatory evening screenings.

5 units, Win (Marsh)

161C. 20th-Century Afro-American Fiction—(Same as African and Afro-American Studies 161C, English 161C.) Afro-American fiction from the Harlem Renaissance. Works by Jean Toomer, Zora Neale Hurston, Ernest Gaines, Richard Wright, Ralph Ellison, James Baldwin, Toni Morrison, Ishmael Reed, James Alan McPherson, Gloria Naylor, and Alice Walker. DR:3 or 7(2)

5 units, Spr (Porter)

161H. Narration, Detection, and Social Marginality—(Enroll in English 161H.) Relationship between narration and detection and their association with marginality, studying the function of detection in the works of "marginal" and "central" writers.

5 units, Spr (Drake)

162A. Study of Chicanas—(Enroll in English 162A, Chicano Studies 161, Feminist Studies 165, Spanish 286.) Develops and applies an integrative ethnocultural and feminist approach to study of Mexican American women. Study of Chicana identity from a variety of perspectives and controversies surrounding culture, gender, class, and race gives insight into problems and possibilities of a Chicana-identified ideology.

5 units, Win (Candelaria)

164A. The Biblical Presence in Modern Poetry—(Enroll in English 164A.) The presence of biblical scripture (people, narratives, place names, prophecy, liturgical and lexical elements from the Hebrew Bible) in British, American, European, and Israeli poetry. DR:7(2)

5 units, Win (Pelstiner)

165A. Introduction to Medieval Culture—(Enroll in English 165A, Medieval Studies 165.) Introduction to the development of medieval culture through religious, philosophical, literary, artistic, social, and political sources, emphasizing interrelationships among them. Lectures by faculty from various departments. DR:7(2)

5 units, Win (Brown, Staff)

165B. Arthurian Literature—(Enroll in English 165B.) DR:7(2)

5 units, Aut (Wack)

165C. Introduction to Literary Theory—(Enroll in English 165C.) Introduces a variety of literary theories and methodologies from Plato to the present. Theoretical approaches include
structuralism, phenomenology, feminism, Marxism, and deconstruction.
5 units, Win (Saldivar)

169. Who's Speaking? The Positioning of the Speaking Subject in Western and Chinese Poetry—(Same as Asian Languages 169, English 169.) Where does the spoken voice come from? How is it constituted? Why is it formulated in certain ways? Where does it derive its stability from, or is stability impossible, despite efforts to the contrary? Focus is on the issue of poetic persona, the occupation of the space of the Other from which to speak. Readings: poems from the English, French, and classical Chinese traditions; and critical theoretical works (Empson's work on the pastoral, and Burke's work on rhetoric).
5 units, Aut (Palumbo-Liu) MW 11-12:30

169B. Readings in the Asian-American Novel—(Same as English 169B.) Asian-American novels from the perspectives of culture, history, and ideology. How do these works evince the workings of America upon the ethnic subject's notions of self-representation? DR:3
5 units, Win (Palumbo-Liu) MW 11-12:30

169D. Readings in Asian-American Short Fiction—(Same as English 169D.) Works of Asian-American short fiction from the perspectives of culture, history, and ideology. How do these texts evince the workings of America upon the ethnic subject's notions of self-representation? Comparison of the short story and novel form in terms of genre and expression. A continuation of some topics in 169B. DR:3
5 units, Spr (Palumbo-Liu) MW 11-12:30

189A. The Body Politic Analogy from Antiquity Through the Renaissance—(Same as English 189A, Italian 289A.) The analogy between the individual and body politic as a master-trope in works from Plato, Vergil, Augustine, Dante, and Ariosto. The body politic analogy as a continuous meditation, by this intertextually linked series of authors, upon the problematic deconstructiveness and disorder in human nature and in history. Recommended: knowledge of Greek, Latin, or Italian.
5 units, Win (MacKinnon) TTh 1:15-3:05

194. Literature and the Humanities—(Enroll in Humanities 194.)
5 units, Spr (Palumbo-Liu)

212A. Medieval to Renaissance: The Development of Literary Forms—(Enroll in English 212A.) The adaptation of established or emerging literary genres and conventions to the changing moral and intellectual attitudes toward the arts during late antiquity, the Middle Ages, and the Renaissance by means of a central distinction and its corollaries. Elucidates certain literary works by accounting, in light of these distinctions, for their choice of genre, procedures of organization, and style.
5 units, Win (Trampi)

213. Family Dynamics in Literature—(Same as Modern Thought and Literature 213, Psychiatry 213.) Seminar uses psychological tools to analyze a variety of literary families. Authors: Freud, Shakespeare, Kafka, Waugh, D. M. Thomas.
2-3 units, Win (Van Natta)

230C,D. 20th-Century Russian Literary Theory from Symbolism and Formalism to Semiotics (Part I and II)—(Enroll in Slavic Languages 230C,D.) Survey of Russian theoretical works on literature. Academic scholarships of Alexander Vesebovsky, Potebnya, theories of Symbolism and Formalism are examined. Symbolist authors (Vyacheslav Ivanov, Belyi, Blok, Bryusov) are seen in the fusion of their theoretical and poetical work as the Formalists' school is understood in its correlation to post-symbolist (Futurist and Acmeists) poetical movements. Postformalist studies of the 30s and 40s (Bachtin, Florensky, Propp, Frejdenberg, Polivanov, etc.) in their relation to contemporary studies of the Prague Circle and later Moscow-Tartu semiotics school. No knowledge of Russian required. (Part I and II may be taken independently).
230C. 4 units, Aut (Ivanov) by arrangement
230D. 4 units, Win (Ivanov) by arrangement

240. Geistesgeschichte to the Enlightenment Threshold—(Enroll in German Studies 240.) Mystical expression from Meister Eckart to Jakob Boehme. Renaissance syncretism, nature philosophy, polemics, and social thought. Origins and branches of Protestantism: Protestantism as a force in social revolution and in the formation of the middle classes; Humanism as a binding element of cultural consciousness. Early modern cosmology, psychology, and anthropology, and varieties of rationalism from Cusanus and Paracelsus up to Leibniz.
3-5 units, Aut (Gillespie)

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. Given in German alternate years.
241. Deutsche Geistesgeschichte I—(Enroll in German Studies 241.) Language and thought from Leibniz to Humboldt.
3-5 units, Aut (Trabant) TTh 4-6
242. Deutsche Geistesgeschichte II—(Enroll in German Studies 242.) A study of key texts by Hegel, Marx, Nietzsche, and Weber.
3-5 units, Win (Staff)
3-5 units, Spr (Mueller-Vollmer)

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)

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.
4 units, Win (Staff)

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 (Bely, Blok, Mayakovskiy, Babel, Zoshchenko, Kataev, Scholokh, Nabokov, Olesha, Pasternak, Grossman, Solzhenitsyn, Siniavsky Brodsky, etc.) Attention to the way poets and novelists have constituted the post-revolutionary "historical experience" of the Russians.
4 units, Spr (Freidin)

4-5 units, Aut (Wynter)

249. Afro-Hispanic Cultural Worlds: An Introduction—(Enroll in African and Afro-American Studies 249, Spanish 249.) 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.
4 units, Win (Wynter)

249F. The Aesthetic Absolute: German Literature and Philosophy around 1800—(Enroll in German Studies 249F/349F, Philosophy 126.)
3-5 units, Win (Mueller-Vollmer, Förster)

253. German Literature and Culture III—(Enroll in German Studies 253.) Introduction to New High German literature from the waning of the Middle Ages through the Renaissance and Reformation period (circa 1350-1600). Readings in 15th- and 16th-century poetry, drama, fiction, and discursive prose (including selections of Latin works by major German authors, in translation). Early modern poetics and prosodic renewal; the development of genres out of the "Bakhtinian" manifold of popular, regional, and international heritages.
3-4 units, Win (Gillespie)

254. German Literature and Culture IV—(Enroll in German Studies 254.) From Baroque to Enlightenment (circa 1600-1750). Readings in literary renewal, experimentation, and theorizing of the 17th century; analysis of masterworks of the lyric from Opitz to Günther, and of German baroque world theater, romance, and novel; and modes (e.g., metaphysical, mannerist, baroque, neoclassical, rococo) on the threshold of the Enlightenment; the establishment of Enlightenment tastes, generic expectations, and language.
3-5 units (Gillespie) given 1992-93

259B. How "Realistic" was European Literary Realism?—(Enroll in Spanish 295/395, French 259B, German 293/393.) Part of the novelistic production in 19th-century European literature presented itself, and has been defined by literary critics, as a "realistic" (i.e., "adequate") description of contemporary social life. A philosophical critique of this claim is applied to the results of such a discussion in different (especially Marxist) traditions of literary historiography and to the poetics of the 19th-century novel. Reconstructs the socio-historical background(s) out of which the need for 'reality effects' emerged in different national contexts. Possible authors: Balzac, Stendhal, Flaubert and Zola, Perez Galdós and Clarín, Fontane, Raabe and others.
3-5 units, Win (Gumbrecht)

260. Technologies and Practices of "Recording," 1860-1940—(Same as History of Science 237.) What we call "recording" are devices capable of preserving and reproducing perceptions of the human body beyond the moment in which they first occur. 1860 to 1940 was characterized by technological inventions in this field (gramophone, film, and television) which impacted on basic dimensions of the "human condition." Focusing on unexploited primary material, seminar investigates historical conditions from which new
technologies and practices of recording emerged and on the processes of their institutionalization. Their effect on more traditional cultural forms and with the intellectual discourses which reacted to them.

3-5 units, Aut (Gumbrecht, Lenoir)
Th 3:15-6:05

265. Habermas—(Same as English 306C, German Studies 265.) Survey of the work of Jürgen Habermas. Issues: his account of the public sphere, consensus theory, the transformation of Marxist and Frankfurt-School paradigms, communicative action, the discussion of modernity and post-modernity, and political interventions on topics such as the Historikerstreit and German unification.

3-5 units, Spr (Berman)

269A. Pirandello, Sartre, and Beckett—(Enroll in Italian 269A.) Problems of identity, self- alienation, and human relationships as portrayed in the novels and plays of Luigi Pirandello, Jean-Paul Sartre, and Samuel Beckett. Comparison of writers' styles and ideas provides the common vision “abandonment” underlying their work. Readings: Pirandello's Il Fu Mattia Pascal, Così è (se vi pare), and Sei Personaggi; Sartre's La Naissée and Huis Clos; Beckett's Molloy. Lectures in English; readings available in translation. DR:7(2)

4 units, Aut (Harrison)

269D. Contemporary Francophone Literature: Africa, Caribbean—(Enroll in French 269D.) Major francophone authors from Africa and the Caribbean. Readings from Césaire, Senghor, Mohamed Dib, Driss Chraibi, Simone Schwartz Bart, Maryse Condé, Sembene Ousmane, Camara Laye.

4 units, Aut (Apostolidès)

279D. Structuralism and Deconstruction: Complexity and Self-Reference in the Humanities and the Social Sciences—(Enroll in French 279D.) Undecidability, infinite defermert, structural incompleteness, bifurcation and structural stability, the text as a machine, etc. Interdisciplinary approach explores conceptual foundations of modern critical theory. Topics: deconstruction of structuralism, the logic of mimetic desire. Readings: Lacan, Derrida, Lévi-Strauss, Girard.

2-3 units, Win (Dupuy)

279E. Symbolic Exchange, Reciprocity, and Violence: Anthropology and Literary Theory—(Enroll in French 279E.) One of the debates constitutive of the French Sciences of Man. Lévi-Strauss's critique of Mauss and Bourdieu's critique of Lévi-Strauss. The structuralist notion of “quasi-object.” Reading of Corneille's comedies and Molière's Dom Juan in the light of this debate. (In French)

2-3 units, Win (Dupuy)

284J. Heidegger and the Two Waves of Heideggerian Influence in France—(Enroll in French 284J.) Essential texts of Heidegger, Sartre, Derrida, and others. Heidegger's influence on literary criticism and the social sciences in France and the U.S.

4 units, Aut (Girard)

288A. Limits of Economic Rationality I: The Nature of the Social Bond—(Enroll in French 288A, Economics 100B, Political Science 259A.) Confrontation of three ways to account for society in an individualistic framework: the social contract (Hobbes, Rousseau); the “invisible hand” of the market (Smith, Walras); society as a crowd (Tarde, Freud, Keynes.) Comparison with the Durkheimian tradition. (In English)

2-3 units, Spr (Dupuy)

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)

290S. Savage Places—(Enroll in German Studies 290S.) Post-Renaissance European and New World fiction about the encounter with non-European peoples and alien or archaic realms. Topics: myth of El Dorado, the noble savage, paganism, cannibalism, woman as divine other, ritual violence. Emphasizes common themes in writers of N. and S. America (e.g., the romance of foundations). Six readings from, e.g., Behn, Defoe, Melville, Mérimée, Conrad, Sacher-Masoch, Hearne, Kafka, Malraux, Roth, Camus, Lowry, Carpenter, Garcia-Márquez, Durrell, Barth.

3-5 units, Win (Gillespie)


5 units, Spr (Wynter)

291A. Generative Devices in Imaginative Writing—(Enroll in English 291.) Designed on the lines of the OuLiPo (Ouvroir de Littérature Potentielle/Workshop for Potential Literature), the Paris-based writers' group whose premise is that formal constraints make for artistic liberation. Students work with restrictive techniques (palindromes, lipograms, heterograms, algorithms, homomorphisms, "false" translations, combinato ries, etc.), and with devices of their own invention. Prerequisite: English 90 or 92.

5 units, Aut (Sorrentino)

293. Verse Translation Workshop—(Enroll in English 293.) The art and practice of translating
poems, emphasizing theory and tradition. Students pursue and present work in progress. Consult instructor during previous quarter.
5 units, Spr (Felstiner)

294. Latin American Cinema: Myths, Realities, and Style—(Enroll in Spanish 294.)
3-5 units, Spr (Ruffinelli)

295. History and Practice of Text Editing—(Same as German Studies 295, English 306D.)
Historical and systematic survey of important techniques of text reconstruction and editing. Practical problems discussed with reference to a variety of literatures (not necessarily European) depending on the participants' interests.
5 units, Spr (Maurer) TTh 1:15-3:05

297. Ideology and Culture: Benjamin, Bourdieu, Jameson, A. Rama—(Enroll in Spanish 297.) Recent theories on the concept of ideology and its relation to culture compared, emphasizing developments in Latin America. Intellectual debate is considered as a symbol of power, articulated on two levels: the interpretation of culture and on-going social transformation. The relationship of ideology to culture through the writings of Benjamin, Bourdieu, Jameson, and Rama.
3-5 units, Aut (Machin)

298. Aesthetics and Politics in 20th-Century Latin America—(Enroll in Spanish 298.) The relationship between aesthetics and politics, as expressed in recent discourse, from a comparative approach. Emphasis is on two interparadigmatic areas: the debate on post-modernism and its repercussions in Latin America, and the "Caliban" paradigm (Retamar, Morse, Jameson). Aesthetics as a laboratory of social theory, and politics as the cultural creation of the image of the future, discussed through textual analysis.
3-5 units, Spr (Machin)

301B. Colloquium: Magic, Science, and Literature in the Middle Ages—(Enroll in English 301B.) The stances of medieval fiction toward two praxes of power—magic and science. Texts: Romance of the Rose, Divine Comedy, Decameron, and Canterbury Tales, and significant secondary reading. Prerequisite: ability to read Chaucer in Middle English.
5 units, Spr (Wack)

302. Colloquium: Culture and Technology—(Enroll in English 302.) Materials mainly from 19th-century Britain; theoretical framework embraces views of R. Williams, Mumford, Heidegger and Benjamin. Works by Carlyle, Ruskin, Morris, Hopkins, and Pater. Topics: the periodization of technology, the impact on culture of industrialism, redefinition of the concept of culture, and the problematics of cultural studies.
5 units, Win (Halliburton)

303. 18th-Century Narratives of Gender and Empire—(Enroll in English 303.) Analyzes connections between gender distinctions in England and the emergent empire in the 18th century, focusing on which representations prevailed, what conclusions may be drawn about sexual and racial difference, and how literary histories of the Enlightenment may be revised to take these matters into account. Theoretical readings enable a reconsideration of the concept of "Enlightenment" as the apparent ground of postmodernism and some versions of feminism. Texts: Defoe's Roxana, Richardson's Pamela, Fielding's Amelia, Cleland's Memoirs of a Woman of Quality, Haywood's Betsy Thoughtless, Johnson's Rasselas, Boswell's London Journal, narratives by Equiano and Sancho, Schott's Millenium Hall, and Wollstonecraft's Maria.
5 units, Win (Nussbaum) F 9-12

306. Colloquium: Women's Choices—Economic Theories and Literary Representations—(Enroll in English 306, Education 279X.) Economic and feminist analysis of literary representations of women's choices under variety of historical conditions. Readings provide perspectives across life stages, race, class, cultures, and include choices relating to education, marriage, work, self-expression, and ethical conduct.
5 units, Spr (Middlebrook, Strober)

306B. Colloquium: Theorizing the Body—(Enroll in English 306B.) Investigates the tension between the physical immediacy of the body and its symbolic construction (and reconstruction) in current literary, cybernetic, and feminist theories. Theoretical readings include Donna Haraway's Primate Visions, Gallagher and Lacqueur's The Making of the Modern Body and Foucault's The Birth of the Clinic. Students formulate individual or team projects they wish to pursue.
5 units, Win (Hayles)

309. The Modern Tradition: Criticism and Colonialism—(Same as Spanish 309, Modern Thought and Literature 361, English 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, Aut (Pratt) M 12:15-3:05

309F. Ethnopoetics—(Enroll in English 309F, Chicano Studies 362.) Ethnopoetics is an ap-
proach to literature that considers material culture as part of the foreground of text. Sometimes perceived as an intersection of poetry and anthropology, ethnopoetics comprehends culture as extending to the myth and the ritual of tribal societies. Uncover the fundamental expression of ethnicity and “Otherness” in Antigone, Durrenmatt’s The Visit, Miller’s The Crucible, Valdez’s The Shrunken Head of Pancho Villa, Malamud’s The Natural, Morrison’s Song of Solomon, Castillo’s Sotogonia, Mendez’s Peregrinos de Aztlán, and Silko’s Ceremony.

5 units, Aut (Candelaria)

309J. Colloquium: Chicano Cultural Studies, Gender, and Ethnicity—(Enroll in English 309J. Spanish 385.) Echoing Richard Johnson’s essay of 1987, asks “What is cultural studies anyway?” Traces historical development of the term from the Birmingham Centre and Raymond Williams, noting the influence of the works of Antonio Gramsci and Stuart Hall. The ways that “cultural studies” has affected the contemporary academic disciplines of English literary studies, sociology, media and communication studies, and history, and the way that “cultural studies” takes Marxist studies outside of the constraining limitations of the academy. How questions of gender, race, and ethnicity addressed implicitly by Gramsci, Williams, Hall, Jameson, and others, are made explicit by various contemporary Chicana/o writers (Paredes, Rivera, Acosta, Arias, Islas, Moraga, Virmontes, Cisneros, and Sanchez.)

5 units, Win (Saldivar)

310. Research Seminar in Musicology: Adorno’s Music Criticism—(Enroll in Music 310.) The musical writings of Theodor W. Adorno (1903-1969) pose a challenge to traditional cultural criticism (by placing music at the center of aesthetic inquiry) and to traditional musicology (by insisting on a philosophical and ideological decoding of musical phenomena). The intellectual roots of Adorno’s theoretical positions and essays are discussed to assess the impact of these ideas on his criticism of canonic figures in European music: Bach, Beethoven, Wagner, Schoenberg, and Stravinsky, among others.

4 units, Win (Dreyfus)

335-338. Advanced Courses on Dante—Advanced study of Dante’s works in light of recent developments in the field. Emphasis on Medieval theories of language and interpretation and questions of textuality and intertextuality in Medieval literature. Prerequisite for undergraduates: 233 or consent of instructor.

335. Dante’s Divine Comedy: Inferno and Purgatorio—(Enroll in Italian 335.) Intensive study of the first canticle and first half of the second canticle of Dante’s masterpiece. (In English)

4 units, Aut (Freccero)

336. Dante’s Divine Comedy: Purgatorio and Paradiso—(Enroll in Italian 336.) Intensive study of the second half of the second canticle and the final canticle of Dante’s masterpiece. (In English)

4 units, Win (Freccero)

339. Dante: Politics and Poetics—(Same as Italian 339.) Advanced undergraduate and graduate-level reading group on the interrelation between poetics and politics in Dante’s writings. Topics: lyric poetry and civil society, language and the court, the christianization of ancient epic. (In Italian)

3 units, Spr (Maurer) T 5-7

348. Machiavelli—(Same as Italian 348.) Open to all students. In-depth introduction to Machiavelli’s work, The Prince, Discourses, Dialogo della Lingua, and the theatrical works, emphasizing Machiavelli’s relation to classical and post-classical political theory, and the political institutions of his period.

4 units, Spr (Freccero)

349J. Goethes Schwierigkeiten beim Schreiben seiner Werke—(Same as German Studies 349J.) Survey and analysis of the most important literary text in Goethe’s work as it emerged out of the European intellectual world around 1800. Emphasis on biographical moments and texts which Goethe, himself, experienced as “problematic” in relation to the totality of his work as a literary and artistic project. (In German)

5 units, Spr (Maurer) T 5-7

349K. Bertolt Brechts lyrisches Werk—(Same as German Studies 349K.) Brecht’s poetry constitutes one of the largest lyrical works in 20th-century German literature. Seminar analyzes Brecht’s poems from the perspective of their literary and artistic “modernity” and establishes a connection between their literary character and Brecht’s political commitment. (In German)

5 units, Aut (Preisendanz) M 3:45-6

349P. Aesthetischer Humor in narrativer Prosa—(Same as German Studies 349P.) Seminar focuses on the emergence of the concept of “humor” in English Enlightenment, philosophy, and literature. Its transformation in the philosophy of German Idealism and German classical literature. “Humor” as a communicative modality of narrative prose in European 19th-century literature. (In German)

5 units, Aut (Preisendanz) W 4:15-6:05
349Q. City Narratives in Modern German and European Literature and Philosophy—(Same as German Studies 349Q.)
3-5 units, Win (Scherpe)

349T. Artificial Paradises: Exoticism in German Literature and Theory of the 20th Century—(Same as German Studies 349T.)
3-5 units, Spr (Scherpe)

351A. Seminar: The Bible and Literature—(Enroll in English 351A.) The Bible as interpretive background for other texts, from the Middle Ages and Renaissance to modern instances.
5 units, Aut (Parker)

354T. Seminar: Technology and Narratives of Identity—(Enroll in Drama 354T.) Study of plays and theories in the contemporary psychoanalytic, feminist, and phenomenological discourses as the intervention of technology has disrupted the Oedipal narrative and required a re-evaluation of issues of domination, identity, and gender.
5 units, Spr (Rayner)

355. Seminar: Shelley and His Circle—Poststructuralist Approaches to Romanticism—(Enroll in English 355.) Close study of Shelley’s work within the context of those who influenced him or were closely associated with him (Godwin, Wollstonecraft, Mary Shelley, Peacock, Byron, and Keats.)
5 units, Aut (B. Gelpi)

360. Gender, Race, and Nation in 19th-Century Latin American Writing—(Enroll in Spanish 360.)
3-5 units, Win (Pratt)

360C. Seminar: Neoclassicism, Aestheticism, and Modern Criticism—(Enroll in English 360C.) Emphasizes the degree to which the Neoplatonic reconstruction of classical literary and aesthetic theory has provided the intellectual foundations for the development of criticism since the Renaissance.
5 units, Spr (Trimpi)

369. Deconstruction Contextualized—(Same as French 289D, German 345, English 369.) The reconstruction and philosophical understanding of the intellectual situations in which “Deconstruction” developed and which conditioned its reception and institutionalization since the 1960s. Analysis of Jacques Derrida’s early writings, his critique of Husserl, Kant, and Lévi-Strauss, and the intellectual and cultural atmosphere by which his readings were informed (comparison with work of Michel Foucault, Roland Barthes, etc.). The circumstances which, since the 1970s made this philosophical position appealing for literary critics, the different context of its reception (especially N. America), and the transformations which its success imposed on Deconstruction. (Contextualizing Deconstruction does not mean refuting Deconstruction.)
3-5 units, Aut (Gumbrecht) T 3:15-5:30

375A. Seminar: Studies in the Renaissance—(Same as English 375A.) Detailed consideration of texts by Erasmus, Montaigne, Shakespeare, and others emphasizing questions of language, gender, and discourse.
5 units, Aut (Parker) T 3:15-6:05

3-5 units, Aut (Berman) W 2:15-4:05

383. Seminar: Foucault and Contemporary Critique—(Same as English 383.) The work and legacy of Michel Foucault in relation to developments in contemporary literary theory and cultural critique.
5 units, Spr (Parker) Th 6:15-9:05

384A. Joyce, Proust, Mann I—(Enroll in German 384A.) Themes, structures, and mythopoetic dimensions of the novel in the context of Modernism. Joyce, Proust, and Mann as synthesizers and interpreters of the historical situation (“Decline of the West,” contention-isms, WWI, etc.), forms of consciousness (Bergson, Nietzsche, Freud, Jung, et al), technological revolution and artistic expression (opera, painting, cinema, etc.) of their age.
3-5 units, Aut (Gillespie)

389. Rereading Gramsci—(Enroll in Italian 389.) The American reception of Antonio Gramsci has been idiosyncratic and embroiled within various contemporary cultural projects. His key notions, e.g., theory of cultural hegemony and the concept of civil society, have been uncritically appropriated and integrated within extraneous theoretical contexts. The genesis and structure of Gramsci’s thought, from a reexamination of late 19th-century/early 20th-century Italian culture and European politics. Focuses on philosophies of Antonio Labriola, Benedetto Croce, and Giovanni Gentile. Gramsci’s thought from his early writings as a journalist, to the Prison Notebooks, emphasizing the dynamics of inter-war European politics and economic developments.
4 units, Spr (Picone)
395A. Philosophical Reading Group.
2-3 units, Aut, Win, Spr (Gumbrecht)
Th 7:30-10 p.m.

The changing function of the Latin American intellectual examined through the case of a group of Argentineans who established a structure of common perspectives and served as diffusers of culture from 1985-89. Comparison to the relationship of ideology and culture, the self-image of the intellectual confronting the democratic transformation, and the role of the transmitter of the new cultural references, particularly changes in language and the concept of intellectual work.
3-5 units, Win (Machín)

433. Aeschylus and the Spirit of Tragedy—Or-esteia is read from the perspective of mimetic anthropology. Recent critical works are discussed and evaluated in the same light.
5 units, Win (Girard)

PROGRAM IN CULTURES, IDEAS, AND VALUES (CIV)

Chair, CIV Program Committee: 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 eight tracks that constitute the CIV program are sponsored by different departments and programs, they share common readings, ensuring that all students are exposed to certain great works.

The sequences have different formats, but in addition to the common readings they share another important feature. Each sequence provides at least two hours per week of small group instruction with an experienced teacher.

Students are encouraged to fulfill the CIV requirement during the freshman year; however, some students may choose to defer it. Since the sequences do not all proceed at the same pace or cover the material in the same order, students must complete one entire sequence to satisfy the CIV portion of the Distribution Requirements. The following courses are available in 1991-92 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.

TRACKS

STRUCTURED LIBERAL EDUCATION

Track Chair: Mark Mancall (Professor of History)
The program in Structured Liberal Education is also designated as a CIV sequence. For details, see the "Program in Structured Liberal Education" section in this bulletin.

GREAT WORKS

Track Chair: George Houle (Professor of Music)
This sequence focuses on major works of literature, religion, philosophy, and political theory from European and non-European traditions that have contributed to contemporary America’s cultural heritage. 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 Chinese cultures. (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 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, emphasizing modern American responses to European and other traditions. (DR:1; three-quarter sequence)
   5 units, Spr (Staff)

EUROPE AND THE AMERICAS

Track Chair: Mary L. Pratt, Professor of Spanish and Comparative Literature

Taught by faculty in literature, history, and anthropology, this track provides an alternative to European-based perspectives on culture and society. It focuses mainly on the Americas from pre-Columbian times through the period of European colonialism to the present. Readings come from N. America, Europe, Central and S. America, the Caribbean, and Africa. Within the Americas, the course draws on Afro-American.
Anglo-American, Asian American, Native American and Spanish Ameridan 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 inequality expressed in cultural terms? How do groups represent each other and themselves in history? The work of artists and intellectuals 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. The differing conceptions of the self and the self in history, and on different modes of representing selfhood in fiction, social theory, autobiography, myth. (DR:1; three-quarter sequence)

5 units, Aut (Rosaldo) lecture TTh 10

5. The themes of property, commonwealth, enslavement and liberation, the importation and exportation of knowledge between Europe and the Americas. (DR:1; three-quarter sequence)

5 units, Win (Jackson) lecture TTh 10

6. Early representations of the Americas by Europeans and of Europeans by Americans; myths of America as utopia, native critiques of colonialism, the legacy of the conquest in contemporary writing. (DR:1; three-quarter sequence)

5 units, Spr (Pratt) lecture TTh 10

LITERATURE AND THE ARTS

Track Chair: David Riggs (Professor of English)

(Enroll in English 7,8,9.) This sequence emphasizes literature, writing, and the creative imagination. Lectures explore literature in its cultural context and include sessions on art, architecture, music, and drama. Students meet three times a week for lectures, and three times weekly to discuss texts and work on writing. The sequence generally moves chronologically from antiquity to the present day, setting works in historical, intellectual, and generic perspective. Seminar instructors are experienced writing teachers, and student essays receive close attention. Autumn and Winter writing workshops use a careful reading of the CIV texts to help students understand the process of writing and to improve their own writing. In both quarters, students must be concurrently enrolled in the CIV and writing components of this course. Students with and without Advanced Placement credit may sign up for this sequence.

7,7A. 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)

8 units (5 for English 7; 3 for English 7A), Aut (Staff) lectures MTW 10 plus sections and workshops

8,8A. 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)

8 units (5 for English 8; 3 for English 8A), Win (Riggs, Staff) lectures MTW 10 plus sections and workshops

9. The Modern World—Thought and literature from the French Revolution to contemporary times, including works by the English Romantics, Kierkegaard, Goya, Dickens, Beethoven, the Impressionists, Kropotkin, Browning, Freud, Woolf, Sartre, Rhys, Marx, and Ellison and American jazz. (DR:1; three-quarter sequence)

5 units, Spr (Ruotolo, Staff) lectures MTW 10 plus sections

EUROPE: FROM ANTIQUITY TO THE PRESENT

Track Chair: Judith Brown (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 European culture, the relationship between European and other cultures in Antiquity, 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 (17 or fewer) led by postdoctoral fellows. (DR:1; three-quarter sequence)

5 units, Aut, Win, Spr, MTW 9 plus section
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 regular 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 (Edwards, Staff) lecture MTW 11
Win (Andersson, Brooks, Wack, Staff) lecture MTW 11
Spr (Lyons, Staff) lecture MTW 11
plus 2-hour discussion seminar

PHILOSOPHY AND HUMAN EXISTENCE

Track Chair: John Dupre (Associate Professor of Philosophy)

(Enroll in Philosophy 5A,B,C.) This sequence, developed by the Department of Philosophy, examines the philosophical roots of our culture. Each week two large-group lectures by regular faculty and two 90-minute discussion sections are taught by postdoctoral scholars to groups of fewer than 20 students. The central theme is the way in which human beings’ understanding of themselves and their relation to the world has profound effects on the organization of society and on individual lives. The central subtheme is how those understandings are shaped by conceptions of gender, race, and social class and are approached from a variety of perspectives in diverse historical contexts, as reflected in philosophical, scientific, and religious texts and traditions. Among the ideas studied are: morality, the soul, justice, conceptions of male and female, slavery and political freedom, ideology, and the nature of scientific theories. Enables students to think critically about philosophic issues and to understand how social and cultural factors affect such thinking. (DR:1; three-quarter sequence)

5 units, Aut, Win, Spr, MWF 10 plus section

TECHNOLOGY AND CULTURE

Track Chair: Barry Katz (Senior Lecturer, VTSS and Mechanical Engineering)

(Enroll in Values, Technology, Science, and Society 1,2,3.) This sequence, taught by the interdisciplinary faculty of the VTSS program, treats science and technology in their interaction with philosophy, literature, politics, and art, viewing technical ideas and artifacts as essential parts of our common cultural heritage. Beginning with the prehistoric world, traces the interconnections among intellectual, material, and social conditions into the age of computers, space travel, and genetic engineering.

1. Technology in the cultures of antiquity: Mesopotamia and Egypt; ancient Israel; the classical civilizations of Greece and Rome; the contributions of China and Islam. (DR:1; three-quarter sequence)

5 units, Aut (Staff) MWF 11 plus section

2. The consolidation of the scientific worldview in the west from the Middle Ages through the Scientific and Industrial Revolutions. Readings from Leonardo da Vinci, Shakespeare, Galileo, Mary Shelley, and others. (DR:1; three-quarter sequence)

5 units, Win (Staff) MWF 11 plus section

3. The interdependence of technology and culture in the 20th century. Topics: personal life, war and peace, the environment, and the transformations of social life in modern America. (DR:1; three-quarter sequence)

5 units, Spr (Staff) MWF 11 plus section

DRAMA

Emeriti: (Professors) Wendell Cole, Martin Esslin; (Associate Professors) Helen W. Schrader, H. Donald Winbigler; (Adjunct Professor) Evelyn M. Draper

Chair: Michael Ramsaur

Professors: Jean-Marie Apostolidès (French and Italian and, by courtesy, Drama), Charles R. Lyons (Drama and Comparative Literature), Carl Weber

Associate Professors: William S. Eddelman, Harry J. Elam, Jr., Anna Deavere Smith (on leave 1991-92)

Assistant Professors: Alice Rayner, Rush Rehm, John B. Wilson

Associate Professor (Teaching): Michael Ramsaur

Senior Lecturers: Patricia Ryan, Alexander Stewart, Sheila Weber

Lecturer: Connie Strayer

Acting Assistant Professor: Victor Leo Walker II

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 stu-
dent 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 required of all majors is:

2. **Literature and Criticism**: Drama 50, Introduction to Drama; Drama 150, 151, 152, Major Dramatic Texts.
3. **Theater History**: Drama 160 or 161, History of the Theater.
5. **Dance**: Drama 27A, 27B, or 27C.
6. **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 Drama 29, 39A, 39B, and 39C.
7. **Electives**: a program of 15 units of elective courses to be worked out in consultation with the major adviser.
8. **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 and/or Drama 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 courses in certain areas:

1. **Acting**:
   a) The student must have completed six courses in acting, including Drama 120A,B,C, or 120D,E,F, and one movement class.
   b) The student must have completed at least 2 units of Drama 29 and acted in at least two departmental productions.

2. **Directing**:
   a) The student must have completed three courses in acting as well as Drama 170, Directing, and 134, Stage Management.
   b) The student must have completed at least 4 units of Drama 29 or 39A, 39B, or 39C, thereby participating in some aspect of at least two departmental productions.
   c) Approved Senior Projects in Acting: Students usually perform major roles in departmental productions to be produced in the senior year. If no suitable production in the season is available, the student may design an appropriate project or performance.

3. **Design or Technical Production (D/TP)**:
   a) The student must have completed four courses in Design or Technical Production: Drama 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 Drama 39A, 39B, or 39C and partici-
c) Approved Senior Projects in Design or Technical Production: upon recommendation of the production committee, the student is assigned a design or production responsibility (lighting design, scenery design, costume design, or technical director) for a major Department of Drama production to be 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 will have met 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 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 61, 62, and 63 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 and design, and all students are expected to demonstrate capacity in at least one area of theater practice. 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. Applicants for the program in design and theater history must also submit a portfolio. An interview, while not required, is strongly recommended. Interviews are best scheduled to fall 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

DIRECTING/CRITICISM
1. A minimum of 72 units of graduate courses and seminars in support of the degree in addition to the doctoral dissertation.
2. A minimum of seven graduate seminars in dramatic literature, theater history, or aesthetic theory. One of them must be in theater history, and one is to be taken outside of the Department of Drama.
3. Two years in the series in directing. Students in criticism/directing must complete the first-year and second-year workshops in directing (370A,B,C,D and 371A,B,C,D) and a third-year production project (372).

DESIGN/THEATER HISTORY
1. A minimum of 72 units of graduate courses in support of the degree in addition to the doctoral dissertation.
2. Dramatic Critical Theory (300).
3. Graduate Directing Workshop sequence (370A,C).
4. A minimum of six graduate seminars in dramatic literature, theater history, or critical theory. Two of them must be in theater history, one must be in dramatic literature, and one must be taken outside of the Department of Drama.
5. Graduate Design Workshop sequence: Design Tutorials (330A,B,C); Design Workshop (331A,B,C); two design projects, one in setting (332A) and one in either costume or lighting design (332B).

LANGUAGE REQUIREMENTS
The candidate must demonstrate reading knowledge of two foreign languages 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. 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 requirement in one language is to be met by the end of the first year. The requirement in the other language must be met by the end of the third year.

TEACHING REQUIREMENT
Three quarters of supervised teaching at half time and one quarter at quarter time are a required part of the Ph.D. program. The requirement is normally met by assisting a faculty member for one quarter during the first year, by teaching two courses during the second year, and by teaching one during the third.

COMPREHENSIVE EXAMINATIONS
Candidates must complete four examinations, three written and one oral, by the end of Winter Quarter of the third year. The core reading list of dramatic texts for each period is available. Each student, however, 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, e.g., one in the first year, two in the second, and one in the third. At least two examinations (one written and one oral or, in exceptional circumstances, two written) must be completed by the end of the second year of residence. During the first year, the student selects one of the four examination topics on which he or she wishes to be examined orally. If the student's individual program permits, this departmental oral examination should be completed by the end of the second year, before application for candidacy (see below).

DIRECTING/CRITICISM
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 in the criticism/directing program are required to take the examinations in Classical, Medieval and Renaissance, and Modern drama. For the fourth examination, a student may choose an additional period (Neoclassical, Romantic and Early Realistic, or Contemporary) or propose a cross-period study on the basis of genre, dramatic style, or the relationship between text and history.

DESIGN/THEATER HISTORY
Students in Design/Theater History are required to take two examinations in theater history (classical to 18th century; 1800 to present); one in dramatic literature in a period of their choice; and a theoretical design project examination.
APPLICATION FOR CANDIDACY

By the end of the second year of residence, the following requirements or appropriate equivalents must be completed:
1. Dramatic Critical Theory, four seminars, and two years of advanced directing and/or design.
2. One language.
3. At least two examinations.

Based on its evaluation of the student’s progress, the Graduate Study 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. This examination covers (1) the field of concentration, as defined by the candidate and his or her adviser, and (2) a dissertation prospectus. Both the field of concentration and a rough draft of the prospectus must be approved by the candidate’s adviser and by the departmental Graduate Study 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 reinstate 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, 1992.

COURSES

A special brochure is available providing full details of courses given in the Summer Quarter.

INTRODUCTORY

5. Introduction to Black American Drama—The development of Black drama in the U.S. from 1858 to the present.
   4 units, Aut (Elam) MWF 11

20. Beginning Acting—Preference given to freshmen, with a 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

27A,B,C. Movement for Actors.

27A. Movement for Actors—(Same as Dance 64.)
   2 units, Aut (Morris-Kramer) TTh 11-12:30

27B. Musical Theater Workshop—(Same as Dance 65.)
   2 units, Win (Cashion) TTh 3:15-5:05

27C. Movement and Music for Actors—(Same as Dance 66.)
   2 units, Spr (Morris-Kramer) TTh 11-12:30

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, Wilson) MWF 11 lab by arrangement

31. Introduction to Stage Lighting—Lecture/lab introducing the basic theories of stage lighting. The material is approached from technical and aesthetic viewpoints.
   4 units, Spr (Ramsaur) TTh 10-11:50

32. Introduction to Costume Design and Construction—Principles of design and construction of stage costume.
   4 units, Win (Wilson, Strayer) TTh 10-11:50

33. Drafting for the Theater—Lecture/lab introducing basic mechanical drawing techniques utilized by scenic and lighting designers. Basic pencil techniques through orthographic and isometric drawing, culminating with the technique of drop point perspective.
   2 units, Spr (Stewart) TTh 2:15-4:05

34. Stage Management Techniques—Survey lecture introducing the production process and
the wide variety of duties and responsibilities of a stage manager.

2 units, Aut (Stewart) MWF 10

37. Costume Construction—"Hands-on" pattern drafting, sewing costumes, millinery work, and the making of costume accessories. Prerequisite: 32.

2 units, Spr (Strayer) W 2:15-4:05

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, Aut (L'Heureux) MTWTh 11
lab Th 7-10

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, Aut (Eddelman) MWF 11

INTERMEDIATE

Primarily for the major but open to all undergraduates who have the necessary prerequisites.

101. Introduction to Acting—Designed as a one-quarter course for anyone interested in a basic approach to acting. Scene work is included.

2 units, Aut (Weber) MW 1:15-3:05
Win, Spr (Staff) TTh 1:15-3:05

103. Improvisation—Beginning course for anyone wishing to study acting as improvisation only. Explores and develops the imagination; teaches games and exercises that foster spontaneity and cooperation. No prerequisite.

3 units, Aut, Win (Ryan) MWF 1:15-3:05

113A,B. Group Communication—Focuses on inter-personal processes of communication as they relate to inter-group experience.

4 units, Win, Spr (Schrader) TTh 2:15-4:05

120A,B,C. Fundamentals of Acting—Provides the fundamental training of the actor as a theatrical instrument. Exercises and improvisation in basic activity, motivation, concentration, and imagination. Courses to be taken in sequence. Prerequisite: sophomore standing or consent of instructor.

120A. 3 units, Aut (Weber) TTh 10-12
120B. Prerequisite: 120A or consent of instructor.

3 units, Win (Weber) TTh 10-12

120C. Prerequisite: 120B or consent of instructor.

3 units, Spr (Weber) TTh 10-12

120D,E,F. Integrated Principles of Acting—For those with a serious pre-professional interest in the study of acting. Provides the fundamental training of the actor as a theatrical instrument. Exercises and improvisation in basic activity, motivation, concentration, and imagination. Additional work in voice and movement. Courses to be taken in sequence. Enrollment limited to 12; admission by audition only on the first day of class.

120D. 3 units, Aut (Ryan) MW 10-12
120E. Prerequisite: 120D.

3 units, Win (Ryan) MW 10-12

120F. Prerequisite: 120E.

3 units, Spr (Ryan) MW 10-12

121. Advanced Scene Study—Designed for students who have completed the 120 series (A,B,C or D,E,F). Selected exercises illuminating Sanford Meisner's systematic approach to the actor's craft.

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

122. Special Studies in Performance: Gender and Identity—A performance course. The use of play and media scripts in performance to investigate gender and identity. Non-actors involved in the study of gender as well as actors at all levels of experience are encouraged to participate.

3 units (Smith) alternate years, given 1992-93

125. Songs for the Theater—Two-quarter tutorial in singing. Prerequisite: consent of instructor.

1-2 units, Aut, Win (Draper)

by arrangement

126. Acting in Greek Plays—How to work with classical texts.

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

127A. Dance History and Philosophy—(Same as Dance 160A.) Historical lecture survey of the
lives and works of key figures in Western theatrical dance, from the Renaissance to the present, through films, videos, and discussions. Topics: public attitudes and perceptions and the Romantic ideal in ballet, the changing image of the male dancer, the birth of abstraction in dance, and the pioneering matriarchs of modern dance. All are discussed against the social and cultural background of the time. DR: 7f(2)

3-4 units, Win (Ross) TTh 1:15-3:05


3-4 units, Spr (Ross) TTh 1:15-3:05

129D. Shakespeare Through Performance—(Same as English 183A.)

5 units, Aut (Friedlander) T 3:15-5:05
Th 3:15-7:05

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 (Wilson) W 2:15-5:05

131. Lighting Design—Lecture/lab dealing with all practical and aesthetic aspects of lighting: electricity, light sources, color instrumentation, control, drafting, and plotting as well as 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 (Wilson) 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, Win (Stewart) MW 10-12

4 hour lab by arrangement

134. Stage Management Project—For students stage managing a Department of Drama production.

1-5 units, any quarter (Stewart)

135. Project in Theatrical Production—Assistant directing, stage design, costume design, lighting design, sound design, technical production, stage managing or other work in connection with Department of Drama productions. Prerequisite: consent of instructor.

1-5 units, any quarter (Staff) by arrangement

140. Playwriting Workshop—(Same as English 93.)

5 units, Aut (L’Heureux) MW 1:15-3:05

150. Major Dramatic Texts I: Greek and Roman—Selected texts from Aeschylus, Sophocles, Euripides, Aristophanes, Plautus, Terence, Seneca. DR: 7(2)

4 units, Aut (Raymer) MWF 9

151. Major Dramatic Texts II: Renaissance to Romantic—Selected texts from Shakespeare, Racine, Corneille, Molière, Wycherley, Congreve, Goldsmith, Sheridan, Schiller, Kleist, Buechner. DR: 7(2)

4 units, Spr (Raymer) MWF 9

152. Major Dramatic Texts III: Early Realistic to the Present—Selected texts from Ibsen, Chekhov, Brecht, Shaw, Williams, Miller, Shepard, Beckett, Ionesco, Genet, Weiss, Osborne, Pinter, Bond, Brenton, Churchill, Kennedy. DR: 7(2)

4 units, Win (Lyons) MWF 9

153. Greek Tragedy: Aeschylus, Sophocles, Euripides—(Same as Classics 12.) DR: 7(2)

3-5 units, Win (McCall)

154N. American Drama, 1920s-1960s—American drama and theater from the end of WWI to the start of the Vietnam War, focusing on the plays of O’Neill, Rice, Odets, Williams, Miller, Hansbery, Albee, and others, and on important theater companies and their practitioners. Emphasis on the impact of political and social movements upon theater during this period. DR: 7(2)

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

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 7(2)

4 units, Win (Elam) MWF 11

157V. Contemporary Black Playwrights—The dramaturgy, 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 ex-
plores diversity among the various societies represented. DR:7(2)
4 units (Elam)
alternate years, given 1992-93

157D. History of the Black Performer in America: From Congo Square to Hollywood—The evolution and vicissitudes of African American performers from the 18th century to the present. Examination of the artistic contribution of Black musicians, comedians, singers, dancers, filmmakers, and actors, and their struggle against social injustice and racism inside and outside the entertainment industry. Their impact and imprint on popular American culture.
4 units, Spr (Walker) TTh 10-11:50

159A,B,C. Shakespeare—(Same as English 173A,B,G.) DR:7(2)
159A. 5 units, Aut (Girard) MTW 1:15
159B. 5 units, Win (Orgel) TTh 1:15-3:05
159C. 5 units, Spr (Rebholz) MTWTh 11

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. DR:7(2)
4 units (Eddelman)
alternate years, given 1992-93

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. DR:7(2)
4 units, Aut (Eddelman) MWF 9

165. Topics in American Musical Theater—Thematic and formal developments in American musical theater, focusing on nine musicals. Slides, recordings, and films. Recommended: background in musical theater.
4 units (Eddelman)
alternate years, given 1992-93

166. Topics in Theater and Society: Gender and Identity—An acting class. Play and media scripts and acting exercises are used to explore current ideas about gender identities. The core of the class is acting, however students have the option of doing written assignments and additional reading in order to meet requirements of other majors.
3-5 units (Smith)
alternate years, given 1992-93

166R. From Suprematism to Constructivism in Russian Avant-Garde Theater—(Same as Art 109C/209C, Slavic Languages 142.)
4 units, Spr (Kolesnikov)

170. Introduction to Directing—Prerequisite: consent of instructor.
4 units, Win (Rehm) TTh 3:15-5:05

171. Undergraduate Theater Workshop—Undergraduate directors present one-act plays in workshop performances. Prerequisite: consent of instructor.
1-4 units, Spr (Staff) by arrangement

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, by arrangement.

ADVANCED COURSES

Courses numbered 200 through 299 are designed for advanced undergraduates and graduates.

203A. 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 1:15-3:05

203B,C. Advanced Improvisation Group—For members of the improv troupe only. Special project work.
1-3 units, Aut, Win (Ryan)
by arrangement

220A,B. Advanced Performance Workshop—Aimed at the serious student of acting, committed to the discipline of the craft and willing to meet the challenges of performance from the perspective of the literate actor. Advanced work in voice, movement, text, acting styles, verse, and language with guest teachers. Taken in sequence; both quarters required. Prerequisites: audition and consent of instructor.
220A. 5 units, Aut (Rehm) MWF 2:15-5:45
220B. 5 units, Win (Ryan) MWF 2:15-5:45

1-4 units, any quarter (Wilson)
by arrangement

231. Advanced Stage Lighting Design—Projects in lighting mechanics and lighting design are resolved through experimentation, class dis-
cussions, and written report. Design projects include dorm shows and other community productions. Lighting designers for major departmental productions are assigned from this class. Prerequisite: 131.

1-4 units, any quarter (Ramsaur) by arrangement


1-4 units, any quarter (Wilson) by arrangement

235. Project in Theatrical Production—(See Drama 135.)

1-5 units, any quarter (Staff)

240. Workshop in Playwriting—(Same as English 93.)

5 units, Aut (L’Hereux) MW 1:15-3:05

250. Major Dramatic Texts I: Greek and Roman—(See Drama 150.)

4 units, Aut (Rayner) MWF 9

251. Major Dramatic Texts II: Renaissance to Romantic—(See Drama 151.)

4 units, Spr (Rayner) MWF 9

252. Major Dramatic Texts III: Early Realistic to the Present—(See Drama 152.)

4 units, Win (Lyons) MWF 9

254N American Drama, 1920s-1960s—(See Drama 154N.)

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

255. American Drama, 1960 to the Present—(See Drama 155.)

4 units, Win (Elam) MWF 11

261. History of the Theater: 18th Century to the Present—(See Drama 161.)

4 units, Aut (Eddelman) MWF 9

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 but open to advanced undergraduates with consent of instructor.

300. Toward a Definition of Postmodernism—Issues of Poststructuralism, Cultural Materialism, and Feminism in texts and performance within the framework of Postmodernism as hypothesized by Lyotard, Habermas, Jameson, and others.

5 units, Aut (Lyons) MW 1:15-3:05

301. 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, Win (Lyons) by arrangement

330A,B,C. Design Workshop—Advanced design for the theater.

5 units, Aut, Win, Spr (Staff) by arrangement

331A,B,C. Second-Year Design Project—Design of a full-length production in conjunction with directing project (372).

5 units, Aut, Win, Spr (Staff) by arrangement

332. Third-Year Design Project.

5 units (Staff)

354T. Seminar: Technology and Narratives of Identity—Study of film, plays, and theory in contemporary psychoanalytic, feminist, and phenomenological discourses as technology has disrupted the Oedipal narrative and required a reevaluation of issues of domination, identity, and gender.

5 units, Spr (Rayner) W 1:15-4:05

359A. Seminar: Shakespeare—(Same as English 373A.)

5 units, Win (Orgel) F 9-12

359B. Seminar: Shakespeare—(Same as English 373B.)

5 units, Spr (Orgel) F 9-12

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.

5 units, Win (Eddelman) TTh 10-12

370A,B,C,D. Directing Workshop I—The director’s approach to works in the realistic tradition. Investigation of basic directorial problems in scenes, using a multi-form theater space, designing actor/audience relationships, and composing modular scenic units. Performances limited to class. Prerequisite: consent of instructor.

370A. 5 units, Aut (Weber) W 3:15-6:05

370B. 3 units, Win (Ramsaur, Eddelman) TTh 2:15-4:05

370C. 5 units, Spr (Weber) T 3:15-6:05

370D. 3 units, Win (Rehm) MW 4:15-6:05

371A,B,C,D. Directing Workshop II.

371A. Graduate Directing Workshop II—Exploration of dramaturgic and directorial methods in working on plays from the classic,
Elizabethan, Epic, or Post-Naturalistic theater. Scene work.
5 units, Aut (Weber) T 3:15-6:05

371B. Graduate Directing Workshop II: Staged Reading.
2 units, any quarter (Weber) by arrangement

371C. Graduate Directing Workshop II: Dramaturgy.
3 units, any quarter (Staff) by arrangement

371D. Graduate Directing Workshop: Project.
5 units, any quarter (Weber) by arrangement

6 units, any quarter (Staff) by arrangement

390. Tutorial.
1-4 units, any quarter (Staff) by arrangement

399. Dissertation Research.
1-9 units, any quarter (Staff) by arrangement

EAST ASIAN STUDIES

Director: Lyman P. Van Slyke
Assistant Director: Theodore N. Foss

Affiliated Faculty:
Art: John D. La Plante, Michael Sullivan (Emeritus), Melinda Takeuchi (on leave 1991-92), Richard Vinograd
Comparative Literature: David Palumbo-Liu
Economics: Masahiko Aoki, John J. Gurley (Emeritus), Lawrence Lau, Yingyi Qian
Education: Thomas Rohlen
Food Research Institute: Scott D. Rozelle
History: Gordon Chang, Peter Duus, Harold L. Kahn, James E. Ketelaar, Jeffrey P. Mass, Lyman P. Van Slyke
Linguistics: William J. Poser, Peter Sells
Philosophy: David S. Nivison (Emeritus)

Political Science: Nina Halpern, Nobutaka Ike (Emeritus), John W. Lewis, Robert North (Emeritus), Daniel Okimoto (on leave, 1991-92), Kurt Steiner (Emeritus), Robert E. Ward (Emeritus)


In addition, a number of other Stanford faculty have some teaching or research interests related to East Asia: Takeshi Ameminya (Economics), Barton Bernstein (History), Chen Fu-mei (Hoover Institution), Walter P. Falcon (Food Research), William B. Gould (Law), Bruce F. Johnston (Food Research), Gerald Meier (Business), Thomas Metzger (Hoover Institution), David Montgomery (Business), Ramon Myers (Hoover Institution), Richard T. Pascale (Business), 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 National Resource East Asia Language and Area 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

BACHELOR OF ARTS

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 (LCI) 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 LCI 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 resources, students admitted to this program with aid are urged to complete the degree requirements in less than two years if their background makes it possible.

Applicants must submit scores 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 Support Section of the Registrar’s Office, Building 590, Stanford University, Stanford, California 94305-3052. 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. (Note that 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 the-
ory-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.

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.

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) fel-
lowships 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

   5 units (Befu) not given 1991-92

   5 units, not given 1991-92

118. Contemporary Chinese Culture.
   5 units, Win (Goldings)

119. Chinese Systems of Authority and Dissent.
   5 units, Spr (Hardie)

121. Introduction to Japanese Society and Culture.
   5 units, Win (Yoneyama)

123. Japanese Economic Organization.
   5 units (Befu) not given 1991-92

125. Japanese Women through Novels.
   5 units, Spr (Befu)

   5 units, Spr (Befu)

239. Cultural Approaches to Education and Development—(Same as Education 306C.)
   5 units, Win (Rohlen)

258. Ideology and Cultural Nationalism.
   5 units, Spr (Befu)

ART

2. Ideas and Forms in Asian Art.
   5 units, Win (Vinograd)

20. Introduction to the Art of Asia (to 600 A.D.).
   4 units, Aut (La Plante)

21. Introduction to the Art of Asia (7th Century-13th Century).
   4 units, Win (La Plante)

22. Introduction to the Art of Asia (14th Century to the Present).
   4 units, Spr (La Plante)

126A/226A. Introduction to Chinese Painting.
   4 units (Vinograd) not given 1991-92

126B/226B. Early Chinese Pictorial Art.
   4 units, Spr (Vinograd)

126C/226C. Later Chinese Painting.
   4 units (Vinograd) not given 1991-92

128A/228A. Ritual Bronzes of Ancient China.
   4 units (La Plante) not given 1991-92

128B/228B. Chinese Ceramics.
   4 units (La Plante) not given 1991-92

128C/228C. Buddhist Art in Asia.
   4 units, Win (La Plante)

128D/228D. Architecture and Gardens of Japan.
   4 units (La Plante) not given 1991-92

128E/228E. Japanese Ceramics.
   4 units (La Plante) not given 1991-92

226E. Colloquium: Across Cultures—Encounters of Eastern and Western Art.
   4 units (Vinograd) not given 1991-92

226F. Colloquium: Psychological and Psychoanalytic Approaches to the Visual Arts.
   4 units (Vinograd) not given 1991-92

227A. Seminar: Painting and Theory in the Sung Dynasty.
   4 units (Vinograd) not given 1991-92

227B. Seminar: Studies on 18th- and 19th-Century Chinese Painting.
   4 units (Vinograd) not given 1991-92

   4 units (Takeuchi) not given 1991-92

229E. Colloquium: Japanese Woodblock Prints.
   4 units (Takeuchi) not given 1991-92

   4 units (Takeuchi) not given 1991-92

ASIAN LANGUAGES

46. Introduction to Chinese Thought—(Same as Philosophy 46, Religious Studies 55.)
   4 units, Win (Ivanhoe) MWF 10

91. Traditional East Asian Civilization: China.
   5 units (Van Zoeren) not given 1991-92

92. Traditional East Asian Civilization: Japan.
   5 units, Win (Hare) MWFTh 10

113. Zhuang Zi—(Same as Philosophy 113/213, Religious Studies 113.)
   5 units, Spr (Ivanhoe) MWF 10

   4 units (Van Zoeren) not given 1991-92

132. Chinese Fiction and Drama in Translation.
   4 units, Win (Wang) MWF 11
133. Modern Chinese Literature in Translation.
4 units, Spr (Lyell) MWF 11

4 units, Aut (Hare) TTh 11

4 units, not given 1991-92

4 units (Hare) given 1992-93

4 units (Ueda) not given 1991-92

142. Person, Number, Gender.
4 units, Spr (Hare)

152. Nomad Empires of Inner Asia—
(Same as History 195.)
4-5 units, Win (Dien) MTWThF 2:15

153. Science and Technology in Traditional China—(Same as History 193, History of Science 153.)
5 units (Dien) given 1992-93

156. China from Earliest Times to the 9th Century—(Same as History 192A.)
5 units, Aut (Dien) MTWThF 11

169. Who’s Speaking?: The Positioning of the Speaking Subject in Western and Chinese Poetry.
5 units, Aut (Palumbo-Liu) MW

4 units, Spr (Staff) MW 3:15-4:35

3 units (Ueda) not given 1991-92

CHINESE

First-time registrants in a first- or second-year course must take a placement test if they have had any training in Chinese before entering Stanford.

1,2,3. First-Year Modern Chinese.
5 units, Aut, Win, Spr (Shou) MTWThF 11 or 1:15

1B,2B,3B. First-Year Modern Chinese for Bilingual Students.
3 units, Aut, Win, Spr (Rozelle) MWF 10 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 (Rozelle) TTh 2:15

21,22,23. Second-Year Modern Chinese.
5 units, Aut, Win, Spr (Chuang) MTWThF 9

21B,22B,23B. Second-Year Modern Chinese for Bilingual Students.
3 units, Aut, Win, Spr (Y. Wang) MWF 3:15

12 units, Sum (Staff) MTWThF 8-12

27,28,29. Intermediate Conversation.
2 units, Aut, Win, Spr (Shou) TTh 2:15

51. Chinese Calligraphy.
1-2 units, 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. 5 units, Aut (Sun) TTh 2:15-4:05
112. 5 units, Win (Sun) TTh 2:15-4:05
113. 5 units, Spr (Sun) TTh 2:15-4:05

121,122,123. Advanced Conversation.
2 units, Aut, Win, Spr (Chuang) W 2:15-4:05

3 units, Aut, Win, Spr (Staff)

200. Directed Reading in Chinese.
units by arrangement, Aut, Win, Spr (Staff) by arrangement

201. Proseminar.
5 units, Aut (Dien) W 2:15-4:05

211,212,213. Advanced Modern Chinese.
5 units, Aut, Win, Spr (Y. Wang) by arrangement

221,222,223. Advanced Classical Chinese.

221. Philosophical Texts.
5 units, Aut (Staff) MWF 1:15

222. Historical Narration.
5 units, Win (Dien) MWF 1:15

223. Literary Essays.
5 units, Spr (J. Wang) MWF 1:15

230. Interpreting Confucian Texts.
5 units, Win (Ivanhoe) MW 2:15-4:05

231. Neo-Confucianism—(Same as Religious Studies 119A.)
3 units (Ivanhoe) not given 1991-92

232. Philosophical Texts of the Ming Dynasty—
(Same as Philosophy 211, Religious Studies 211.)
5 units, Aut (Ivanhoe) MW 2:15-4:05


241. The Short Story.
5 units (Lyell) given 1992-93

5 units, Win (Chuang) MWF 11

243. The Novel.
5 units, Aut (Lyell) MWF 9

260. Introduction to Chinese Poetry.
4 units (Van Zoeren) not given 1991-92
261. Shih-ching and Ch’u-ts’u.
   4 units (Van Zoeren) not given 1991-92

263. Lyric (shih) I.
   4 units (Van Zoeren) not given 1991-92

264. Lyric (shih) II.
   4 units (Van Zoeren) not given 1991-92

   4 units (J. Wang) given 1992-93

273. Chinese Drama.
   4 units (Wang) not given 1991-92

278. Teaching Asian Languages.
   1 unit, Spr (Staff) by arrangement

291. The Structure of Modern Chinese.
   4 units, Win (Sun) by arrangement

334. Seminar in Modern Chinese Literature.
   5 units, Spr (Lyell) MW 2:15

351. Seminar in Chinese Traditional Historiography.
   5 units, Spr (Dien) Th 2:15-4:05

   5 units, Win (J. Wang) T 2:15

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

   12 units, Sum (Staff) MTWThF 8-12

   3 units, Aut, Win, Spr (Busbin) MWF 9, 10, or 11

   3 units, Aut, Win, Spr (Yagi) MWF 11

   5 units, Aut, Win, Spr (Arao, Sakamoto)
   MTWThF 9, 10, or 1:15

   12 units, Sum (Staff) MTWThF 8-12

   2 units, Aut, Win, Spr (Kubota)
   TTh 1:15 or 2:15

ADVANCED

101,102,103. Third-Year Modern Japanese.
   5 units, Aut, Win, Spr (Kubota)
   MWF 11-12:20

   12 units, Sum (Staff) MTWThF 9-12

   3 units, Aut Win, Spr (Kubota)
   MW 2:15-3:30

   2 units, Sum (Kubota) MW 4-6

121,122,123. Advanced Japanese Conversation.
   2 units, Aut, Win, Spr (Kubota) TTh 11

GRADUATE

   units by arrangement, Aut, Win, Spr (Staff) by arrangement

201. Proseminar.
   5 units, Aut (Matisoff) Th 2:15-4:05

211,212,213. Advanced Modern Japanese.
   5 units, Aut, Win, Spr (Arao) TTh 11-12:15

246. Introduction to Classical Japanese.
   5 units, Aut (Staff) by arrangement

   247. 5 units, Win (Matisoff) by arrangement
   248. 5 units (Hare) given 1992-93

250. Introduction to Kambun.
   4 units (Ueda) not given 1991-92

251. Graduate Seminar: Japanese Historical Texts.
   5 units, Win (Mass) W 2:15-4:05

   4 units (Hare) not given 1991-92

   4 units (Matisoff) not given 1991-92

   4 units, Aut (Sells) by arrangement

288. Teaching Asian Languages.
   1 unit, Spr (Staff) by arrangement

296. Readings in Modern Japanese Literature.
   4 units, Aut (Ueda) MW 2:15

298. Translation Workshop.
   4 units (Ueda) not given 1991-92

330. Seminar in Heian Fiction.
   5 units, Win (Hare) T 1:15-3:05

   5 units (Hare) not given 1991-92

396. Seminar in Modern Japanese Literature.
   5 units, Spr (Ueda) T 2:15-4:05
### KOREAN

1,2,3. First-Year Modern Korean.
   5 units, Aut, Win, Spr (Cho)
   MTWThF 1:15

   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 (Cho) not given 1991-92

   4 units, Aut (Sells) by arrangement

288. Teaching Asian Languages.
   1 units, Spr (Staff) by arrangement

### EAST ASIAN STUDIES

   1 unit, Aut (Staff) M 3:15

### ECONOMICS

121/221. Economic Development in China—(Same as Food Research 148.)
   5 units, Win (Rozelle) TTh 1:15-3:05

124. The Japanese Economy.
   5 units, Win (Aoki)

   5 units, Win (Litwack)

130. Rise of Industrial Asia—(Same as Political Science 125, VTSS 152)
   5 units, Aut (Lau, Lewis, Okimoto)

131. The Development of the Korean Economy.
   5 units, Aut (Chung)

220. Marxist Economic Theory.
   5 units, not given 1991-92

292. Comparative Theory of Firms and Organizations.
   5 units, Win (Aoki)

293. Socialist Economies.
   5 units, not given 1991-92

391A,B,C. Seminar in Comparative Institutional Analysis.
   10 units (Staff) by arrangement

### EDUCATION

161. Introduction to Teaching and Learning in Asia.
   3 units, Spr (Herring) by arrangement

306C. Cultural Approaches to Education and Development—(Same as Anthropology 239.)
   3-5 units, Win (Rohlen) MW 1:15-3:05

### FOOD RESEARCH INSTITUTE

148/248. Economic Development in China—(Same as Economics 121.)
   5 units, Win (Rozelle) TTh 1:15-3:05

### HISTORY

159. Introduction to Asian American History.
   4-5 units, Aut (Chang) MTWTh 10

192A. China from Earliest Times to the 9th Century—(Same as Asian Languages 156.)
   5 units, Aut (Dien) MTWThF 11

192C. Modern and Contemporary Chinese History.
   5 units, Spr (Van Slyke) MTWThF 11

193. Science and Technology in Traditional China—(Same as Asian Languages 153, History of Science 153.)
   5 units (Dien) given 1992-93

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) MTWTh 9

   5 units, Spr (Washo) MTWTh 1:15

195. Nomad Empires of Inner Asia—(Same as Asian Languages 152.)
   5 units, Win (Dien) MTWThF 2:15

201/301. Undergraduate Colloquium: Theaters of Power.
   5 units, Spr (Baker, Ketelaar) T 1:15-4:05

265S. Senior Research Seminar: Asian American History.
   5 units, Spr (Chang) W 2:15-4:05

290S. Senior Research Seminar: The Taiping Rebellion.
   5 units, Aut (Kahn) W 1:15-3:05

293. Undergraduate Colloquium: China's Inner Asian Borderlands.
   5 units, Spr (Staff) M 3:15-5:05

   5 units, Aut (Kahn) T 1:15-3:05
390B. Graduate Colloquium: Topics in Late Traditional and Modern Chinese History.
5 units, Win (Van Slyke) T 1:15-3:05

390C. Graduate Colloquium: Topics in Late Traditional and Modern Chinese History.
5 units, Spr (Van Slyke) T 1:15-3:05

395A. Graduate Colloquium: Early and Medieval Japan.
5 units, Aut (Mass) W 2:15-4:05

395B. Graduate Colloquium: Medieval and Early Modern Japan.
5 units, Win (Ketelaar) Th 1:15-4:05

395C. Graduate Colloquium: Modern Japan.
5 units, Spr (Waswo) Th 3:15-5:05

490A. Graduate Seminar: Modern China.
5 units, Win (Van Slyke) W 3:15-5:05

490B. Graduate Seminar: Research in Modern and Contemporary China.
5 units, Spr (Van Slyke) by arrangement

498. Graduate Seminar: Japanese Historical Texts—(Same as Asian Languages 251.)
5 units, Win (Mass) W 2:15-4:05

LINGUISTICS

271. The Structure of Korean—(Same as Asian Languages 271.)
4 units, not given 1991-92

4 units, Aut (Sells) by arrangement

291. The Structure of Modern Chinese—(Same as Asian Languages 291.)
4 units, Win (Sun) by arrangement

PHILOSOPHY

46. Introduction to Chinese Thought—(Same as Asian Languages 46, Religious Studies 55.)
4 units, Win (Ivanhoe) MWF 10 sections by arrangement

113/213. Zhuang Zi—(Same as Asian Languages 113, Religious Studies 113.)
5 units, Spr (Ivanhoe) MWF 10

211. Philosophical Texts of the Ming Dynasty—(Same as Asian Languages 232, Religious Studies 211.)
5 units, Aut (Ivanhoe) MW 2:15-4:05

212. Interpreting Confucian Texts—(Same as Asian Languages 230, Religious Studies 212.)
5 units, Win (Ivanhoe) MW 2:15-4:05

POLITICAL SCIENCE

20. Introduction to Comparative Politics.
5 units (Halpern) given 1992-93

5 units (Okimoto) given 1992-93

5 units, Win (Halpern)

125. Seminar: Rise of Industrial Asia—(Same as Economics 130, VTSS 152.)
5 units, Aut (Lau, Lewis, Okimoto)

139. Seminar: Chinese Foreign Policy.
5 units, Spr (Halpern)

139A. Japanese Foreign Policy.
5 units (Okimoto) given 1992-93

140A,B,C. Ethics of Development in a Global Environment—(Same as Engineering 297A,B,C.)
1 or 4 units, Aut, Win, Spr (Lusignan)
W 7:30-9, workshops by arrangement

5 units (Okimoto) given 1992-93

5 units (Okimoto) given 1992-93

225. Seminar: Political Economy of Socialist Reform.
5 units, Spr (Halpern)

RELIGIOUS STUDIES

1E. Eastern and Western Conceptions of the Self.
5 units (Yearley) not given 1991-92

4 units, Spr (Nattier) MWF 11

18. Zen Buddhism.
4 units (Bielefeldt) not given 1991-92

4 units (Faure) not given 1991-92

55. Introduction to Chinese Thought—(Same as Philosophy 46, Asian Languages 46.)
4 units, Aut (Ivanhoe) MWF 10 plus section

111. Religious Classics of Asia.
4 units (Staff) not given 1991-92

113. Zhuang Zi—(Same as Asian Languages 113, Philosophy 113/213.)
5 units, Spr (Ivanhoe) MWF 10

5 units, not given 1991-92

117. Syncretism and Sectarianism in Chinese Buddhism.
5 units (Faure) not given 1991-92

118. Death Rituals in East Asia.
4 units (Faure) not given 1991-92

119A. Neo-Confucianism.
3 units (Ivanhoe) not given 1991-92
5 units (Bielefeldt) not given 1991-92

150. Systems of Buddhist Thought.  
5 units (Bielefeldt) not given 1991-92

151. Buddhism in India: The First 500 Years.  
5 units, Aut (Nattier) MWF TTh 2:15-4:05

210. Speech and Writing in the Buddhist Tradition.  
4 units (Faure) not given 1991-92

211. Philosophical Texts of the Ming Dynasty—(Same as Asian Languages 232, Philosophy 211.)  
5 units, not given 1991-92

212. Interpreting Confucian Texts.  
5 units, Win (Ivanhoe) MW 2:15-4:05

4 units, Aut (Foss) Th 1:15-3:05

218. The Trickster in Asian Religions.  
4 units (Faure) not given 1991-92

221. Ch’an/Zen Tradition and Popular Religion.  
5 units (Faure) not given 1991-92

230A. Zen Buddhism Seminar.  
5 units (Bielefeldt) not given 1991-92

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

4 units (Bielefeldt) not given 1991-92

312. Workshop on Teaching "Introduction to Buddhism."  
4 units, Aut (Nattier) by arrangement

315. Ch’an Studies: Methodological Issues.  
4 units (Faure) not given 1991-92

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**ECONOMICS**

Chair: Gavin Wright  
Vice Chair: Lawrence J. Lau  
Associate Professors: Steven N. Durlauf, Robert W. Staiger  
Assistant Professors: Julie L. Anderson, Orazio Attanasio, Avner Greif, Harry Huizinga, Anjini Kochar, John M. Litwack, Yingyi Qian, Douglas O. Staiger, Jeroen Swinkels, Frank A. Wolak  
Courtesy Professors: W. Brian Arthur (Food Research Institute), David Baron (Graduate School of Business), John Ferejohn (Political Science), Ken-ichi Imai (Institute for International Studies), David Kreps (Graduate School of Business), A. Mitchell Polinsky (Law School), John Roberts (Graduate School of Business), Thomas Sargent (Hoover Institution), Barry Weingast (Hoover Institution), Robert Wilson (Graduate School of Business), Mark Wolfson (Graduate School of Business)  
Courtesy Assistant Professor: Alan Garber (Medical School)  
Visiting Associate Professors: Lawrence Goulder, Steven Slutzky, Ho-Mou Wu  
Visiting Assistant Professors: Chin-Seung Chung, Diogo Lucena, Geoffrey Rothwell, Mark Schankerman, Paul Sheard, Solomos Solomonou, W. Edward Steinmueller  
Affiliated Professors: Carl H. Gotsch (Food Research Institute), Timothy E. Josling (Food Research Institute), Robert H. Keeley (Industrial Engineering and Engineering Management), Henry Levin (School of Education), Reynaldo Martorell, Clark W. Reynolds, Scott R. Pearson (Food Research Institute), Anne E. Peck (Food Research Institute), James L. Sweeney (Engineering-Economic Systems), Pan A. Yotopoulos (Food Research Institute)  
Affiliated Associate Professors: James E. Hodder (Industrial Engineering), Jeffrey Williams (Food Research Institute)  
Visiting Lecturers: John Earle, Daniel Haak, Timothy Taylor  
Acting Instructors: Robert Fleck, Masao Suzuki

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 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 microeconomic and macroeconomic theory, mathematical economics, econometrics, economic history, international trade, alternative economic systems, labor, public finance, comparative institutional analysis, and economic development.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

Undergraduate Economics majors must choose between two programs:

1. The program in Economic Perspectives and Policies teaches students to think and write about economic problems and issues, using the basic tools of economic analysis without extensive use of mathematics.

2. The program in Quantitative Economics also deals with economic problems and policy issues, but with a more mathematical orientation. One of its goals is to bring students to a level of quantitative proficiency in economic theory and applied econometrics to do master's level work. Students who have taken Math. 43 or Economics 180 or who have equivalent preparation are qualified to enter the quantitative major. The department recommends election of this major by students who have or can acquire the required mathematics skills. Students who can satisfy the mathematics requirement are urged to take 51Q even if they are uncertain which major they will eventually choose, since 51Q is required for the Quantitative program but also may be substituted for 51 under the Perspectives and Policies major.

Students who expect to undertake graduate study in economics, particularly prospective Ph.D. candidates, are strongly advised to elect the “A” courses and the Quantitative major.

COURSE WORK REQUIREMENTS

QUANTITATIVE ECONOMICS

1. Economics 1, 51Q or 51A, completed by the end of the sophomore year, if possible.
2. Thirty units in courses numbered 100 or above.
   a) Economics 102, 103, and 104 are required and must be taken at Stanford in California.
   b) Fifteen additional units from economics courses numbered between 100 and 198, excluding 101-104, 151-152, 170-172, and 180-181. A maximum of 10 units of directed reading (139D and Food Research Institute (FRI) directed reading) may be used. Courses 212A,B and 214A,B in Engineering-Economic Systems and courses numbered 205 and above in FRI may be used. Some courses offered by Overseas Studies may be counted toward this requirement, up to a limit of 10 units (see the list below).
3. Math. 43 or equivalent. Economics 180 may be substituted for Math. 43.

ECONOMIC PERSPECTIVES AND POLICIES

1. Economics 1, 51, and 52. Economics 51 and 52, whenever possible, should be completed by the end of the sophomore year. Economics 51Q or 51A may be substituted for 51.
2. Thirty units in courses numbered 100 or above.
   a) Economics 101 is required and must be taken at Stanford in California.
   b) Two courses (10 units) must be chosen from among Economics 102, 111, 118, 141, 145, 149, 157, and 165 and must be taken at Stanford in California.
   c) Fifteen additional units from among economics courses numbered between 100 and 198, excluding 101, 103-104, 151-152, and 190-191. A maximum of 10 units of directed reading (139-D and FRI directed reading) may be used. Courses 212A,B, and 214A,B in Engineering-Economic Systems and in FRI courses numbered 205 and above may be used. Some economics courses offered by Overseas Studies may be counted toward this requirement, up to a limit of 10 units (see the list below).
3. Fifteen units of quantitative work. All courses taken to satisfy this requirement must be approved in writing by the student's adviser. Advisers automatically approve courses from among the following: Economics 90, 91, 102, 170, 171, 172, 180, and 181; any Math. courses numbered 19 or above and Advanced Placement Math Credit (equivalent to Math. 41 and 42); any Operations Research courses; any Statistics courses numbered 60 or above; Psychology 60; Computer Science 105A, 106A,B, and Industrial Engineering 133. No more than 10 units of accounting courses (Economics 90, 91, Industrial Engineering 133) may be used toward this requirement.
4. Senior Research Paper (3 units). Register only at Stanford in California for Economics 188 during the quarter in which the 20-page paper
is written. It should be written, applying the principles learned in economics courses, after the basic economics and quantitative requirements and most of the upper division courses have been completed.

OTHER REQUIREMENTS

At least 25 units applied toward course work requirements (1) and (2) of either of the foregoing programs must be taken at Stanford in California. To use transfer credit in partial satisfaction of the requirements under either program, the student must obtain written permission 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.

No courses receiving Department of Economics credit under either program may be taken Satisfactory/No Credit. No more than 10 units of course work for requirement (3) of the Economics Perspectives and Policies program may be taken Satisfactory/No Credit.

An average letter grade indicator (LGI) of “C” or better must be received for all units at Stanford applied toward requirements (1) and (2) of either program.

No course may be counted more than once in satisfying these requirements.

Students are responsible for seeing that all grades of “incomplete” are cleared within one year after the grade is given.

HONORS PROGRAM

The honors program 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. It leads to an A.B. with honors in Economics. In addition to the requirements for the A.B. in Economics listed above, the honors program requires:

1. An LGI in economics courses of at least 3.5. See details in the departmental Information Book for Economics Majors.

2. 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 under requirement (1).

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 insure 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 structured 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. (The coterminal A.B./A.M. program previously offered was terminated June 1, 1990.)

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. Courses numbered below 100 may not be counted for this purpose. Economics courses must include 202, 210, and at least two other 200-level courses. Courses that are listed simultaneously with two numbers (e.g., 51 and 151, 121 and 221) may count towards the 45 units only at the level
of the lower number. 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. In addition, an LGI of "B-" or better must be earned in each of the two graduate theory courses. All courses must be taken for a letter grade.

DOCTOR OF PHILOSOPHY

Admitted students must be adequately prepared in calculus, linear algebra, and statistics (see above). When deemed appropriate, a student may be required to complete the necessary background preparation at Stanford. All students take a common core curriculum at the outset and later branch out in the desired fields of specialization. Well-prepared students should anticipate spending, with some overlap, approximately two years in course work and another two years in seminars, independent study, and dissertation research. The goal is to complete the program in four years, although some types of research programs may require at least five years to complete. The department has a strong commitment to guiding students through the program expeditiously.

Questions and petitions concerning the program and the admissions process should be addressed to the Director of Graduate Studies, who has responsibility for administering the graduate program.

Specific requirements are best discussed in two stages, the first consisting of requirements for admission to candidacy and the second involving further requirements for earning the degree.

Admission to Candidacy for Ph.D.—A student may apply for admission to candidacy when the following minimal requirements are met:

1. Successful results on comprehensive examinations in "Price and Allocation Theory" (the examination based on material from Economics 202, 203, 204), "Theory of Income and Economic Fluctuations" (the examination based on material from Economics 210, 211, 212), and "Econometrics," (the examination based on material from Economics 270, 271, 272).

2. 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, economic history, general theory, international economics, labor economics, monetary theory, public finance, structure of industry, theory of choice.

(The student cannot offer both general theory and theory of choice fields to fulfill the requirement.) Each field listed above can be satisfied by completing two courses, although students in some fields may be advised to add a third course which can then be counted toward the distribution requirement discussed later. All courses (or comprehensive exams, when offered) must be passed with an LGI of "B" or better.

3. Completion of a "second-year 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 end of the second 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. Distinction: the student is expected to show "distinction" in some important aspect of his or her graduate program. Generally this is accom-
plished by earning an LGI of “A-” or better in one or more of the fields offered. However, distinction can be earned in other ways, e.g., by writing and publishing an article in a professional journal.

3. 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.

4. Seminar Participation: each student is expected to participate in at least two distinct 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).

5. 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 Law School catalogue 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 Law School Bulletin 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. Support takes 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
Notes—Consult the quarterly Time Schedule for the exact times courses are given.

Because the “Q” and “A” courses are more advanced, when 51 is a course prerequisite, 51Q and 51A also suffice; when 51Q is required, 51A suffices.

1. Elementary Economics—The functioning of a modern market economy; determination of national income and its distribution; composition of output; growth of the economy. Inflation and unemployment. The role of government: spending, regulation, taxation, monetary and fiscal policy. DR:9(5)

5 units, Aut (T. Taylor)
Win (J. Taylor)
Spr (Stiglitz, T. Taylor)

51. Economic Analysis I—(Graduate students register for 151.) Same as 51Q except that calculus is not used. Prerequisite: 1.

5 units, Aut (Wu)
Win (Slutsky)
Spr (Fleck)
51A. Advanced Microeconomic Theory—
(Graduate students register for 151A.) Mathematically rigorous course on the interaction of firms and households through markets. Topics: comparative statics of firm and household behavior; market efficiency in simple general equilibrium models; and issues in information economics, e.g., moral hazard and adverse selection. Prerequisites: 1, 180 or Math. 43.

5 units, Spr (Brown)

51Q. Economic Analysis I—(Graduate students register for 151Q.) The nature of economic systems. Methods of allocating economic resources. Theories of production and consumer choice. The role of markets and prices in a decentralized system. Principles of efficient and equitable allocation. Methods of calculus are used to develop theoretical structures most appropriate for doing modern applied economic analysis. Prerequisites: 1, Math. 43 or equivalent.

5 units, Aut (Qian)
Win (Lucena)

52. Economic Analysis II—(Graduate students register for 152.) Analysis of equilibrium and instability in the economic system as a whole. National accounts and aggregate relationships among stocks and flows in markets for goods, services, and financial assets. Prerequisite: 51.

5 units, Aut (Suzuki)
Win, Spr (Hickman)

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. Limited enrollment in Spring.

5 units, Aut, Win (Hansen)
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 (Hansen)

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 1991-92

100B. Limits of Economic Rationality I: The Nature of the Social Bond—(Same as French 288A, Political Science 259A.) Confrontation of three ways of accounting for society in an individualistic framework: the Social Contract (Hobbes, Rousseau); the "Invisible Hand" of the market (Smith, Walras); society as a crowd (Tarde, Freud, Keynes). Comparison with the Durkheimian tradition. (In English)

2-3 units, Spr (Dupuy)

100C. Limits of Economic Rationality II: Individualism and Social Justice—(Same as French 288B.) 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). (In English)

2-3 units, alternate years, given 1992-93


5 units, Aut (Haak)
Win (Earle, Haak)
Spr (Lucena)

102. Introduction to Econometrics—Probability, random variables, distribution theory, theory of estimation, and hypothesis testing. Introduction to simple and multiple regression analysis. Applications to economics. Students without computer experience should acquire it early in the quarter. Prerequisite: Statistics 60 or the equivalent.

5 units, Aut (Kochar)
Win (Pencavel)
Spr (Schankerman)

103. Applied Macroeconomic Analysis—Priority for majors enrolled in the Quantitative Economics track. 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 (Staff)
Win (Attanasio)
Spr (Earle)

104. Applied Microeconomic Analysis—Priority for majors in the Quantitative Economics track. Develops skills in the empirical analysis of microeconomic theory, models, and data. Topics vary with instructor. Students complete individ-
ual projects and core material. Limited enrollment. Prerequisites: 51Q or 51A, and 102.
5 units, Aut (Rothwell)
Win (Schankerman, Rothwell)
Spr (D. Staiger)

106. The World Food Economy—(Same as Food Research 103.) 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 decisionmaking as it relates to food policy.
5 units, Win (Falcon, Naylor) MW 9-10:50

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, Aut (Peck) TTh 9-10:50

111. Money and Banking—Financial processes emphasizing the role of the banking sector and monetary policy. Implications for economic growth and stability are developed in the light of modern theory. Prerequisites: 51 and 52.
5 units, Aut (Huizinga)

111 A. Advanced Money and Banking—Same topics as 111, covered in more depth and with greater rigor.
5 units, not given 1991-92

4 units, Aut (Keeley) MWF 9
Win (Hodder) MWF 10

113. Technology and Economic Change—(Same as VTSS 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). Optional section for 5 units. DR:9(5)
4-5 units, Spr (Rosenberg)

115. European Economic History—The history of the European economies from 1870 to WWII. Topics: long-term economic growth and its determinants, variations in economic growth and business cycles, sectoral growth and structural change, inflation and deflation, living standards and real incomes, the Great Depression; 1873-96, the Belle-epoque, 1899-1914; the post-war reconstruction, 1918-29; the world depression and recovery, 1929-39. Emphasizes Britain, France, and Germany. Small European economies are considered in the context of particular issues. Quantitative approach integrating economic analysis to historical issues.
5 units, Aut (Solomou)

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, Win (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.) 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. Interactions and causal effects between economic development and population growth.
5 units, Win (Yotopolous) MW 1:15-3:05
5 units, Aut (Litwack)

121. Economic Development in China—(Same as Food Research 148; graduate students register for 221.) Structure and development of the economy of the People's Republic of China. Topics: 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: 1.
5 units, Win (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. Theoretical approaches examined: Classical, Marxian, Schumpeterian, Keynesian, and Neoclassical. 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.) Historical approach to the political economy of development, focusing 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, Aut (Reynolds) MW 3:15-5:05

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. Macroeconomic performance of the Japanese economy and its interaction with the rest of the world. Prerequisite: 51.
5 units, Win (Aoki)

125. Economic Development in Africa—(Same as Food Research 149; graduate students register for 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, and external debt.
5 units, Aut (Fafchamps) TTh 1:15-3:05

126. Comparative Economic Systems—Theoretical and institutional analysis of how economic problems are resolved under alternative economic systems. Examination of alternative theories of capitalism and socialism. The roles of market vs. hierarchical organizations in resource allocation. Comparisons of various capitalist and socialist economies.
5 units, Win (Litwack)

127. The Political Economy of Commodity Markets—(Same as Food Research 106; graduate students register for 206.) History, politics, and theoretical analyses of domestic and international markets for basic commodities. Topics: government regulation of private trading, public trading through buffer stocks and marketing boards, international commodity agreements, rationing and famine relief, and the changing views of the social value of private speculation. Examples from 18th century to present.
5 units, Spr (Williams) MW 9-10:50

129. Planning and Analysis of Development Projects—(Same as Food Research 129; graduate students register for 229.) Techniques for designing, costing, appraising, and managing development projects. Modules: project planning and scheduling using CPM and PERT 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 (Gotsch) given 1992-93

130. The Rise of Industrial Asia—(Same as Political Science 125, VTSS 152.) Interdisciplinary seminar on the political, economic, security, social, and cultural aspects of industrial development and change in Asia as a region. Enrollment limited to 15. 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, Lewis, Okimoto) Th 3:15-5:05
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, Aut (Chung)

132. Application of Mathematical Programming to Agricultural Systems—(Same as Food Research 130.) Develops applied skills in linear, mixed integer, and non-linear programming using GAMS. Problem areas: multi-period and increasing returns investment decisions, risk and uncertainty, producer-consumer sector models and CGE models. Comparisons with budgeting and simulation methods in analyzing agricultural development policies. Prerequisite: course in microeconomic theory.

3-5 units (Gotsch) given 1992-93


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

139D. Directed Reading and Research—(Graduate students register for 239D.)

1-10 units (Staff)

140. Introduction to Financial Economics—Introduction to modern portfolio theory and corporate finance. Topics: capital budgeting techniques, consumer behavior towards risk, properties of various financial instruments, 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 statistics.

5 units, Spr (Wu)

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 and 52.

5 units, Win (Shoven)

142. Economic Policies of the European Community—(Same as Food Research 146; graduate students register for 246.) Analysis of current economic policies of the European Community and the planned completion of the internal market by 1992. Development of competition, transportation, and factor market policies; agricultural policy reform and changes in the food industry; external trade policy and relations with the U.S. and Japan; monetary and macroeconomic coordination and proposals for a common currency and central bank. Prerequisites: 51, 52, or equivalent.

5 units, Aut (Josling) MW 1:15-3:05

143. Economics of Biological Resources—(Same as Public Policy 143.) Economic analysis of natural resources and their management where population dynamics plays a central role. Topics: fishing, the spotted owl and ancient forests, and other predator-prey models; foraging (search) theory, "selfish" genes, and other models of optimizing behavior among species. Prerequisites: 51Q or 51V and background in multivariate calculus (Math. 21, 42, or Economics 180).

5 units, Win (G. Brown)

144. Economics of American Agriculture: Structure and Policy—(Same as Food Research 144.) American agriculture and its historical and contemporary role in the economy. Topics: the role of agriculture in American economic development, policy toward commercial agriculture, poverty problems in rural America, and the international dimensions of U.S. agriculture. Emphasis on policy alternatives rather than on farm management.

4-5 units, Aut (Falcon) MW 9-10:50


5 units, Win (Pencavel)

146. Comparative Labor Markets—Analysis and description of labor markets in different countries. Empirical regularities and irregularities across countries in wages, employment, and unemployment. Alternative labor market models and labor market institutions. Economies covered: Western Europe, Japan, Australia, certain less developed economies, the centralized economies of the Soviet Union and China, the emerging economies in Eastern Europe. Prerequisite: 51. Recommended: 102.

5 units, not given 1991-92

147. Economics of Human Resources—Investment in human capital, including education, information, health, and on-the-job training. Role of human capital in the analysis of economic growth. Effects of ability, socioeconomic background, and investment in human capital on the distribution of income. Prerequisite: 51.

5 units, Spr (Levin)

148. Urban Economics—The economy of cities. Location and land use, urban transportation, housing, and local taxation and provision of public services. Emphasis on theory; some discussion
of public policy. Students must write a field essay applying urban economic theory to some aspect of the San Francisco urban scene. Prerequisite: 51.

5 units, Spr (Swinkels)

149. The Modern Firm in Theory and Practice—Theoretical and institutional analysis of modern corporate firms: industrial relational, motivational, financial, information structural, managerial, and legal. Also, the role of various hybrid institutional forms between the market and the integrated firm: subcontracting, franchising, R&D cooperatives, and consortia. Practices in the American, Western European, and Japanese firms. Prerequisites: 51A or 51Q; familiarity with quantitative approach.

5 units, Aut (Sheard)

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 include 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. Prerequisites: 51, 52 (52 may be taken concurrently).

5 units, Win (Weingast)

151, 151A, 151Q. Economic Analysis I—(See 51, 51A, 51Q.)

152. Economic Analysis II—(See 52.)

153. Political Economy of Institutions—(Same as Public Policy 193.) 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 and 150.

3 units, not given 1991-92

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, Aut (Polinsky)

155. Environmental and Natural Resource Economics—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, 51A, or 51Q.

5 units, Spr (Goulder, Naylor)

156. Economics of Health and Medical Care—(Same as Health Research and Policy 256; graduates register for 256.) Open to graduate students and undergraduates (seniors, juniors) 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, Spr (Fuchs, Garber)

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 (Bresnahan)

158. Antitrust and Regulation—The history, economics, and legal background of the institutions under which U.S. industry is subject to government control. Topics: antitrust law and economics; the 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)

150. Economics of Regulation—Apply to 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, Spr (Owen) T 4-6

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, Spr (Greif)

162. Introduction to Dynamic Economics—Provides dynamic viewpoint to 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, Win (Kurz)

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, Win (Huizinga)

166. International Trade Policy—(Same as Food Research 166.) Effects of selected government policies affecting international trade. Trade policy and economic welfare, exchange rate policy, government responses to competition from imports, issues underlying international negotiation of reductions of barriers to trade, and special trade arrangements for developing countries. Prerequisite: 165.

5 units, Spr (Pearson) MW 11-12:50

167. European Economic Integration—Theory of Customs Union and Free Trade Areas; trade creation and trade diversion; origin, development, and working of the European Common Market; the European common agricultural policy; Theory of Optimum Currency Areas and economic integration. A European parallel currency? Origin, development, and working of the European Monetary System (EMS) and relationships to other currency blocs. Prerequisite: 165 or consent of instructor.

5 units, not given 1991-92

170. Intermediate Econometrics I—(Same as 270.)

5 units, Aut (Amemiya)

171. Intermediate Econometrics II—(Same as 271.)

5 units, Win (Wolak)

172. Intermediate Econometrics III—(Same as 272.)

5 units, Spr (MaCurdy)

180. Mathematics for Economists—Training in areas of mathematics which have frequent applicability to economic problems. 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 organization; 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, and Math. 41 or the equivalent.

5 units, Aut (Hammond)

181. Optimization and Economic Analysis—The development of optimization techniques, including calculus, linear and nonlinear programming, the calculus of variations, and control theory. Emphasis on concepts and results rather than techniques and proofs. Examples: static and dynamic theories of the household and the firm, and problems in aggregative planning and control. Prerequisites: 51 and 180, or Math. 43 or equivalent.

5 units, not given 1991-92

185. The Distribution of Income and Wealth—Basic facts about the distribution of income and wealth in the U.S., with comparisons to other advanced countries. Methods of measuring inequality. Statistical distributions and stochastic models. Economic theories of the distribution of income: neo-classical, Marxist, and neo-Keynesian. The relation between wealth and income distribution. Normative theories of just distribution and the limiting effects of incentives on the redistribution of income (may be taken as 285 by
178. Junior Research Workshop—Preference given to juniors; also for students in honors program considering other thesis topics, especially economic history. Introduces economics majors to current research in applied and theoretical economics. Students read, discuss, and present research papers. Suggested topics: economics of network technologies, compatibility standards and markets in computer and telecommunications industries; determinants of U.S. industrial “competitiveness”; and public and private incentives and institutions for the production and distribution of knowledge. Enrollment limited to 15. Prerequisites: 51, 51A, or 51Q and one course in calculus.

5 units, not given 1991-92

187. Senior Research Paper—Attend organizational meeting on Friday, first week of classes (see Stanford Daily for details).

3 units, Aut, Win, Spr (Goulder)

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 (J. Taylor)

PRIMARILY FOR GRADUATE STUDENTS


by arrangement.


by arrangement.

A. CORE THEORY CURRICULUM


5 units, Aut (Lau, Swinkels, Brown)

203. Price and Allocation Theory II—Two five-week modules. First concerns the Walrasian model of a competitive economy, focusing on the existence, uniqueness, and optimality of competitive equilibria in simple general equilibrium models such as pure exchange and representative agent models. Second is an introduction to normal and extensive form games, principal-agent theory and the techniques for computing optimal contracts, optimal taxes, and optimal regulatory schemes. Prerequisite: 202.

5 units, Win (Swinkels, Brown)

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)


5 units, Aut (J. Taylor)


5 units, Win (Attanasio, Durlauf)

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 (Hall, Stiglitz)

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 1991-92

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 1991-92, students must complete 215 and 217 and submit a paper for either quarter. Students wishing to do research in this field are strongly advised to take supporting course work in international economics, comparative institutional analysis, and with the Food Research Institute.


215. Economic Development—Dual economy models; involuntary unemployment and surplus labor in agriculture, rural land and credit institutions, industrialization and parastatals, urban labor markets, and rural-urban labor migration. Taxation and public finance.

5 units, Win (Kochar)


5 units, Spr (McKinnon)

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 1991-92

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, Win (David)

227. European Economic History—Economic growth and development in Western Europe from the 11th to the 20th centuries, emphasizing
the formative period up to the 19th century. The experiences of Britain, France, Germany, and other continental countries, with that order of emphasis. The interrelations between the growth and distribution of output, demographic trends, technological and organizational changes in trade and industry, and the changing formal and informal institutions governing political and economic activity.

5 units, not given 1991-92

228. Institutions in Economic History: Form, Function, and Evolution—(Given as 294 in 1991-92.)
5 units, Aut (Greif)

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, Spr (Durlauf)

5 units, Aut (Sargent)

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 (Coulter, Stiglitz)
242. 5 units, Spr (Shoven)

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 presenta-

G. ECONOMICS OF LABOR

To receive credit for the field, students must complete 246 and 247.

5 units, Aut (Pencavel)

5 units, Spr (MacCurdy)

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, Win (D. Staiger)

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 either 259 or 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, Bresnahan)

260. Special Topics in Industrial Organization and Regulation—Focused, in-depth study of issues of current research and policy interest: empirical tests of oligopoly theories; dynamics of change in regulatory policy; theory of economic institutions; anti-trust status of joint ventures; and use of capacity, innovation, and product variety as a barrier to entry. Significant research issues that remain unresolved and promising ways to attack them.

5 units, Spr (Bresnahan, Noll)


5 units (Arthur) given 1992-93

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—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 (Staff) by arrangement

355. Workshop in Industrial Organization, Regulation, and Applied Microeconomics—Working seminar on current research in the field by visitors, presentations by students, and structured discussion of recent papers. Students are required to write an original research paper, make a formal seminar presentation, and lead a structured discussion.

10 units, Aut, Win, Spr (Staff) by arrangement

358A,B,C. Workshop in Political Economics and Collective Choice—Multidisciplinary working seminar on current topics in mechanisms of social choice, political processes, and the politics of economic policy. Offered in collaboration with the Graduate School of Business and the Department of Political Science. Participants are required to undertake an original research project, approved by the instructors, and to make an oral presentation.

10 units, Aut, Win, Spr (Baron, Bendor, Ferejohn, Noll)

I. INTERNATIONAL ECONOMICS

To receive comprehensive credit for this field, students must complete 265 and 266, for which one term paper is required. Students wishing to specialize in international economics are strongly advised to take 267, in which topics may vary somewhat depending on the research interests of the instructors. Further complementary courses are 217 and 233. Selected courses in Economics of Industry sometimes cover trade-related problems.


5 units, Aut (Huizinga, McKinnon)


5 units, Aut (Huizinga, McKinnon)


5 units, Spr (R. Staiger)
**ECONOMICS 383**

**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)

**271. Intermediate Econometrics II—**Linear regression model; relaxation of classical-regression assumptions; simultaneous equation models; time series analysis. Prerequisite: 170/270.

5 units, Win (Wolak)

**272. Intermediate Econometrics III—**Continuation of 271. Nonlinear estimation; limited dependent variable (Tobit) models. Prerequisite: 171/271.

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.

5 units, Win (Amemiya)


5 units, Spr (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 1991-92

**370A,B,C. Workshop in Econometrics.**

10 units (Staff) by arrangement

**K. MATHEMATICAL ECONOMICS**

**Field I: Theory of Choice**—Requirements are two of the following courses.


3 units, Win (Hammond)


5 units, not given 1991-92


5 units, not given 1991-92

**Field II: General Theory**—Requirements are two courses chosen from 284, 286, and 287.

284. Topics in Dynamic Economics—Principle of optimality, discounted dynamic programming under certainty and uncertainty, and applications in economics. Optimal control theory and applications. Stochastic control and Ito calculus. Nonlinear dynamical systems, bifurcations and sunspot equilibria. Topics may change each year.

5 units, Aut (Kurz)

285. The Distribution of Income and Wealth—(See 185.) not given 1991-92

286. Game Theory and Economic Application—I. 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. II. Learning and evolution in game theory. III. Cooperative games; the characteristic function and core; balanced games and relations to Walrasian equilibrium; Shapley value. Bargaining theory.

5 units, Aut (Swinkels)

287. General Equilibrium Theory—Comprehensive treatment of current research in general equilibrium analysis of economies with incomplete markets. Topics: questions of existence and optimality with nominal and real assets. Students must participate actively in the seminar by presenting relevant journal articles. Prerequisites: 202 and 203.

5 units, Aut (Brown)

290. Multiperson Decision Theory—(Same as Business 601C.) Review of selected current working papers emphasizing methods of game
theory and topics in mathematical economics that use game-theoretic models. The effects of differences in information, limitations on observability and contracts, etc., on strategic behavior. Prerequisites: two courses from the Choice Theory/Mathematics Economics sequences, or consent of instructor.

5 units, Spr (Wilson)

385A, B, C. Workshop in Mathematical Economics.
10 units (Staff) by arrangement

386. Interdisciplinary Seminar on Conflict Resolution—(Same as Business 694, Law 325, Operations Research 366, Psychology 283.) Addresses problems of decision making, risk analysis, conflict resolution and negotiation from normative and descriptive perspectives.
1-2 units, Win, (Arrow, Mookin, Ross, A. Tversky, Wilson) T 4-6

387. Interdisciplinary Workshop in Equity and Social Choice Theory—(Same as Philosophy 255.) Graduate seminar on recent work on social choice theory and related literatures in economics, philosophy, and political science as it concerns the equitable allocation of resources and respect for individual rights. Students receive up to 3 units for presenting their own work or a survey paper.
1-3 units, Win (Suppes, Ferejohn) T 3:15-5:05

388. Interdisciplinary Workshop in Risk Management—(Same as Operations Research 369.) Examines a number of current issues in risk management from an organizational perspective. Speakers from engineering, economics, law, medicine, and business, as well as risk management private consultants.
1 unit (Lieberman, Arrow) not given 1991-92

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).

292. Comparative Theory of Firms and Organizations—Theory of worker controlled firm; bargaining game approach to the firm; hierarchy as an information system controlling mechanism/incentive device; corporate culture and side-contracting (cooperation, collusion); hierarchical vs. non-hierarchical coordination; financial contracts of the firm. Emphasis is on recent theories; motivation of discussion is provided by the institutional comparison of Anglo-American, Japanese, continental European, and Socialist enterprises. Prerequisite: 291.

5 units, Win (Aoki)


5 units, not given 1991-92

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 to highlight alternative conceptual frameworks—neo-classical, transaction cost economics, institutionalism, 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, Spr (Greif)

391A, B, C. Seminar in Comparative Institutional Analysis.
10 units (Staff) by arrangement

OVERSEAS STUDIES

The following courses are approved for the Economics major and taught overseas at the campus indicated. Students are encouraged to discuss with their major advisers on campus which courses would best meet individual educational needs. Descriptions can be found in the "Overseas Studies" section of this bulletin or in the Overseas Studies Program office, 126 Sweet Hall.


5 units, Win (Carnoy)

123X. Efficiency of Capitalist and Socialist Economics and the Polish Crisis—Krakow.

5 units, Spr (Wojtyna)
ENGLISH 385

124X. Economic Institutions of Modern Japan—Kyoto.
  5 units, Spr (Abe, Imai)

126X. From Socialism to Capitalism in East Germany: A Political Economy Approach—Berlin.
  4-5 units, Aut (Krueger)

159X. Political Economy of Industrial Change: Italy and Europe in a Global System—Florence.
  5 units, Spr (Bianchi, Bellini)

  5 units, Win (Crafts)

ENGLISH


Chair: Ronald A. Rebholz

Vice Chair: Albert J. Gelpi

Director of Creative Writing Program: Nancy H. Packer

Acting Director of Freshman English Program: Ann Watters


Associate Professors: Sandra E. Drake, Jay Fliegelman, Regenia Gagnier (on leave Winter), Barbara Charlesworth Gelpi, Horace A. Porter, Mary F. Wack

Assistant Professors: Joss Lutz Marsh, Nancy Porter Stork (on leave Winter), Michael Tratner

Professor (Teaching): Larry Friedlander (on leave 1991-92)

Courtesy Professor: Charles R. Lyons (Drama)


Visiting Professors: N. Katherine Hayles, Felicity A. Nussbaum

Visiting Associate Professor: Cordelia Candelaria

Visiting Assistant Professors: Ian Balfour, Deborah Esch, Priscilla Wald

Acting Instructor: Katherine A. Armstrong

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; and 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 nine areas. (A course from Area A will prove more useful if taken sooner rather later; and, if possible, students should take courses in chronological sequence). At least one of the courses satisfying the major must be English 150-189 (Seminars for English Majors) or English 196 (Honors Seminar) or an English seminar offered in the Stanford in Oxford program. Other English Courses which are taught in a seminar format and require a substantial amount of critical writing may be approved by the Undergraduate Studies Committee 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.

A) Language: English 102, 180A, 205; Linguistics 1
B) Medieval: English 165A, 165B, 171A, 181B, 211, 212 A
C) Renaissance: English 113, 176, 182B, 182 C, 182D, 212B
D) Shakespeare: English 173A, 173B, 173G, 183A
E) Restoration and 18th Century: English 115, 115B, 131, 163A*.
G) American Literature before 1900: English 121, 123A, 175, 186A, 186D
P) Poetry: English 92, 150, 150G, 188P

* May be counted for one area only.

In addition, students must elect two 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 nine areas A-H, P listed above, and fulfill the language and seminar requirements.

In addition they must take four courses specifically designed for either the fiction or the poetry concentration. Fiction writers must first take English 90 (Fiction Writing), then two quarters of 190 (Intermediate Fiction Writing) or a more advanced fiction writing course, and 137 (Development of the Short Story). Poets must first take English 92, then two quarters of 192 (Intermediate Poetry Writing) or a more advanced poetry writing course, and one course in poetry in addition to the course that fulfills area requirement P, to be approved by a poetry instructor in the Creative Writing program. Courses taken to satisfy an area requirement cannot also satisfy a Creative Writing requirement.

Admission to English 190 or 192 is by consent of the instructor and based on the quality of the
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 A, to be taken as early as possible in their program of studies.
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 A-H, P listed under the major in English, and fulfill the seminar requirement. In addition, they must complete a coherent program of four courses in French literature, read in the original. The program of each student must be approved by the Director of Undergraduate Studies in English and by the Department of French and Italian.

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 A-H, P, 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 A-H, P, 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 nine areas A-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 nine areas A-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, Oxford, 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 (A-H, P)—nine 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 Support Section of the Registrar’s Office, Stanford University, for admission as non-matriculated 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.
2. State of California Community College Instructor Credential: given to candidates who successfully complete the requirements for the A.M. degree in English for this credential.

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 re-evaluated 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.). Since master's degree candidates are accepted for a specific terminal program, they will not subsequently be admitted 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 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 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.

Candidates who can demonstrate unusually strong preparation in the history of English literature may undertake a 40-to-60-page master's essay. Such candidates should register for 15 units of English 398 with the faculty member who supervises the work on the essay. Candidates who write a master's essay 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.

Candidates for the Master of Arts in Teaching must complete a minimum of two-thirds of their specified work in the Department of English.

MASTER OF ARTS IN TEACHING

The A.M. in Teaching (not offered 1991-92) 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 now 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 must take at least 70 units (normally 14 courses) of the 97 in classroom courses (that is, courses other than 396, 397A, 398, and 399), of which no more than 15 units (normally three courses) may come from 100-level courses.

Normally, this program should be 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. Three and one-half quarters of supervised teaching are a requirement of the Ph.D. program.

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, in English and Linguistics, in English Philology, or in English Medieval Literature.

ENGLISH LITERATURE

Requirements are as follows:

1. A 5-unit course in Old English (usually 205) and a 5-unit course in Middle English language or literature (read in the original), or equivalent work elsewhere.

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. A 2-unit course introducing the new graduate student to the various opportunities and responsibilities of the department and a 5-unit course on teaching composition.

4. Students are encouraged to take an advanced course in literary theory or criticism.

5. A minimum of 30 additional units of graduate courses and seminars (excluding 396, 397A, 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.

6. Consent of the adviser if courses taken outside the Department of English are to count toward the 97-unit requirement.

7. 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 week of 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.

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 AMERICAN LITERATURE
Requirements are as follows:
1. A 5-unit course in Old English (usually 205) and a 5-unit course in Middle English language or literature (read in the original), or equivalent work elsewhere.
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. A 2-unit course introducing the new graduate student to the various opportunities and responsibilities of the department and a 5-unit course on teaching composition.
4. Students are encouraged to take an advanced course in literary theory or criticism.
5. Consent of the adviser if courses taken outside the Department of English are to count toward the requirement of 97 units.
6. Qualification: see paragraph (7) under requirements of the Ph.D. program in English literature.
7. 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 (7) 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. A 2-unit course introducing the new graduate student to the various opportunities and responsibilities of the department and a 5-unit course on teaching composition.
4. A knowledge of one foreign language comparable to that demanded under the basic program and an advanced reading knowledge of a second language.
5. 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.
6. 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.
7. 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 5-unit course in Old English, a 5-unit course in Middle English, and English 102 (History of the English Language) for 5 units.
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. A 2-unit course introducing the new graduate student to the various opportunities and responsibilities of the department and a 5-unit course on teaching composition.

4. Students are encouraged to take an advanced course in literary theory or criticism.

5. A minimum of 30 additional units of graduate courses and seminars (excluding 396, 397A, B, and C, 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.

6. 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.

7. Qualification: see paragraph (7) 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). 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 Graduate Studies Committee.

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.

The candidate must satisfy one language requirement by the end of the first year (that is, before registration in the following year), and the other by the end of the third year.

Foreign language requirements for the Ph.D. may be fulfilled in any of the following ways:

1. Achievement of a sufficiently high score (70th percentile) on the foreign language examination prepared by the Educational Testing Service (ETS). Latin and Greek are not tested by ETS.

2. A reading examination given each quarter by the various language departments, except for Latin and Greek.

3. For Latin and Greek, an examination by the Department of English. The Latin examination is given before registration in the Autumn Quarter in order to permit those who need the course to register for Latin 3. It is also given in the eighth week of the Winter and Spring Quarters, along with other departmental examinations for languages not tested by the Educational Testing Service.

4. Passage with a letter grade indicator (LGI) of "B" or higher of a course in literature numbered 100 or higher in a foreign language department at Stanford. As an alternative for Latin, French, and Spanish, passage of Latin 51 and 52, French 10, Italian 10, and Spanish 15, respectively, with an LGI of "B" or higher.

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 Professor Mary Pratt in the Department of Spanish and Portuguese.

**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**

Freshman Writing 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 Freshman English office.

0 units, Aut, Win, Spr (Staff)

1, 2. **Freshman English**—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 a research paper. 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. The readings are intended to serve writing needs and are not studied for their own sakes. (DR: W)

1A, 2A. **Writing: Process, Structure, and Style**—Focus is 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 Freshman English**—One-quarter course that fulfills the University’s Writing Requirement but is offered only for students who have scored a 4 or 5 on the English AP exam. Classes meet twice a week for 75 minutes or three times per week for 50 minutes, and each student has individual tutorial sessions with the instructor. Students concentrate on the same writing techniques as those presented in the 1 and 2 sequence. A variety of writing workshops is offered. The emphasis of all the workshops, whatever the nature of the readings, is student writing and its improvement. Readings are intended to serve writing needs and are not studied for their own sakes. (DR: W)

3A. **Writing: Process, Structure, and Style**—Focus is 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 politics 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 (Ross)

Win (Wyle)

7,8. Literature and the Arts—A Cultures, Ideas, and Values (CIV) sequence emphasizing 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 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. Autumn and Winter Quarter writing workshops use a careful reading of the CIV texts to help students understand the process of writing and to improve their own writing. Students must be concurrently enrolled both quarters in CIV and the writing components of the course. Students with and without Advanced Placement credit may sign up. 

7,7A. Antiquity and the Middle Ages—From Homer and the Hebrew Bible to the dawn of the Renaissance, covering Sappho, the Greek tragedians, Plato, Aristotle, Virgil, the New Testament, St. Augustine, the Koran, Dante, Medieval poetry and Boccaccio and Chaucer, and readings in non-western traditions. Writing instruction concentrates on finding an appropriate thesis and on developing and organizing ideas. DR:1; three-quarter sequence. 

8 units (5 for English 7, 3 for English 7A) 

Aut (Parker, Staff) lectures plus sections and workshops

8,8A. 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. 

8 units (5 for English 8, 3 for English 8A) 

Win (Riggs, Staff) lectures plus sections and workshops

9. The Modern World—Thought and literature from the French Revolution to contemporary times, including works by the English Romantics, Kierkegaard, Goya, Dickens, Beethoven, the Impressionists, Marx, Kropotkin, Browning, Freud, Woolf, Sartre, Rhys, Ellison, and American jazz. DR:1; three-quarter sequence. 

5 units, Spr (Ruotolo, Staff) lectures plus sections

10,11G,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:1(2) 

3 units, Aut (Lerer)

11G. Masterpieces of English Literature II: From the Enlightenment to the Modern Period—(English majors and others taking 5 units, register for 111G.) Introduction to literary masterpieces written in English between 1700 and the present focusing on the shifting ways that genders have been defined during this period. Divided about equally between poetry and fiction, with some drama. DR:1(2) 

3 units, Spr (Tratner)

12. Masterpieces of American Literature—(English majors and others taking 5 units, register for 112.) Survey of some major works of American literature, 1846-1940. Authors: Hawthorne, Melville, Whitman, Dickinson, James, Fitzgerald, Wright, Faulkner. DR:1(2) 

3 units, Aut (A. Gelpi)

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:1(2) 

3 units, Spr (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, Aut (L’Heureux)

50. Poetry and Poetics—(English majors and others taking 5 units, register for 150.) Introduction to the reading of poetry through a variety of poems, emphasizing the ways the meanings of poems are shaped through diction, imagery, figurative language, and technical elements of verse. DR:7(2)

3 units, Aut (Lindenberger)

Win (Perloff)

50G. Poetry and Poetics—(English majors and others taking 5 units, register for 150G; same as Feminist Studies 164.) Introduction to poetic techniques and genres (narrative, lyric, elegy, satire), emphasizing texts in which representations of gender difference play a significant role. Ovid’s Metamorphoses, Renaissance love lyrics, satiric verse from Alexander Pope to Queen Latifah, and contemporary American poetry that engages in dialogue with conventional notions of masculinity and femininity. DR:7f(2)

3 units, Spr (Middlebrook)

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 (Wack)

68. American Indian Mythology, Legend, and Lore—(English majors and other students taking 5 units, register for 168.) Introduction to American Indian oral tradition, centering on an investigation of the nature of native American prose and poetry, especially the relationship between oral tradition and writing. DR:7(2)

3 units, Win (Fields)

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 (Haefele, Hillis, MacDonald, Owens, 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 (Neelon)

93. Playwriting—(Same as Drama 140/240.) Dialogue, character, and action as strategy in the writing of drama. Prerequisites: 90, submission of manuscript.

5 units, Aut (L’Heureux)

Western Thought and Literature—See Humanities 61, The Ancient Near East, Greece, and Rome; 62, The Middle Ages and the Renaissance; and 63, The Enlightenment to the Present.

BASIC UNDERGRADUATE SURVEYS, SEMINARS, AND WORKSHOPS

Note—Graduate students may receive graduate credit for three 100-level courses.

100. Literature and the Institution of Literary Study—(Same as Classics 100, Comparative Literature 100, German Studies 179D.) Overview of the emergence of literature as a phenomenon specific to Western culture, of the academic literary disciplines in general, and of theoretical approaches to literature in particular. With reference to ancient Greek Rhetoric and Poetics, tracks the development of ideas of literature and literary study from the Middle Ages through the present multicultural situation. Topics: the material culture of literary study and production (e.g., scribal vs. print vs. media cultures) and the emergence of key concepts of Western tradition, e.g., “text” and “authorship” and the institutionalizations they underwent.

5 units, Win (Cumbrecht, Selden)

102. The History of the English Language—(Same as Linguistics 102.) Evolution of the English language as a medium of literary expression. (Area:A) DR:9(4)

5 units, Spr (Stork)

110. Masterpieces of English Literature I: Chaucer, Shakespeare, Milton, and Their Contemporaries—(See 10.)

5 units, Aut (Lerer)

111G. Masterpieces of English Literature II: From the Enlightenment to the Modern Period—(See 11G.)

5 units, Spr (Tratner)

111G. Masterpieces of English Literature II: From the Enlightenment to the Modern Period—(See 11G.)

5 units, Spr (Tratner)

112. Masterpieces of American Literature—(See 12.)

5 units, Aut (A. Gelpi)

113. The Renaissance—A basic survey of English literature. (Area:C)

5 units, Spr (Orgel)

115. Survey of 18th-Century Literature—(Area:E)

5 units, Spr (Castle)

115B. 18th-Century British Literature—Drama, poetry, and prose fiction by Congreve,
Pope, Swift, Johnson, Richardson, Fielding, and Burney. Examines the diversity of 18th-century British literature. Marginal genres (travel-writing and romances) and some noncanonical authors, e.g., Aphra Behn assessed. Themes: the woman writer, rise of the novel, cult of sensibility, and the validity of terms traditionally applied to the period by literary critics ("neoclassicism" and "reason"). Emphasis on the relation between literature and society. Texts are placed in the context of audience and authorship. (Area:E)

5 units, Win (Armstrong)

121. American Literature and Culture to 1855—(Same as American Studies 150.) (Area:G)
5 units, Win (Fliegelman)

123A. Presentations of American Women—(Same as Feminist Studies 102A.) Interdisciplinary textual readings and theoretical discussions. Surveys representations of women in the late 19th- and early 20th-century U.S. Interrogates the relationships between representations of women and modern U.S. nationalism and between political and aesthetic representation of the period. (Area:G)
5 units, Spr (Wald)

124B. Contemporary Chicano Narrative—(Same as Comparative Literature 124B, Spanish 187.) The developments in literary form represented in works by Paredes, Rivera, Acosta, Anaya, Islas, Rios, Cisneros, Moraga, Viramontes, Chavez, and Sanchez as resistant ideological forces seeking to shape modes of perception and effecting new interpretations of social reality. The tendency of contemporary Chicano/a narrative toward dialectical patterns expressed as a "dialectical of difference." (Area:H)
5 units, Spr (Saldívar)

130. The Novel—(See 30.)
5 units, Spr (Packer)

131. The 19th-Century British Novel—(Area:E)
5 units, Aut (Castle)

132G. The 19th-Century English Novel—(Area:F) DR:7†(2)
5 units, Win (Polhemus)

133. 20th-Century British Fiction—(Area:H)
DR:7(2)
5 units, Aut (Marsh)

133G. The 20th-Century English Novel—DR:7†(2)
not given 1991-92

5 units, Win (L'Heureux)

140. Drama—(See 40; same as Drama 50.)
5 units, Aut (L'Heureux)

145. 20th-Century British Theater—Hamlet as a "modern play" about consciousness of self, language, and silence; how these themes inform plays from Shaw to Stoppard; how playwrights have adapted various theatrical forms to enhance/replace language; how British theater responded to European influences. Discussions include Beckett, Osborne, Pinter, Shaffer, Churchill. Some evening screenings. Recommended: 40. (Area:H)
5 units, Win (Bartholomew)

150. Poetry and Poetics—(See 50.) (Area:P)
5 units, Aut (Lindenberger)
Win (Perloff)

5 units, Spr (Middlebrook)

5 units, Win (Balfour)

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)

155B. Yeats and Eliot—Close reading of the two archetypal, yet opposite, poets of High Modernism. Focus is on the relation of poetic language to the larger metaphysical and political issues inherent in Anglo-American Modernism. Yeats's A Vision and Eliot's critical prose considered in the light of contemporary theory. (Area:H)
5 units, Spr (DiPiero)

160C. Fictions and Visions of Childhood—The relationship between representations of children in well-known literary texts and conceptions of, and attitudes towards, children in the 19th- and 20th-century English-speaking world: fiction and the moral, religious, personal, social, erotic, and aesthetic significance of childhood as constituted within a culture. (Area:F or H)
5 units, Win (Polhemus)

160D. Cinema and Literature—The two-way relationship of literature and cinema from 1900, primarily in the U.S. and England. The modes of narration and the development of genres in both media. Topics: role of the novel in the rise of
classical narrative cinema, and early theorization
of film by Russian director Sergei Eisenstein and
others; the "Victorian Sensibility" of silent Ameri-
can cinema, particularly films of D. W. Griffith;
Dickens and the idea of an English national cin-
ema; F. Scott Fitzgerald, Rudolf Valentino, and
the birth of the "star"; film noir and hard-boiled
fiction, a cross-media post-war aesthetic; Chaplin
and Beckett, slapstick as high art; constructing
the horror genre in novel and film. Mandatory
evening screenings. (Area:H)

5 units, Win (Marsh)

160E. Introduction to Ethnic and Third World
Literature—(Same as Comparative Literature
160E.) Writings by and about women and men
who live at the intersections of gender, colonial-
ism, race, sexuality, and ethnicity. Issues of identity,
power relations, necessity and freedom, and
possibilities of opposition and resistance. Foci-
uses on Latin American, African, Middle Eastern,
and S. Asian authors who pose these issues in the context of contemporary debates about
cultural and personal identity.

5 units, Spr (Saldivar)

161C. 20th-Century Afro-American Fiction—
(Same as African and Afro-American Studies
161C, Comparative Literature 161C.) Afro-
American fiction from the Harlem Renaissance
forward. Works by Jean Toomer, Zora Neale
Hurston, Ernest Gaines, Richard Wright, Ralph
Ellison, James Baldwin, Toni Morrison, Ishmael
Reed, James Alan McPherson, Gloria Naylor, and
Alice Walker. (Area:H) DR:3 or 7(2)

5 units, Spr (Porter)

161H. Narration, Detection, and Social Margi-
nality—Relationship between narration and de-
tection and their association with marginality,
studying the function of detection in the works of
"marginal" and "central" writers. (Area:H)

5 units, Spr (Drake)

162A. Study of Chicanas—(Same as Chicano
Studies 161, Feminist Studies 165, Spanish 286.)
Develops and applies an integrative ethnoca-
tural and feminist approach to study of Mexican
American women. Chicana identity from a vari-
ety of perspectives; controversies surrounding
culture, gender, class, and race for insight into
problems and possibilities of a Chicana-identified
ideology.

5 units, Win (Candelaria)

163A. Writing Lives—The writing of autobiog-
raphy, fictional and non-fictional, through exam-
plary texts from the early 18th to the early 19th
century. The category of the "self" is indispens-
able, but emphasis is primarily rhetorical and tex-
tual, rather than psychological or psychoanalytic.
Possibilities and limits of the notion of a "genre"
of autobiography. (Area:E or F)

5 units, Win (Balfour)

164A. The Biblical Presence in Modern Po-
etry—The presence of biblical scripture (people,
place names, narratives, prophecy, and liturgical
and lexical elements from the Hebrew Bible) in
British, American, European, and Israeli poetry.
(Area:H) DR:7(2)

5 units, Win (Felstiner)

165A. Introduction to Medieval Culture—
(Same as Medieval Studies 165.) Introduction to
the development of medieval culture through
study of religious, philosophical, literary, artistic,
social and political sources, emphasizing interre-
lationships among them. Lectures by faculty from
various departments. (Area:B) DR:7(2)

5 units, Win (Brown, Staff)

165B. Arthurian Literature—(See 65B.)
(Area:B)

5 units, Aut (Wack)

165C. Introduction to Literary Theory—Socio-
historical examination of the ideology of 20th-
century aesthetics and critical methods. Organ-
ized around historical, generic, and methodologi-
cal principles, considers classical foundations of
formal methods, moving to in-depth readings in
structuralism (Saussure), poststructuralism (Der-
rida, DeMan), ideological analysis (Eagleton,
Jameson, Said), cultural studies (Johnson), and
various "subaltern" studies (Spivak, Spillers,
Alarcon).

5 units, Win (Saldivar)

165D. Introduction to Literary Theory—Intro-
duces upper-division undergraduates to the "state
of the question" in contemporary critical theory.
The basic tenets of theory as laid down by Plato
and Aristotle, Russian Formalism, the Frankfurt
School (especially Walter Benjamin), the post-
Structuralism of Barthes, Derrida, and Foucault;
some feminist criticism, media criticism (Baudril-
lard) and cultural studies (James Clifford).

5 units, Spr (Perloff)

168. American Indian Mythology, Legend, and
Lore—(See 68.) (Area:H)

5 units, Win (Fields)

169. Who's Speaking? The Positioning of the
Speaking Subject in Western and Chinese Po-
etry—(Same as Asian Languages 169, Compara-
tive Literature 169.)

5 units, Aut (Palumbo-Liu)

169B. Readings in the Asian American Novel—
(Same as Comparative Literature 169B.) (Area:H)
DR:3

5 units, Win (Palumbo-Liu)
169D. Readings in Asian American Short Fiction—(Same as Comparative Literature 169D.) (Area: H) DR:3
5 units, Spr (Palumbo-Liu)

171A. Chaucer's Canterbury Tales—Chaucer's poetry read in Middle English. (Area: B)
5 units, Spr (Lerer)

173A. Shakespeare—(Same as Drama 159A.) The Two Gentlemen of Verona, Romeo and Juliet, A Midsummer Night's Dream, Julius Caesar, TROILUS AND CRESSIDA, THE TEMPEST, THE WINTER'S TALE. (Area: D) DR:7(2)
5 units, Aut (Girard)

173B. Shakespeare—(Same as Drama 159B.) Tentative list: As You Like It, The Merchant of Venice, Othello, Hamlet, King Lear, THE WINTER'S TALE. (Area: D) DR:7(2)
5 units, Win (Orgel)

175. Henry James—(Area: G)
5 units, Aut (Dekker)

176. Donne and Jonson: Poems—(Area: C)
5 units, Win (Trimpi)

179B. Faulkner—(Area: H)
5 units, Aut (Moser)

180-189. Seminars for English Majors—Preference given to English majors. Scholarly and critical studies of literary texts. One seminar (or its equivalent) is required of all English majors. 180-188 satisfy the appropriate area requirements, A-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 two required electives (see program for major in English above), is mainly the theory of literary genres. Sign up in department.

180A. Seminar: Language and Gender in Contemporary American Fiction—(Area: A)
5 units, Win (Heath)

181B. Seminar: The Bible and Medieval Literature—(Area: B)
5 units, Aut (Brown)

182B. Seminar: Renaissance Poetry—(Area: C)
5 units, Win (Rebholz)

182C. Seminar: Marlowe and Elizabethan Culture—(Area: C)
5 units, Aut (Riggs)

182D. Seminar: The Social Text of 17th-Century Poetry—(Area: C)
5 units, Aut (Ross)

183A. Seminar: Shakespeare Through Performance—(Same as Drama 129D.) (Area: D)
5 units, Aut (Friedlander)

185B. Seminar: Gender and Intersubjectivity: The Brownings and the Rossettis—(Area: F)
5 units, Win (B. Gelpi)

185C. Seminar: Love and Passion in 19th-Century Fiction—(Area: F)
5 units, Spr (Polhemus)

185D. Seminar: The 19th-Century Novel—Censorship, Offensiveness, and Creativity—(Area: F)
5 units, Aut (Marsh)

186A. Seminar: Psychological Themes in American Fiction—(Same as American Studies 208.) (Area: G)
5 units, Aut (Moser)

186D. Seminar: The Popular Book in America—(Same as American Studies 219.) (Area: G)
5 units, Spr (Fliegelman, Ryan)

186E. Seminar: Hawthorne and James—(Area: G)
5 units, Spr (Dekker)

187B. Seminar: William Carlos Williams—(Area: H)
5 units, Spr (Sorrentino)

187C. Seminar: Virginia Woolf—(Area: H)
5 units, Win (Trainer)

187D. Seminar: Modern British and American Poetry—(Area: H)
5 units, Spr (Felstiner)

187E. Seminar: American Catholic Writers—(Same as American Studies 210.) (Area: H)
5 units, Win (A. Gelpi)

187F. Seminar: The 20th-Century British Novel—(Area: H)
5 units, Spr (Koponen)

187J. Seminar: Baseball Fiction—(Area: H)
5 units, Win (Candelaria)

188P. Seminar: Poetry and Poetics—(Area: P)
5 units, Win (Felstiner)

189A. Seminar: The Body Politic Analogy from Antiquity through the Renaissance—(Same as Comparative Literature 189A, Italian 289A.)
5 units, Win (MacKinnon)

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 (Owens, Haefele, Hillis)

191. Expository Writing—Advanced composition open to undergraduates and graduates. Taught through tutorials and partly through short
ENGLISH 399

lectures and general discussion. General instruction in writing.

191E. Advanced General Composition.
3 units, Spr (Emery)

192. Intermediate Poetry Writing—May be taken twice. Prerequisite: 92.
5 units, Win, Spr (Neelon)

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.
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 (Halliburton)
sec. 2 (Junkerman)

196B. Honors Essay Workshop—Required of all English honors students.
3 units, Win (Perloff)

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 199 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

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)

SPECIFIC TOPICS AND AUTHORS:
FOR UNDERGRADUATE AND GRADUATE STUDENTS

Note—Students in other departments who wish to broaden their programs will find these courses useful.

200A. Introduction to Old Norse-Icelandic—
(Same as German Studies 205A/305A.) (Area:A)
5 units, Win (Andersson)

200B. Advanced Old Norse-Icelandic—
(Same as German Studies 205B/305B.) (Area:A)
3-5 units, Spr (Andersson)

205. Old English—Study of Old English; critical reading of short poems and selected prose in language and literature. Prerequisite for 301A. (Area:A)
5 units, Aut (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)
5 units, Spr (Stork)

212A. Medieval to Renaissance: The Development of Literary Forms—The adaptation of established or emerging literary genres and conventions to the changing moral and intellectual attitudes toward the arts during late antiquity, the Middle Ages, and the Renaissance by means of a central distinction and its corollaries. Elucidates certain literary works by accounting, in light of these distinctions, for their choice of genre, procedures of organization, and style. (Area:B)
5 units, Win (Trimpi)

212B. Medieval to Renaissance: The Development of Literary Forms—(See 212A.) (Area:C)
5 units, Spr (Trimpi)

262. The Caribbean-Americas: An Introduction to Their Literature, Thought, and Cultural Worlds—(Same as African and Afro-American Studies 248, Spanish 248.)
3-5 units, Aut (Wynter)

291. Generative Devices in Imaginative Writing—Designed on the lines of the OuLiPo (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, combinatories, etc.,
and with devices of their own invention. Prerequisite: 90 or 92.
5 units, Aut (Sorrentino)

293. Verse Translation Workshop—The art and practice of translating poems, with some emphasis on theory and the tradition. Students pursue and present work in progress. Consult instructor during prior quarter.
5 units, Spr (Feldstner)

301A. Colloquium: Beowulf—Reading and critical analysis of Beowulf. Prerequisite: 205 or its equivalent.
5 units, Win (Brown)

301B. Colloquium: Magic, Science, and Literature in the Middle Ages—The stances of medieval fiction toward two praxes of power—magic and science. Texts: Romance of the Rose, Divine Comedy, Decameron, Canterbury Tales, and significant secondary reading. Prerequisite: ability to read Chaucer in Middle English.
5 units, Spr (Wack)

5 units, Win (Halliburton)

303. 18th-Century Narratives of Gender and Empire—Analyzes connections between gender distinctions in England and the emergent empire in the 18th century, focusing on which representations prevailed, what conclusions may be drawn about sexual and racial difference, and how literary histories of the Enlightenment may be revised to take these matters into account. Theoretical readings enable a reconsideration of the concept of “Enlightenment” as the apparent ground of postmodernism and some versions of feminism. Texts: Defoe’s Roxana, Richardson’s Pamela, Fielding’s Amelia, Cleland’s Memoirs of a Woman of Quality, Haywood’s Betsy Thoughtless, Johnson’s Rasselas, Boswell’s London Journal, narratives by Equiano and Sancho, Scott’s Millenium Hall, and Wollstonecraft’s Maria.
5 units, Win (Nussbaum)

306. Colloquium: Women’s Choices—Economic Theories and Literary Representations—(Same as Education 279X.) Economic and feminist analysis of literary representations of women’s choices under a variety of historical conditions. Readings provide perspectives across life stages, race, class, cultures, and include choices relating to education, marriage, work, self-expression, and ethical conduct.
5 units, Spr (Middlebrook, Strober)

306A. Colloquium: Modern American Texts—1900-1940—Intensive study of the issues of modernism in early 20th-century U.S. literature and culture. Focuses on relationship of these issues (especially subjectivity and textual experimentation) to the Americanization movement in education and the social sciences during this period with a comparison of social scientific and “literary” works. Possible authors: DuBois, William James, Dewey, Boas, Stein, Hemingway, Horace Kallen, Cahan, Yezierska, H. D., Barnes, James Weldon Johnson, Larsen, Hurston, Margaret Mead, Emma Goldman, and Faulkner.
5 units, Spr (Wald)

306B. Colloquium: Theorizing the Body—Investigates the tension between the physical immediacy of the body and its symbolic construction (and reconstruction) in current literary, cybernetic, and feminist theories. Readings: Donna Haraway’s Primate Visions, Gallagher and Laqueur’s The Making of the Modern Body, and Foucault’s The Birth of the Clinic. Individual or team projects.
5 units, Win (Hayles)

306C. Habermas—(Same as Comparative Literature 265, German Studies 265.) Survey of the work of Jürgen Habermas. Issues: his account of the public sphere, consensus theory, the transformation of Marxist and Frankfurt-School paradigms, communicative action, the discussion of modernity and post-modernity, and political interventions on topics such as the Historikerstreit and German unification.
5 units, Spr (Berman)

5 units, Win (Eisch)


5 units, Win (Porter)

309F. Ethnopoetics—(Same as Chicano Studies 362.) Ethnopoetics is an approach to literature that considers material culture as part of the foreground of text. Sometimes perceived as an intersection of poetry and anthropology, ethnopoetics comprehends culture as extending to the myth and ritual of tribal societies. Uncovers the fundamental expression of ethnicity and “Otherness” in Antigone, Durrenmatt’s The Visit, Miller’s The Crucible, Valdez’s The Shrunken Head of Pancho Villa, Malamud’s The Natural, Morrison’s Song of Solomon, Castillo’s Sotogonia, Mendez’s Peregrinos de Aztlán, and Silko’s Ceremony.

5 units, Aut (Berman)

309H. Realism and the Novel—(Same as Comparative Literature 377, German Studies 377.) Examination of the realistic novel in distinct national and historical contexts. Emphasis on the transformation of the generic and ideological components of realism from the mid-19th century through the encounters with naturalism, socialism, and post-colonialism. Issues: subjectivity, commodity structures, and nationhood. Texts by Keller, C. Brontë, Fontane, Wharton, Seghers, Solzhentysyn, Gordiner, and Márquez.

5 units, Aut (Candelaria)

309J. Colloquium: Chicano Cultural Studies, Gender, and Ethnicity—The Relevance of Theory—(Same as Comparative Literature 309J, Spanish 386.) Echoing Richard Johnson’s essay of 1987, asks “What is cultural studies anyway?” and traces historical development of the project from Antonio Gramsci and Raymond Williams to Stuart Hall. How questions of gender, race, and ethnicity addressed implicitly by Gramsci, Williams, Hall, Jameson, and others, are made explicit by various contemporary Chicana/o writers (Paredes, J. Saldivar, Calderon, Moraga, Anzaldua, and Alarcon).

5 units, Win (Saldivar)

315A. Seminar: Marlowe and Elizabethan Culture.

5 units, Aut (Riggs)

318. Seminar: 18th-Century Women Writers—English women novelists, poets, critics, and playwrights, emphasizing recent feminist scholarship on 18th-century women’s writing and changing historical conceptions of that literary marketplace.

5 units, Spr (Castle)

351A. Seminar: The Bible and Literature—The Bible as interpretive background for other texts, from the Middle Ages and Renaissance to modern instances.

5 units, Aut (Parker)

355. Seminar: Shelley and His Circle—Poststructuralist Approaches to Romanticism—Close study of Shelley’s work within the context of those who influenced him or were closely associated with him: Godwin, Wollstonecraft, Mary Shelley, Peacock, Byron, and Keats.

5 units, Aut (B. Gelpi)

360C. Seminar: Neoclassicism, Aestheticism, and Modern Criticism—Emphasizes the degree to which the Neoplatonic reconstruction of classical literary and aesthetic theory has provided the intellectual foundations for the development of criticism since the Renaissance.

5 units, Spr (Trippi)

361. The Modern Tradition: Criticism and Colonialism—(Same as Comparative Literature 309, Modern Thought and Literature 361, 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, Aut (Pratt)

366. Seminar: American Enlightenment—The writings of major figures of the American Enlightenment (Franklin, Adams, Jefferson, Madison, and Paine), emphasizing European contemporaries, American antecedents, and a variety of cultural contexts.

5 units, Spr (Fliegelman)

369. Deconstruction Contextualized—(Same as Comparative Literature 369, French 289D/389D, German Studies 345.) The reconstruction and philosophical understanding of the intellectual situations in which “Deconstruction” developed and which conditioned its reception and institutionalization since the 1960s. Analysis of Jacques Derrida’s early writings, his critique of Husserl, Kant, and Lévi-Strauss, and the intellectual and cultural atmosphere by which his readings were informed (comparison with work of Michel Foucault, Roland Barthes, etc.) The circumstances which, since the 1970s made this philosophical position appealing for literary critics, the different context of its reception (especially N. America), and the transformations which its success imposed on Deconstruction. (Contex-
ualizing Deconstruction does not mean refuting Deconstruction.)

3-5 units, Aut (Gumbrecht)

371. Seminar: Chaucer— _Canterbury Tales_ in its social, political, and critical contexts; emphasis on the place of Chaucer’s work in the environments of humanist poetics and courtly performance, and to the concepts of literature in society generated out of those environments. The early transmission and reception of _Canterbury Tales_, and the problems posed for modern critics and theorists by the manuscript status of the work.

5 units, Aut (Lerer)

373A,B. Seminar: Shakespeare and the Idea of Theater—(Same as Drama 359A,B.) Two-quarter graduate seminar. Part I: a set of approaches to Shakespeare (textual, historical, cultural, political, theoretical), including training in scholarly methods and investigatory practice. What sort of phenomenon theater was in Shakespeare’s time, what ends it was designed to serve, what the functions of its mimesis was, what social and political reality it had, what it was as an institution and as a concept. Playhouses, theories of drama, attacks on and defenses of the stage, and the texts of Shakespearean plays. Students design an original project for investigation that might become a dissertation subject. Part II is built around these projects, eventuating in the writing of a scholarly paper of publishable quality. Students taking only Part I must produce an appropriate amount of written work. Students who have a relevant project to pursue may, with consent of instructor, enroll for only the second term.

5 units, Win, Spr (Orgel)

375A. Seminar: Studies in the Renaissance—(Same as Comparative Literature 375A.) Texts by Erasmus, Montaigne, Shakespeare, and others, emphasizing questions of language, gender, and discourse.

5 units, Aut (Parker)

376. Seminar: Milton.

5 units, Win (Evans)

383. Seminar: Foucault and Contemporary Critique—(Same as Comparative Literature 383.) The work and legacy of Michel Foucault in relation to developments in contemporary literary theory and cultural critique.

5 units, Spr (Parker)

384B. Seminar: The Brontës—Fiction, Family, and Feminism.

5 units, Spr (Polhemus)

384C. Seminar: The 19th-Century Novel: Censorship, Offensiveness, and Creativity—The controls imposed on the novel by reviewers, publishers, and libraries, and the fictional strategies and public positions later Victorian writers adopted to placate, evade, or defy them. Topics: Realism and Naturalism as problem styles; taboos on sexuality and religious orthodoxy; the horror of “hooligan” language; the dynamics of self-censorship; and how to make a bestseller of a book that might have been banned. Authors: George Meredith, George Moore, Oscar Wilde, Thomas Hardy, Mrs. Humphry Ward, Rudyard Kipling, Marie Corelli, George Du Maurier, Robert Louis Stevenson, and others.

5 units, Win (Marsh)

385A. Seminar: Joyce’s _Ulysses_.

5 units, Aut (Sorrentino)

385B. Seminar: Theory and Practice of the Avant-Garde—Avant-garde movements of the early 20th century (Futurism, Cubism, Dada) in verbal and visual works. Futurism is studied via the Italian manifestos (Marinetti, etc.), paintings (Boccioni, Balla, Carra, Severini) and proto-Futurist poetry of Apollinaire and Cendrars (in bilingual texts); Cubism in Gertrude Stein and William Carlos Williams, in relation to Picasso, Braque, etc., and Dada in the work of Duchamp, Schwitters, Tzara, etc., (both verbal and visual). Examines and revises existing theories of the avant-garde. Recommended: reading knowledge of French, Italian, or German.

5 units, Win (Perloff)

385C. Seminar: The Politics of Modernism—Woolf, Joyce, Eliot, Yeats—Modernism’s relation to the shifting political debates in the early 20th century over socialism, nationalism, and feminism. Focuses on similarity between right- and left-wing political theories, explaining why extreme conservatives (Eliot, Yeats) and radical socialists (Joyce, Woolf) developed similar “experimental” literary forms.

5 units, Spr (Trainer)

389A. Seminar: Toni Morrison.

5 units, Spr (Drake)

390. Graduate Fiction Workshop—Primarily for graduate students in the Writing program. May be repeated for credit. Prerequisite: consent of instructor.

3-5 units, Aut (Packer)

Win (L’Heureux)

Spr (Sorrentino)

391. Advanced Work in Writing and Criticism.

any quarter, by arrangement

392. Graduate Poetry Workshop—Primarily for graduate students enrolled in the Writing program. May be repeated for credit. Prerequisite: consent of instructor.

3-5 units, Aut (DiPiero)

Win (Fields)

Spr (Staff)
394. Independent Study—Preparation for qualifying examination and for the Ph.D. oral examination. Satisfactory/No Credit only.

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. Satisfactory/No Credit only.

396. Introduction to Graduate Study—Required for first-year graduate students in English, Modern Thought and Literature, and Comparative Literature teaching in the Freshman English program. Experience leading a section, evaluating essays and examinations, and a broad introduction to the opportunities and responsibilities of graduate study. Meets weekly. Assigned brief readings and a short final paper. Satisfactory/No Credit only.

2 units, Aut (Halliburton, Watters)

397A. Rhetoric and Teaching Composition—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, may be given responsibility for conducting a class, grading papers, holding conferences. Class meetings are devoted to discussing rhetoric, 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. Satisfactory/No Credit only.

5 units, Aut (Watters)

397B. Teachers Workshop I—Seminar for second-year students teaching composition. (Second-year students are advised to take only one literature course during their first quarter of teaching.) Strong pragmatic emphasis: discussion of writing assignments, evaluation of essays, coordination of reading and writing, conduct of conferences. Occasionally, experienced teachers of composition are invited to discuss particular problems in teaching. No written work required.

5 units, Win (Watters)

397C. Teachers Workshop II—Seminar for second-year students teaching the second quarter of composition, focusing on the syllabus. Students share assignments, problems, and solutions they have encountered in their teaching.

5 units, Spr (Watters)

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

399. Thesis.

any quarter, by arrangement

REGULARLY OFFERED BUT NOT DURING 1991-92

5. Introduction to Literature.

64A. Literature of the Holocaust.

101. Linguistics and Literature.

104. Language and Literary Theory.

120. American Historical Novel.

122. American Literature, 1855-1917.

123. American Literature, 1917 to the Present.


158A. Plath, Sexton, Rich.

161. Afro-American Literature.


161F. The Harlem Renaissance.

164A. Literature of the Holocaust.

174. Swift.

201. Old Saxon.

239. American Short Fiction.

290A. Reading and Writing the Novella.

314E. Seminar: Historical Interpretation of Renaissance Drama—Theory and Practice.

316A. Seminar: Studies in Romanticism.

320. Seminar: The 1890s—American Literature and Culture.

320B. Seminar: American Renaissance.


357. Seminar: Recent American Poets.


364B. Seminar: The Bloomsbury Group.

365. Topics in American Literature.

365A. Seminar: The American Historical Romance.


367. Seminar: Theology and the Reading of Medieval Literature.

368. Seminar: Childhood and Sexuality.

374. Seminar: Ben Jonson.

376. Seminar: Swift and Johnson.

384. Seminar: Jane Austen.

385A. Seminar: Ezra Pound and the Pound Tradition.

385B. Seminar: Melville.

385C. Seminar: Wallace Stevens, Poetry and Influence.

PROGRAM IN ETHICS IN SOCIETY

Director: Kenneth Arrow
Faculty Committee: Kenneth Arrow, Chair (Economics); Barton Bernstein (History), David Brady (Graduate School of Business), Michael Bratman (Philosophy), Philip Clark (Philosophy), Rachel Cohon (Philosophy), Partha Dasgupta (Economics and Philosophy, on leave), John Dupre (Philosophy), John Ferejohn (Political Science), Thomas Grey (School of Law), Timothy P. Jackson (Religious Studies), David Kennedy (History), Susan Okin (Political Science), Debra Satz (Philosophy), David K. Stevenson (School of Medicine), Terry Winograd (Computer Science), Ernie Young (Center for Biomedical Ethics)

Visiting Assistant Professor in Ethics in Society, and Philosophy: Philip Clark

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 international relations, poverty and public policy, law, medicine, business, and technological regulation.

Students interested in pursuing studies in these areas should consult with the director or Professor 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. Approved course work satisfying the requirements must be taken in addition to course work for the major.

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 Political Science 51D, Public Policy 103A), or Philosophy 171. This is normally taken in the sophomore year.
   (c) Ethics in Society 77, Development and Population Interactions in the Third World (enroll in Economics 119, Food Research 121). This course is aimed primarily at the junior year, and is taken upon admission to the honors program.

2. One four- or five-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, and in addition to those offered by members of the Program Committee, are offered by other departments. Students may also take a course with the honors thesis in mind. In view of requirement (1), this elective must be outside the Department of Philosophy. Students are not restricted to choosing from the sample of such courses included below.

3. Ethics in Society 190, Honors Seminar (same as Philosophy 178).

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 graduate program centers on a seminar on applied ethics (Philosophy 278). Students present talks on normative themes of their own choosing, providing an opportunity for graduate students from different disciplines to interact in the process of deliberating over ethical matters of common interest.
COURSES
UNDERGRADUATE

For course information not listed, please refer to the relevant department listings elsewhere in this bulletin.


5 units, Win (Clark) MWF 11 plus section

30. Introduction to Political Philosophy—(Enroll in Philosophy 30, Political Science 51D, Public Policy 103A.) The concepts of equality, justice, tolerance, liberty, utility, and rights through some major works in political philosophy. Each presents a distinct and systematic conception of human nature and social and economic conditions of a just association which expresses that nature. Readings: Hobbes, Locke, Mill, Marx, Rawls, and Nozick. DR:8(3)

5 units, Aut (Satz) MWF 11 plus section

77. Development and Population Interactions in the Third World—(Enroll in Economics 119, Food Research 121.) 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. Interactions and causal effects between economic development and population growth.

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

85. Historical and Ethical Issues in Population Studies—(Same as History 104.) Populations are composed of majorities and minorities who compete for power, resources and relative welfare. Intrinsic is the power to determine basic values (what is morally right and wrong for groups and individuals) and what “the government” should or should not do about regulating human reproduction, health, death, and migration. Issues: sexuality, contraception, abortion, the control of epidemic diseases, the regulation of private consumption (alcohol, smoking, and drugs), the right to die, and freedom to enter or leave a national population. Interdisciplinary, introducing moral history and ethical dimensions of making decisions about moral issues, focusing on how history and ethics combine to influence past and present demographic policies. Moral negotiation is practiced through discussion, and spoken and written argument in ethical discourse.

4-5 units, Aut (Johansson) MTW 100

100. Computers, Ethics, and Social Responsibility—(Enroll in Symbolic Systems 100, Computer Science 201, VTSS 215.)

105. Introduction to African and Afro-American Studies—(Enroll in African and Afro-American Studies 105, Anthropology 105.) DR:3(*)


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.) DR:8f(3)

156. Economics of Health and Medical Care—(Enroll in Economics 156, Health Research and Policy 256.)

162. Ethics, “Abominations,” and “Liberations”—(Enroll in Religious Studies 162.)

164. Race and Ethnicity in American Experience—(Enroll in History 164, American Studies 164.) DR:3

170. Reason and the Good in Ethical Theory—(Enroll in Philosophy 170.)

171. Political Philosophy—(Enroll in Philosophy 171.)

183. The Politics of Welfare Policy—(Enroll in Political Science 183D.)

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 made available to class members a week prior to the presentation. Group discussion follows.

3 units, Win (Clark, Okin) T 1:15-3:05

200A,B. Honors Thesis—Limited to Ethics in Society honors students.

8-10 units, any quarter (Staff) by arrangement
203A. Introduction to Political Data Analysis—
(Enroll in Political Science 203A.)

203B. Statistical Modeling for Political
Science—(Enroll in Political Science 203B.)

210. Ethics and Technology—(Enroll in VTSS
210.)

266. Medical and Legal Ethics—(Enroll in Re-
ligious Studies 266.)

268. Seminar: Contemporary Theories of Jus-
tice—(Enroll in Political Science 268.)

286. Limits of Economic Rationality I: The Na-
ture of the Social Bond—(Enroll in French
286A, Economics 100B, Political Science 259A.)

274. Morality and Reasons for Action—(Enroll
in Philosophy 274.)

278. Graduate Seminar in Applied Ethics—
(Enroll in Philosophy 278.) Interdisciplinary.
Students and faculty present issues of public and
personal morality, topic chosen with the advice
of the instructors. Student-prepared reading list
is made available to class members a week prior
to their presentation. Group discussion follows.
3 units, Win (Moravcsik, Satz) Th 3:15-5:05

285. The Distribution of Income and Wealth—
(Enroll in Economics 285; same as 185.)

370. Gender, Law, and Public Policy—(Enroll
in Political Science 370.)

PROGRAM IN FEMINIST STUDIES

Chair: Jane Collier
Program Committee: Diana Akiyama, Gordana
Crnkovic, Joanna Davidson, Howard Eilberg-
Schwartz, Elisabeth Hansot, Kathryn Kerns,
Sherri Matteo, Susan Nolen-Hoeksama,
Debra Satz, Carolyn Schwarz, Kirsten Sword,
Kimberly Yang

Resource Faculty and Staff: Anne Arvin (Medi-
cine), Barbara Babcock (Law), Joel Beinin
(History), Joseph Berger (Sociology), Russell
Berman (German Studies), Helen Blau (Phar-
macology), Judith Brown (History), Albert Ca-
marillo (History), Laura Carstensen
(Psychology), Terry Castle (English), Brigitte
Cazelles (French and Italian), Michelle Cliff
(Feminist Studies), Elizabeth Cohen (Educa-
tion and Sociology), Jane Collier (Anthropol-
ogy), Carol Conell (Sociology), Wanda Corn
(Art), Carl Degler (History), Carol Delaney
(Anthropology), Carl Djerassi (Chemistry),
Sanford Dornbusch (Sociology), Sandra Drake
(English), John Dupre (Philosophy), Howard
Eilberg-Schwartz (Religious Studies), John
Felstiner (English), Estelle Freedman (His-
tory), Regenia Gagnier (English), Hester Gel-
ber (Religious Studies), Barbara Gelpi
(English), Akhil Gupta (Anthropology), Elisa-
beth Hansot (Political Science), Jerald Herting
(Sociology), Margo Horn (Innovative Academ-
ic Courses), Odile Hullot-Kentor (French
and Italian), Kathryn Kerns (Meyer Library),
Susan Krieger (Feminist Studies), Nancy Koll-
mann (History), Anneliese Korner (Psychiatry,
Emerita), Herbert Leiderman (Psychiatry), Su-
zanne Lewis (Art), Iris Litt (Adolescent Medi-
cine), Carolyn Lougee (History), Eleanor
Maccoby (Psychology, Emerita), Joanne Mar-
tin (Business), Sherri Matteo (Institute for Re-
search on Women and Gender), Diane
Middlebrook (English), Pauline Newman-
Gordon (French and Italian), Nel Noddings
(Education), Susan Okin (Political Science),
Mary Pratt (Spanish and Portuguese), Deborah
Rhode (Law), Adrienne Rich (English and
Feminist Studies), Cecelia Ridgeway (Sociol-
yogy), David Rosenhan (Law), Mary Lou
Roberts (History), Janice Ross (Dance Divi-
sion), Anna Deavere Smith (Drama), Susan
Stephens (Classics), Janice Stockard (Anthrop-
pology), Kathryn Strachota (German Studies),
Myra Strober (Education), Joan Talbert (Edu-
cation), Susan Treggiari (Classics), Elizabeth
Traugott (English and Linguistics), David
Tyack (History and Education), Mary Wack
(English), Michael Wald (Law), Priscilla
Wald (English), Sylvia Wynter (Spanish and Portu-
guese, and African and Afro-American Stud-
ies), Sylvia Yanagisako (Anthropology)

Feminist Studies is an interdisciplinary under-
graduate program that investigates the signifi-
cance of gender in all areas of human life. The
program 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 utilize feminist
perspectives to expand and reevaluate the as-
sumptions 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 femi-
nism throughout the University and facilitates the
undergraduate major in Feminist Studies. In ad-
dition, it seeks to encourage feminist analysis and
teaching at Stanford, both in courses instituted
within the program and those housed within departments. The program also provides information and advice for graduate work in Feminist Studies.

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: senior division for entries submitted by currently enrolled juniors or seniors and junior division for freshmen and sophomores. Essays should reach the Feminist Studies office by April 12; essays 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 must 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.

**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, one of whom must be the chair of the program. 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 at 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 preliminary 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 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:
101. Introduction to Feminist Studies: Issues and Methods

102A. Contemporary Issues in Feminist Theory, or
102B. Feminism and Political Theory, or
102C. Contemporary Issues in Feminist Thought

103A. Seminar in Feminist Studies, or
103B. Feminist Methodology in the Social Sciences.

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 final draft is due by the end of February and the second by mid-April. The final draft must be submitted four weeks before the end of exam week. Students may receive up to 10 units of credit for preparation of the honors thesis, but these units do not count toward requirement (1).

Honors Certification is recommended for students who have achieved an LGI of “B+” or better in their required course work in Feminist Studies and who have submitted a thesis judged to be of superior academic quality by the subcommittee of the Feminist Studies committee charged with making such decisions.

CURRICULUM

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 cross-cultural perspective.

Required Courses—
Introduction to Feminist Studies: Issues and Methods (Feminist Studies 101.)
Contemporary Issues in Feminist Theory, Feminism and Political Theory
or Contemporary Issues in Feminist Thought (Feminist Studies 102A, 102B or 102C.)
Seminar in Feminist Studies, or Feminist Methodology in the Social Sciences (Feminist Studies 103A or 103B.)

Courses that fulfill the social science requirement in the Feminist Studies major are numbered from 120-149.
Courses that fulfill the humanities requirement in the Feminist Studies major are numbered from 150-189.
Courses that offer a cross-cultural perspective include Feminist Studies 120, 140, 142.

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:

Sex and Gender
Women in Language and Symbol
Race, Class, and Sex
Women and Work
Feminist Perspectives on Science, Health, and the Environment
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, organizing and teaching a course, or other supervised research. This requirement may be fulfilled by designing a public service internship, an Innovative Academic course, an Undergraduate Specials course, 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

Approved courses 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 the bulletin is printed, but updated listings are available at the Feminist Studies office. Courses with Feminist Studies numbers have been offered by the program a number of times. Courses marked (*) satisfy the requirement of a cross-cultural perspective on women's issues.

INTRODUCTORY

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 multi-cultural perspectives on feminism; women's work, health, and sexuality; creativity, spirituality, and movements for social change. DR:9f(5)

5 units, Win (Freedman) MWF 1:15-3:05

102A. Presentations of American Women—(Same as English 123A.) Interdisciplinary textual readings with theoretical discussions. Surveys representations of women in the late 19th- and early 20th-century U.S. Interrogates the relationships between representations of women and modern U.S. nationalism and between political and aesthetic representation of the period.

5 units, Spr (Wald)

102B/202B. Feminism and Philosophy—Feminist approaches to two central areas: political philosophy and philosophy of science. Feminist critiques of the main Western political traditions (Liberalism, Marxism, and Socialism); Radical Feminism: specific issues such as affirmative action, abortion, and pornography. Feminist responses to specific areas of science, especially those concerned with sexual difference; critical consideration of general assumptions about scientific objectivity. Undergraduate prerequisite: 101, or consent of instructor. DR:8f(3)

5 units, Dupré (not given 1991-92)

102C/202C. Contemporary Issues in Feminist Thought—(Same as Political Science 163.) Undergraduate seminar on 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:8f(3)

5 units, Hansot (TTh 1:15-3:05)

118. Survey of 18th-Century Literature—(Enroll in English 115.)

5 units, Spr (Castle)

122. U.S. Women's History 1820-1980—(Same as History 173B.) The transformation of Victorian womanhood in the late 19th century, including the workforce participation of immigrant and black women and the educational and professional opportunities for middle-class white women, the impact of wars and depression on 20th-century women's lives, and the rebirth of feminism. DR:9f(5)

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

123. Gender and Society—(Enroll in Sociology 138.) 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 (Szelemy) given 1992-93

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:9f(4)

3 units, Aut (Carstensen) TTh 10-11:30

130. Gender and Education—(Same as Education 170, Sociology 112.) 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, Aut (E. Cohen, Strober) MW 1:15-3:05

134. The Sociology of Gender—(Same as Sociology 104.) 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, Spr (Ridgeway) TTh 9:30-10:45

135/235. Women and Organizations—(Same as Sociology 167.) 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

139A. Education and the Status of Women: A Comparative Perspective—(Same as Education 197, Sociology 117.) Theories and perspectives from the social sciences relevant to an understanding of the role of education in changing, modifying, or reproducing structures of gender differentiation and hierarchy. Cross-national research on the status of women and its uses to evaluate knowledge claims from varying perspectives.

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

140. Sex Roles and Society—(Same as Anthropology 11.) The diversity of women’s and men’s roles, experiences, and self-conceptions in a number of human societies. A critical perspective on contemporary views of the “nature” of women and men, and how women and men are shaped by particular forms of social life. DR:9f(5*)

3-5 units (Delaney) given 1992-93

142. Women in Cities: A Cross-Cultural Perspective—(Same as Anthropology 145.) Women’s experiences in cities throughout the world and the determinants of their similarities and differences. Topics: women and migration, changing forms of the sexual division of labor, changing family and kinship structures, prostitution, and political activism. DR:9f(5)

5 units, Spr (Klimt)

142A. The Family—(Enroll in Sociology 142.) 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, Win (Herting) TTh 2:15-3:45

143. Status, Friendship, and Social Pressure: An Experiential Approach—(Enroll in 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 (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 2-hour section M or T 2:15-4:05

147A. Identities—(Same as Anthropology 10.) Seminar examines processes shaping people’s self-conceptions and conceptions of others, focusing on the role of class, race, and gender in shaping ethnic identities. What are Western concepts of “self” and how have these concepts been appropriated or transformed by individuals and groups asserting oppositional identities? Readings in texts on social theory and literature, popular culture and official documents, e.g., immigration policies or high school history textbooks.

5 units (J. Collier) given 1992-93

155. Women in the Ancient World—(Enroll in Religious Studies 112.) Biblical characters (Sarah, Hagar, Naomi and Ruth, Deborah, and Esther); postbiblical texts (Judith, Joseph and Asenath, Paul and Thecla, and Susanna). Attitudes toward women and women’s religious activities and beliefs in the Greco-Roman world. Feminist analysis of attitudes toward women in biblical traditions and scholarly reconsiderations of images of women in antiquity.

5 units, Aut (Bach) MW 11-12:15

164. Poetry and Poetics—(Same as English 50G/150G.) Introduction to poetic techniques and genres (narrative, lyric, elegy, satire), emphasizing texts in which representations of gender difference play a significant role. Ovid’s Metamorphoses, Renaissance love lyrics, satiric verse from Alexander Pope to Queen Latifah, and contemporary American poetry that engages in dialogue with conventional notions of masculinity and femininity. DR:7f(2)

3 or 5 units, Spr (Middlebrook) MTWTh 9

165. Study of Chicanas—(Same as Chicano Studies 161, English 162A, Spanish 286.) Develops and applies an integrative ethnocultural and feminist approach to study of Mexican American women. Chicana identity from a variety of perspectives; controversies surrounding culture, gender, class, and race for insight into problems and possibilities of a Chicana-identified ideology.

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

165A. An Alternative Discourse of “Difference”: The Writings of Chicanas and African American Women—(Same as Chicano Studies 105.) Comparative examination of texts from a perspective of difference as a term of critical analysis rather than description. Emphasis is on placing writings in historical and social contexts, including the ways in which they respond to the Chicano Power and Black Power Movements of the late 1960s and early 70s and their exclusion-
ary gender practices. What textual strategies do these women employ to give voice to the concerns of U.S. women of color, and how and to what extent do the concerns of Chicanas and African American women overlap? Ways in which these writings formulate resistance and cultural critique. Additional readings in feminist theory and cultural studies.

3 units, Spr (Salazar)

168. Introduction to Feminist Theology—(Same as Religious Studies 130.) Introduces basic assumptions, approaches, paradigms and critiques which feminist thinkers brought to bear on traditional Christian theology. Readings on feminist theologians who have 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.

5 units, Win (Akiyama)

170. Introductory Seminar: Men’s Voices, Women’s Voices: Sex and Revolution in 18th-Century France—(Enroll in History 30S.) Relationship between gender and the Enlightenment and French Revolution. How did Enlightenment thinkers write about gender? What roles did gender play in the social and cultural milieu of the philosophies? The ways in which Enlightenment conceptions of gender were enacted and transformed by the French Revolution. Was the French Revolution inherently gendered?

5 units, Spr (Staff) W 1:15-3:05

173. Women and Feminism in Eastern Europe—Interdisciplinary approach through literary works by E. European women authors, films, sociology and political science studies, theoretical socialist texts thematizing gender issues, and contemporary “Western” and “Third World” feminist theory. Questions of social relationships between Western and East European feminism. Prerequisite: 101 or equivalent.

5 units, Win (Crnkovic’) MW 3:05


5 units, Win (Eilberg-Schwartz)

175A. Women in Jewish Modernity—(Enroll in History 136.) 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.

5 units, Spr (Magnus) MTWTh 10

176. American Drama 1960 to the Present—(Enroll in Drama 155.) Contemporary American drama from a multicultural perspective. The key dramas by women, men, Asian Americans, Latino Americans and African Americans read and discussed. The social, economic, and political developments of this period that shaped the drama and were influenced by it. Theories on dramatic practice, feminist criticism, and African American aesthetics illuminate complex dimensions of contemporary American drama and look for commonalities in cultural or gender lines. Research paper on subject determined in consultation with the instructor. DR:3 or 7(2)

4 units, Win (Elam) MWF 11

ADVANCED

Open to non-majors with the proper prerequisites. Feminist Studies majors have preference when enrollment must be restricted.

103A/203A. Seminar: International Feminisms: Theory and Practice—Situates contemporary feminist issues and debates in an international frame, emphasizing postcolonial context (Asia, Africa, the Americas). Intersections between gender, race, ethnicity, nationality and class, referencing the international division of labor, migration and transculturation, revolutionary social movements, and cultural production. Theoretical writings, fiction, and film. Discussion-based seminar; enrollment limited (preference given to Feminist Studies majors). Prerequisites: 101 and consent of instructor.

5 units, Aut (Chang) MW 1:15-3:05

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. Emphasizes interactive processes and the personal involvement of an observer. Readings from feminist scholarship and feminist methods texts. Enrollment limited to 15 (preference given to Feminist Studies majors). Consent of instructor required.

5 units, Spr (Krieger) T 3:15-6:05

127. Women and Moral Theory—(Same as Education 276.) Ethical problems in education. After reading and discussing background material in ethics and feminism, concentrates on ethical problems in education of interest to feminists. Emphasis on the ethics of caring.

4 units (Noddings) not given 1991-92
136. Utopian Political Thought—(Enroll in Political Science 153.) 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. DR:8f(3)

5 units, Spr (Hansot) TTh 2:15-4:05

137. Female Saints—(Enroll in French 138.) 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 translation. (In English) DR:8(3)

4 units, Win (Cazelles)

138. Feminist Political Theory: Gender, Power, and Justice—(Enroll in Political Science 154.) Emphasis on recent feminist theories. How feminist perspective complicates and enhances political thought. Types of contemporary feminist thought and the effects of men's and women's different perspectives on moral, social, and political issues. DR:8f(3)

5 units, Win (Okin)

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.

6 units (Djerassi) not given 1991-92

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, rheumatoid arthritis, and women and the health care system. Psychological and physiological aspects of women's sexuality. DR:9f(4)

4 units, Spr (Matteo)

147. Creation/Procreation: A Comparative Study—(Same as Anthropology 154, 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 is on the ways these beliefs are embedded in practices and structures of social life and on Western categories and meanings, and their implications for theorizing. DR:8f(3)

5 units (Delaney) not given 1991-92

147B. Women in Human Origins Research—(Same as Anthropology 183.) Seminar on the role of women as agents of evolutionary change and as researchers in the field of paleoanthropology. Women in studies of fossils, the interpretation of early hominin social behaviors, and the earliest evidence of sexual division of labor in humans.

5 units, Win (Hager)

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, Win (Delaney)

151. Women in Judaism—(Same as Religious Studies 128.) DR:8|(3)

5 units, Win (Eilberg-Schwartz)

160A. Dance History and Philosophy—(Enroll in Dance 160A, Drama 127A.) Historical lecture survey on the lives and works of key figures in Western theatrical dance from the Renaissance to the present, through films and discussions. Topics: public attitudes and perceptions and the Romantic ideal; the changing image of male dancers; the birth of abstraction in dance; and the pioneering matriarchs (Isadora Duncan, Martha Graham, Doris Humphrey, and Mary Wigman.)

DR:7f(2)

3-4 units, Win (Ross)


3-4 units, Spr (Ross)

161C. 20th-Century Afro-American Fiction—(Enroll in English 161C, African and Afro-American Studies 161C.) DR:3 or 7(2)

5 units, Spr (Porter)

161H. Narration, Detection, and Social Marginality—(Enroll in English 161H.)

5 units, Spr (Drake) MTWTh 1:15

169. Colloquium: Literature and Sexuality: The Latin American Case—(Enroll in Spanish 170.)

3-5 units, Win (Lopes)

185B. Seminar: Gender and Intersubjectivity—The Brownings and the Rossettis—(Enroll in English 185B.)

5 units, Win (Gelpi) TTh 1:15-3:05
186. Undergraduate Topical Seminar on the Psychology of Gender—(Same as Psychology 198.) In-depth coverage of a specified topic related to psychology of women and gender. Prerequisite: Psychology 116.

3 units (Carstensen) given 1992-93

222. 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 (or 220) and Sociology 121, or consent of instructor.

5 units, Spr (Johnston) T 7-10 p.m.

230A. Women and Gender in Modern France—(Enroll in History 230A, French 189A.) Womens’ lives and the importance of gender issues in French politics and society from the late 18th to the early 20th century. Topics: role of women in revolutionary and utopian politics, work and domesticity in an industrializing society, and changing notions of sexuality and sexual difference. DR.9(5)

5 units, Spr (M. L. Roberts) Th 2:15-4:05

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, Hufty) F 12-1

239. Undergraduate Colloquium: Gender, Class, and Social Transformation in Modern Europe—(Enroll in History 239.) How gender and class shaped social transformations in Europe 1850 to 1945: industrialization, middle-class and working-class formation, social and political movements (socialist, religious, middle-class reform movements), WWI, the rise of Nazism in Germany, the emergence of the welfare state. Focusing on England, France, and Germany, analyzes and compares how class, gender, and sexuality shaped these processes and the extent to which definitions of masculinity and femininity were transformed by them.

5 units, Aut (Canning) Th 2:15-4:05

240. Marxisms, Feminisms, Postmodernisms—(Same as Anthropology 240.) Current debates in the social sciences and humanities between different strands of Marxism, feminism, and postmodernism. Focuses on Marxist and feminist appropriations and critiques of postmodernism by examining the literature on, and by, marginalized and repressed groups. Questions of identity, location, voice, exploitation, and political strategy. Enrollment limited to 20. Prerequisites: Anthropology 244 and 262 (or equivalent course in feminist theory), or consent of instructors.

5 units (Gupta, Yanagisako) given 1992-93

253. Religion—(Enroll in Anthropology 253.) Covers range of 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 relation between religion, power, and gender? Prerequisite: consent of instructor.

5 units, Aut (Delaney)


5 units, Win (Choksy) T 2:15-4:05

265A/365A. Undergraduate Colloquium: Sexuality in American History—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, Spr (Freedman) Th 2:15-4:05

266/366. Italian Women Writers—(Enroll in Italian 266/366.) The traditional canon of Italian literature is an almost exclusively male domain. Italian anthologies and literary histories rarely make reference to women writers, and bibliographies of critical works seldom acknowledge their existence. Concentrating on works of prose
fiction, gives a sense of the range and creative energy of women writers today, Authors: Banti, Bellonci, Cialenza, Ginzburg, Manzini, Morante, Romano. (In Italian)

4 units, Spr (Springer)

279. Women’s Choices: Economic Theories and Literary Representations—(Enroll in Education 279X.) Economic and feminist analysis of literary representations of women’s choices under a variety of historical conditions. Readings provide perspectives across life stages, race, class, and cultures, and include choices relating to education, marriage, work, self-expression, and ethical conduct. Text studies: J. E. Neal, Elizabeth I; Janet Lewis, The Wife of Martin Guerre; Jane Austin, Persuasion; Ann Lane, The Life of Charlotte Perkins Gilman; Colette, Cheri and The End of Cheri; Tillie Olsen, Silences; Toni Morrison, Beloved; readings in economic and feminist theory.

4-5 units, Spr (Strober, Middlebrook)
TTh 1:15-3:05

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. To be arranged in advance. 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. Maximum of 6 units. any quarter, by arrangement

195. Directed Reading.

FOOD RESEARCH INSTITUTE

Emeriti: (Professors) Roger W. Gray, Bruce F. Johnston, William O. Jones, Dudley Kirk
Director: Walter P. Falcon
Associate Director: Anne E. Peck

Associate Professor: Jeffrey C. Williams
Assistant Professors: Sandra O. Archibald, Marcel Fafchamps, Scott D. Rozelle

The Food Research Institute, a research and teaching unit in the School of Humanities and Sciences, was founded in 1921 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’s specialized library contains over 75,000 items, including an up-to-date series of periodicals from over 50 countries. It is open for reference use to students and other scholars.

Food Research Institute Studies, published three times a year, reflects the research interests of the institute.

THE INSTRUCTIONAL PROGRAM

Graduate teaching is an integral part of the program for both the A.M. and Ph.D degrees. The 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 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, Sociology, Political Science, and Human Biology.

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 coterminous degree for advanced undergraduate students in Economics, Political Science, Human Biology, 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 (LCI) 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 coterminous degree programs.

GRADUATE PROGRAMS
MASTER OF ARTS

The A.M. degree 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. All courses must carry a number of at least 100. 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. Normally, fields are chosen from Agricultural Development and Economic Growth, International Agricultural Policy, and Production, Consumption, and Market Analysis. A student wishing to offer a field 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.

To meet the foreign language requirement, a candidate must demonstrate a reading knowledge of one language other than English. The requirement may be satisfied in either of two ways: (1) by completion with a passing grade of an approved course for the language concerned, or (2) by passing a special reading examination, to be given by a qualified member of the Food Research Institute or of the relevant language department.

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 fields, plus Food Research 363, 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

103. The World Food Economy—(Same as 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. 5 units, Win (Falcon, Naylor) MW 9-10:50

105. Commodity Futures Markets and Prices—(Same as Economics 107; graduate students register for 205.) The uses and functioning of commodity futures markets, market performance issues, and analysis of the economic effects of futures markets. 5 units, Aut (Peck) TTh 9-10:50

106. The Political Economy of Commodity Markets—(Same as Economics 127; graduate students register for 206.) History, politics, and theoretical analyses of domestic and international markets for basic commodities. Topics: government regulation of private trading, public trading through buffer stocks and marketing boards, international commodity agreements, rationing and famine relief, and the changing views of the social value of private speculation. Examples from 18th century to present. 5 units, Spr (Williams) MW 9-10:50

121. Development and Population Interactions in the Third World—(Same as Economics 119.) 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 im-
applications in terms of alternative structures of development, the timing of the demographic transition, income distribution, employment, and migration. Interactions and causal effects between economic development and population growth.

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

129. Planning and Analysis of Development Projects—(Same as Economics 129; graduate students register for 229.) Techniques for designing, costing, appraising, and managing developing projects. Modules: project planning and scheduling using CPM and PERT 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 (Gotsch) given 1992-93

130. Application of Mathematical Programming to Agricultural Systems—(Same as Economics 132; graduate students register for 230.) Develops applied skills in linear, mixed integer, and non-linear programming using GAMS. Problem areas: multi-period and increasing returns investment decisions, risk and uncertainty, producer-consumer sector models, and CGE models. Comparisons with budgeting and simulation methods in analyzing agricultural development policies. Prerequisite: course in microeconomic theory.

3-5 units (Gotsch) given 1992-93


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

144. Economics of American Agriculture: Structure and Policy—(Same as Economics 144; graduate students register for 244.) American agriculture and its historical and contemporary role in the economy. Topics: the role of agriculture in American economic development, policy toward commercial agriculture, poverty problems in rural America, and the international dimensions of U.S. agriculture. Emphasis is on policy alternatives rather than on farm management.

4-5 units (Falcon) given 1992-93

145. Interaction of U.S. Agriculture with the Environment—(Same as Human Biology 153; graduate students register for 245.) Agriculture in the U.S. is shaped by biological and economic influences. Issues: plants and their genetic manipulation, soil and water conservation, pest control, agroecosystems, and food processing and preservation technologies. Focus: assessing long-run biological, environmental, and economic consequences of agricultural practices, their interactions, and the way in which policy affects these practices. Prerequisite: Economics 1.

4-5 units, Spr (Archibald) TTh 9:00-10:50

146. Economic Policies of the European Community—(Same as Economics 142; graduate students register for 246.) Analysis of the current economic policies of the European Community and the planned completion of the internal market by 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 (Josling) MW 1:15-3:05

148. Economic Development in China—(Same as Economics 121; graduate students register for 248.) Structure and development of the economy of the People’s Republic of China. Topics: 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, Win (Rozelle) TTh 1:15-3:05

149. Economic Development in Africa—(Same as Economics 125; graduate students register for 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.

5 units, Aut (Fafchamps) TTh 1:15-3:05

166. International Trade Policy—(Same as Economics 166; Ph.D. students register for 266.) Effects of selected government policies affecting international trade. Trade policy and economic welfare, exchange rate policy, government responses to competition from imports, issues underlying international negotiation of reductions of barriers to trade and special trade arrangements for developing countries. Prerequisite: Economics 165.

5 units, Spr (Pearson) MW 11:12-12:50

188. Colloquium on Population Studies—(Same as Human Biology 60, Biology 183; graduate stu
dents register for 288.) Series of talks by distinguished speakers introducing a variety of topics in population studies.

1 unit, Win (Feldman, Arthur) W 4:10-5:30

PRIMARILY FOR GRADUATE STUDENTS

205. Commodity Futures Markets and Prices—(See 105.)

206. The Political Economy of Commodity Markets—(See 106.)

218. Economic Development in Latin America—(Same as Economics 123.) Open to advanced undergraduate students with consent of instructor. Historical approach to the political economy of development. 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, Aut (Reynolds) MW 3:15-5:05

220. 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, and sectoral models. Prerequisites: microeconomics and econometrics.

5 units, Win (Peck, Williams) MW 11-12:50

221. Economics of Production—Production theory emphasizing agriculture. Topics: production, cost and profit functions; technological change; risk and uncertainty in models of production. Readings, complemented with problem sets, emphasize econometric estimation of production relationships. Prerequisites: Economics 202 and econometrics, or consent of instructor.

5 units, Win (Rozelle) TTh 1:15-3:05

224. Explorations in the New Development Economics—Expanded case for intervention in economic development based on the absence of a complete set of markets in developing countries and asymmetry of information. Implications for strategies of economic development, especially exchange rates, trade, and industrial policies. Prerequisite: graduate trade or development course, or consent of instructor.

5 units, Win (Yotopoulos) TTh 3:15-5:05

225. 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) TTh 11-12:50


5 units, (Arthur) given 1992-93

229. Analysis and Management of Development Projects—(See 129.)

230. Applications of Mathematical Programming to Agricultural Systems—(See 130.)

236. Population Perspectives in the Third World—(See 136.)

244. Economics of American Agriculture: Structure and Policy—(See 144.)

245. Interaction of U.S. Agriculture with the Environment—(See 145.)

246. Economic Policies of the European Community—(See 146.)

248. Economic Development in China—(See 148.)

249. Economic Development in Africa—(Same as 149.)

266. International Trade and Investment Policy—(See 166.)

267. International Agricultural Policy—Comparative study of agricultural policies and their interaction in world markets. Emphasis on policies in industrial and middle-income countries. Determinants of policies and choice of policy instruments. Consequences of these policies for world markets; international regulation of agricultural trade, trade aspects of food quality and environmental regulations, international negotiation on trade aspects of agricultural policies. Prerequisite: 144 or consent of instructor.

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

287. Economic Demography—(Same as Economics 249.) The effects of demographic changes on individual and collective economic welfare; and economic theories of demographic decision making. Topics: overlapping generations models; economic life cycle analysis; economic
implications of changes in fertility and mortality; demography of the labor market; stable population theory; and economic theories of fertility.

5 units (Arthur) given 1992-93

288. Colloquium on Population Studies—(See 188.)

363. Seminar: Policy Analysis for Applied Economists—Required field seminars for institute Ph.D students; open to others with consent of instructors.

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

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) Raymond D. Giraud, Alphonse Juilland, Roberto B. Sangiorgi, Leo Weinstein
Chair: Jean-Marie Apostolidès
Vice Chair: Jeffrey Schnapp (Italian Division)

French Division

Professors: Jean-Marie Apostolidès, Marc Bertrand, Brigitte Cazelles, Robert G. Cohn, Jean-Pierre Dupuy, René Girard, Hans Gumbrecht, Ralph M. Hester, Pauline Newman-Gordon, Michel Serres
Assistant Professors: Odile Hullot-Kentor, James Winchell (Paris, Autumn, Winter)
Professor (Teaching): John G. Barson
Senior Lecturers: Clio P. Dorr, Nelee Langmuir, Michelle Morran
Lecturer: Mary Jane Parrine (Curator, Romance Languages and Humanities)
Acting Assistant Professor: Celeste Kinginger (Language Program Coordinator)
Visiting Professor: Philippe Roger (Autumn)

Italian Division

Professors: John Freccero, Patricia Parker (English and Comparative Literature, and by courtesy, Italian)
Associate Professors: Jeffrey Schnapp (on leave 1991-92), Carolyn Springer
Assistant Professor: Robert Harrison (Undergraduate Adviser) (Florence, Spring)
Senior Lecturers: Maria Devine, Leda S. Mussio, Annamaria Napolitano (Language Program Coordinator), Leopoldina Viggiano
Visiting Professor: Karl Maurer (Spring), Paul Picone (Spring)

FRENCH DIVISION

OFFERINGS

The French Division offers a variety of programs in French language and linguistics, literature, cultural history, and theoretical studies, courses in which all interested students are welcome to enroll. Undergraduates may obtain the A.B. degree with emphasis on literature, language, or French studies. In addition to awarding the Ph.D. degree, the French Division also offers a Master of Arts program. 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 in either of the two options described below. (See Graduate Program, specialization.)

Offerings feature exceptionally strong possibilities for study abroad. Open to advanced French majors and graduate students, the Stanford Program in Paris offers the opportunity to study during the Autumn and Winter Quarters at the University of Paris. Students live with Parisian families or in residence halls and work under the supervision of a Stanford faculty member. Stanford and the French Division also enjoy contacts with the Institut d'Etudes Politiques, the Ecole Polytechnique, and other prestigious institutions. An annual exchange permits two doctoral candidates in French to study at the Ecoles Normales Superieures. Those interested in study abroad should contact the department during Autumn Quarter and may obtain applications and more information from the Overseas Studies office in Sweet Hall.

The division also offers a range of on-campus features to enhance its academic programs. 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.)
A curator for Romance Languages oversees the extensive collection in French at the Green library. The division also maintains the holdings of the Hoover Institute on War, Revolution, and Peace and includes a wealth of information on 20th-century France.

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. And finally, a distinguished group of visiting professors is a permanent part of the French Division.

UNDERGRADUATE PROGRAMS
BACHELOR OF ARTS
Candidates should normally have completed the series of first- and second-year courses through French 24 or its equivalent. Regular placement tests enable students who have begun the study of French elsewhere to be granted advanced standing.

In addition to the first years of language study, all French majors must complete 60 units of additional course work, distributed in accordance with the specialization they have selected. Only upper division courses may count toward the major. Individual work should normally be limited to 4 units. Modifications of the requirements may be granted upon the adviser's and the chair's recommendation.

Students majoring in French are encouraged to participate in the Stanford Program in Paris. Three specializations are available: French Literature, French Language, and French Studies.

SPECIALIZATION IN LITERATURE
This option emphasizes work in all periods of French literature from the Medieval to the Modern. Majors who choose this specialization must fulfill the following requirements (60 units):
1. Three advanced language courses: two selected from the courses numbered 123 to 125, and one selected from the courses numbered 200 to 204.
2. Three literature survey courses (numbered 130 to 132).
3. Five literature courses: one in the Middle Ages or the Renaissance (135 to 139; 213 to 229); one in the 17th century (150 to 159); one in the 18th century (160 to 169); one in the 19th century (170 to 179); and one in the 20th century (180 to 189).
4. The remaining units may be taken in literature, cultural history, and related fields. They should serve to strengthen an area of specialization and/or the writing of an honors essay.

Students choosing the literature option should note that most graduate programs in French require proficiency in at least one additional modern language.

SPECIALIZATION IN LANGUAGE
This option emphasizes work in French linguistics and semiotics. Majors who choose this specialization must fulfill the following requirements (60 units):
1. Three advanced language courses: 123, 124, and 125.
2. Three survey of literature courses: 130, 131, and 132.
3. Five language and cultural history courses distributed as follows: one in semiotics (202) or in translation (205); one in linguistics (201, 203 or 206); one in stylistics (200); one in cultural history (290 or 291); and the course in Methods of Teaching French (293).
4. The remaining units may be taken in literature, linguistics, and related fields.

SPECIALIZATION IN FRENCH STUDIES
The aim of this program is to enable students to pursue a broadly based major by combining the study of French language, culture, and literature with such fields as art, communication, drama, economics, history, linguistics, music, philosophy, and political science.

Majors who choose this specialization must fulfill two sets of requirements, 32 units of upper division French courses and 28 units of approved courses outside the division, as follows:
1. Two of the three literature survey courses (130, 131, or 132).
2. Two of the three cultural history courses (290, 291, or 294).
3. Four literature or culture courses: one among the courses numbered 150 to 189; and three among the courses numbered 280-289.
4. The 28 remaining course units taken outside the division must have a significant French component and constitute a coherent program of study. These courses should be approved by the major adviser.

HONORS PROGRAM
Majors in their junior year may apply to the honors program if they have already taken five upper division courses with a letter grade indicator (LGI) of "B+". The honors program student fulfills all regular requirements for the A.B. in French and writes 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 of essay work.

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 Literature, candidates should complete four English literature courses numbered 100 or above and related to their French courses. However, two English literature courses can count toward the four electives in French.

French and Italian Literatures—In addition to reading proficiency in Italian, majors should satisfy requirements similar to those stated in the "Specialization in Literature" section above.

English and French, and Italian and French—English majors and Italian majors interested in a combined degree with French literature should refer to "Extended Majors" in the English and Italian sections in this bulletin.

GRADUATE PROGRAMS

Applicants should read carefully the general regulations governing advanced degrees in the "Degrees" section in 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.

In addition to the Ph.D., the department offers two master's programs and participates with the School of Education in its Master of Arts in Teaching program.

Visiting Students—Students who are not candidates for a graduate degree but meet the standards of admission to a master's or Ph.D. program may apply to the Graduate Admissions Support Section of the Registrar's Office for admission as nonmatriculated students for a period of not more than three consecutive quarters. Each quarter they may take up to three courses numbered 200-299 or two such courses and (with the consent of the instructor) one 300-level course.

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 French courses, selected in consultation with the M.A.T. departmental adviser, and 12 units in the School of Education. Detailed requirements for the course are outlined in the "School of Education" section of this bulletin. (Not offered 1991-92.)

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 IN FRENCH

(TERMINAL PROGRAM)

The A.M. provides a combination of language, literature, cultural history, 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, they should enroll for an average of 12 units per quarter.

Candidates for this degree are not eligible for financial aid.

REQUIREMENTS

The basic course program is as follows:

<table>
<thead>
<tr>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>One course in textual analysis (200)</td>
</tr>
<tr>
<td>4</td>
<td>One philology course (202, 204, or 210)</td>
</tr>
<tr>
<td>4</td>
<td>One linguistics course (201, 203 or 206)</td>
</tr>
<tr>
<td>4</td>
<td>One cultural history course (290 or 291)</td>
</tr>
<tr>
<td>4</td>
<td>One methodology course (293 or Linguistics 289)</td>
</tr>
<tr>
<td></td>
<td>Among the advanced literature courses, two in the early periods (213 to 239); and two in the later periods (240 to 269)</td>
</tr>
<tr>
<td>36</td>
<td>Total</td>
</tr>
</tbody>
</table>

EXAMINATION

The examination is administered two weeks before the end of the final quarter of a candidate's program by a committee of three professors of French chaired by the candidate's adviser. It is a 90-minute oral examination conducted in French and structured as follows:

1. A half-hour presentation in French of a textual analysis. The passage to be commented on is chosen by the candidate's adviser from a work in the candidate's area of interest. The candidate is informed of the selection and given a copy of the text 48 hours before the examination.

2. A one-hour period of interrogation based on the texts included in a reading list provided all
A.M. candidates, with emphasis on periods and authors other than those covered in the candidate's work. Questions are asked relating to literature, language, and cultural history. The candidate's success in the examination is decided by a majority vote. In the event of failure, the examination may be taken a second time.

DOCTOR OF PHILOSOPHY

Regardless of the chosen area of specialization (see below), all graduate students must comply with University and departmental regulations. The following requirements, dealing with such matters as residency, teaching, and examinations, may be in addition to the University's basic regulations discussed in the "Degrees" section of this bulletin.

REQUIREMENTS

The A.M. or its equivalent in French is required of all Ph.D. students who must, therefore, apply for a master's degree.

Residency and Course Work—For a graduate student entering with an A.B., the Ph.D. program should normally be completed in four years. The first and second years should be devoted to full-time study, for a total of no fewer than 72 units of graduate work; the third and fourth years to study, teaching, and dissertation work. In accordance with University regulations, candidates for the Ph.D. must complete nine quarters (three years) of full-time work, or the equivalent, in graduate study beyond the bachelor's degree.

Teaching—In addition to training capable and creative scholars, one of the program's primary objectives is to promote the effective teaching of French at all levels. To this end, students are expected to demonstrate pedagogical proficiency by teaching under supervision the equivalent of four courses. Prior to teaching (normally during the third and fourth year), students enroll in 293, Methods of Teaching French, or Linguistics 289.

Language—It is recommended that doctoral candidates be competent in Latin and a second Romance language. This choice may vary according to the candidate's area of specialization.

SPECIALIZATION

Two areas of specialization are available to Ph.D. candidates as follows:

FRENCH LITERATURE

Students who choose this option are expected to concentrate on certain areas or centuries, but knowledge of all centuries should be well advanced at the time of the graduation.

The A.M. in French, or its equivalent, is required. The candidate must:

1. Complete a minimum of 36 graduate units, which must include the required courses specified in the terminal A.M. program.
2. Pass the Ph.D. qualifying examination in Spring Quarter of the second year of graduate studies in French.

After successful completion of (1) and (2), the student is admitted to Ph.D. candidacy. Regardless of the area of concentration, the candidate must take a total of 10 literature courses in the department, exclusive of directed reading, covering four centuries. (For the purpose of this requirement, the Middle Ages count as one century.)

The Ph.D. Qualifying Examination—The examination consists of a two-hour oral examination to be held in Spring Quarter of the second year. The candidate is asked to give a commentary in French of a text by a previously chosen author. The text will be indicated two days before the examination. A brief question and answer period follows the commentary.

The second part of the examination includes a discussion in French or English of the period of the work selected, as well as the periods immediately preceding and following. The examination is intended to provide an opportunity for the candidate to use his/her knowledge of the literary, cultural, and social history of the period. For works of the Middle Ages or 20th century, three successive centuries including that of the candidate's specialization must be represented.

LITERATURE, THEORY, AND CULTURAL STUDIES

This option combines advanced work in literary studies with interdisciplinary and theoretical methods. A primary goal is in-depth understanding of the cross-cultural nature of knowledge. To this effect, students are offered the opportunity to develop an anthropological approach which emphasizes the interactive relations among various processes of interpretation.

The A.M. in French, or its equivalent, is required. The candidate must:

1. Complete a minimum of 36 graduate units, including the courses specified in the terminal A.M. program or their equivalents.
2. Pass the Ph.D. qualifying examination in Spring Quarter of the second year of graduate studies in French.

After successful completion of (1) and (2), the student is admitted to Ph.D. candidacy. Regardless of the area of concentration, the candidate must take two courses among the "theory" series (courses numbered 270/370 to 279/379); three courses among the "interdisciplinary" series (280/380 to 289/389); and four additional courses in literature, cultural studies, or related fields.
The Ph.D. Qualifying Examination—The examination consists of a two-hour oral examination to be held in Spring Quarter of the second year. The candidate is asked to submit a substantial reading list reflecting the area of interest which must be approved by the examination committee.

The examination takes the form of an oral colloquy between the student and the examination committee. The candidate is expected to demonstrate knowledge of a substantial number of literary works in his/her area of concentration; of relevant theoretical approaches; and of the cultural context pertaining to his/her particular interest. The candidate is encouraged to present a commentary in French of a text selected by the adviser. The ensuing discussion may be conducted in French or in English according to the candidate's preference.

University Oral Examination—Regardless of the option selected by the candidate, he/she is expected to take the University oral examination normally no later than the end of the third year of studies. This supposes that the candidate has successfully completed the qualifying examination and formed a doctoral committee.

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.

Dissertation—The doctoral dissertation, which must be written in English, 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.

Students interested in a joint degree or a minor should plan 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 to students from other departments.

The requirements for a graduate minor in French Literature are:
1. A sound reading knowledge of French.
2. A minimum of 24 units of course work (six courses) covering at least four centuries in French studies.

ITALIAN DIVISION

OFFERINGS

The Italian Division offers a variety of graduate and undergraduate programs in Italian language, literature, culture, and intellectual history. Its course offerings run the full gamut 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. Students who wish to major in Italian may choose between two concentrations for the A.B. degree in Italian, opting for an emphasis on either Italian literature or Italian studies. Also available to Italian majors is 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 Humanities, Comparative Literature, 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.

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 Linguistics, Comparative Literature, Modern Thought and Literature, and in departments offering related courses such as history, history of art, music, philosophy, etc.
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. Information on the Florence program is available at the Overseas Studies office, room 126, Sweet Hall.

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.

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. Irrespective of their concentration, all Italian majors are required to complete the first-year language sequence, taking Italian 1, 2, 3 (or the equivalent). They must also take two second-year language courses: Italian 51, 52, and/or 53 (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.

In addition to five quarters of language study, all Italian majors must complete 60 units of additional course work, distributed in accordance with the concentration they have selected. Two concentrations are available: Italian literature and Italian studies.

CONCENTRATION IN ITALIAN LITERATURE

The literature concentration emphasizes work in all periods of Italian literature from the Medieval to the Modern. The requirements for majors who choose this concentration are:

1. Complete a minimum of 45 units of Italian courses (selected from courses numbered in the 100s, 200s, and 300s).
2. Of these courses, take at least one on Dante, 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. Take the intermediate-level survey sequence (Italian 227 and 228).
4. Of the 60 units required for the major, take up to 15 units of course work outside the department in related fields.

CONCENTRATION IN ITALIAN STUDIES

The Italian studies concentration is designed for students whose primary interest is in Italian but who have a strong interest in a secondary and related field (such as history, international relations, etc.). It requires less extensive course work in Italian literature and slightly more work in Italian language and civilization. The requirements (60 units) for students choosing this concentration are:

1. Complete a minimum of 32 units of Italian courses (selected from courses numbered in the 100s, 200s, and 300s).
2. Of these courses, take the following:
   a) Italian 227 and 228, intermediate-level survey sequence (2 quarters).
   b) Italian 127, Introduction to Italian History.
   c) One of the advanced language courses: either Italian 114, 115, or 116.
3. Up to 28 units outside the department in related fields. These courses must have a significant Italian component and be structured to constitute a coherent program of study.

Students opting for the Italian studies concentration must formulate their course plans in quarterly consultation with the Italian undergraduate adviser. The adviser helps design the program of study and advise on course selections, and may also approve courses offered at Stanford in Italy.

THE FLORENCE PROGRAM

All Italian majors, whatever their concentration, 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 a sojourn in Florence to ensure that their course selections meet Italian Division requirements.
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 requirement for the A.B. in Italian with a concentration in Italian literature, 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-unit requirement for the A.B. in Italian with a concentration in Italian literature, candidates must complete four French literature courses numbered 100 and above related to the field of concentration in Italian literature.

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 and submit an honors essay representing 6 to 9 units of academic work. 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

MASTER OF ARTS IN ITALIAN

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, they 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. There is the option of substituting a master's thesis for two literature courses.

Reading knowledge of a second Romance language, demonstrated by passing an examination, is required. French is recommended.

Requirements for the completion of the A.M. include a comprehensive literature and language examination, which is given two weeks 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 August 1.

DOCTOR OF PHILOSOPHY IN ITALIAN LITERATURE

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 courses taken within the Italian program, courses taken in other departments, and independent work under supervision of a member of the Italian
work completed elsewhere is counted as part of financial support with training as scholars and as Italian Fellows on a plan which integrates faculty. Students are admitted into the program for a maximum of four years. (Graduate-level work completed elsewhere is counted as part of this four-year period.) Although financial support is limited to four years, the timetable for the completion of requirements allows students to spread work over a five-year period. 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, 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.

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.

In the admission application, candidates must include the following in addition to materials required in the application forms:

1. A brief statement of principal areas of interest (periods, authors, genres, or theoretical issues) in Italian studies.
2. A detailed description of present degree of proficiency in the Italian language and in other languages they have studied.
3. A copy of one undergraduate term paper on a literary topic (preferably Italian) which they consider representative of their best undergraduate work. The paper may be either in English or Italian.

Applicants should take the General portion of the Graduate Record Examination and have the results sent to the Graduate Admissions Support Section of the Registrar’s Office.

REQUIREMENTS

Residency and Course Work—In accordance with the University regulations, candidates for the Ph.D. must complete nine quarters (three full years) of full-time work, or the equivalent, in graduate study beyond the bachelor's degree. Of the nine quarters, a minimum of three must be taken consecutively at Stanford. A maximum of 72 units of graduate work, in addition to the doctoral dissertation, are required of every student in the Italian Ph.D. program.

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 the equivalent of four Italian language courses as part of the fellowship program (normally during the third and/or fourth year). During the first term of teaching, students must enroll in Italian 460, 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, four courses are required: Italian 397, The History of the Italian Language; Italian 460, Graduate Workshop on Pedagogy; Italian 490, Proseminar in the Italian Literary Studies; and Italian 497, 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 success-
ful 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 examinations are required of candidates for the Ph.D., both oral: 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 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 examination must be established in consultation with the student's dissertation director, who chairs a committee of examiners (usually three) selected jointly by the dissertation director and the student according to the list's emphasis. Reading lists for the University oral generally cover all periods of Italian literature, with the student's area of specialization the primary focus of both examinations, 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 will have received the morning of the examination. The second, also 30 minutes, is a question and answer period concerning the student's presentation. The third, one hour, takes the form of an oral colloquy on the student's reading list as a whole. The fourth, lasting 30 minutes, is allocated to a defense of the student's dissertation proposal (a copy of which is submitted to the examiners one week in advance of the examination).

Dissertation—The student presents a dissertation proposal as part of the University oral examination. Successful completion of the examination constitutes approval of the proposal. The committee of readers for the dissertation is ordinarily drawn from the University oral examining committee. 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

A minor in Italian Literature is offered for students from other departments. The requirements for a graduate minor are: (1) a minimum of 24 units of graduate course work in Italian literature, and (2) a sound reading knowledge of the Italian language.

COURSES

FRENCH DIVISION

Note—Changes in course offerings after Courses and Degrees has gone to print are sometimes necessary. Students are advised to consult the department bulletin board regularly.

GENERAL

These courses are open to all undergraduate and graduate students, are taught in English, and do not require a knowledge of the French language.

105. The Writings of Albert Camus—Reading/discussion of all the major works: novels, plays, short stories, essays. Lectures and readings in English.

4 units, Win (Cohn)

Sartre, Camus. Lectures and readings in English. Readings in French optional.

4 units, Aut (Cohn)

138. Female Saints—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 translation. (In English) DR:8(3)

4 units, Win (Cazelles)

139C. The Grail in Modern Culture—Focusing on the legendary quest for the “Holy” Grail, explores the uses and transformations of medieval romance in modern culture. Reading of the first-known Grail romance (the Story of the Grail, by Chrétien de Troyes, late 12th century) and analysis of traditional motifs such as courtly love, life in the forest, and chivalric adventures in relation to the Grail as a symbol of an unattainable ideal. The re-inscriptions of those motifs in post-medieval culture, emphasizing films, (e.g., Camelot, Excalibur, Perceval, Monty Python and the Holy Grail, Indiana Jones and the Last Crusade). (In English)

4 units, Spr (Cazelles)

187P. Humanities Seminar—(Same as Overseas Studies-Paris.)

3 units, Win (Faure)

188P. The Ideologies of French Everyday Life—(Same as Overseas Studies-Paris.)

4 units, Aut (Faure)


4 units, Win (Newman-Gordon)

259B. How “Realistic” was European Literary Realism?— (Same as Comparative Literature 259B, Spanish 295/395, German 293/393.) Part of the novelistic production in 19th-century European literature presented itself, and has been defined by literary critics, as a “realistic” (i.e., “adequate”) description of contemporary social life. A philosophical critique of this claim is applied to the results of such a discussion in different (especially Marxist) traditions of literary historiography and to the poetics of the 19th-century novel. Reconstructs the socio-historical background(s) out of which the need for “reality effects” (effets du réel) emerged in different national contexts. Possible authors: Balzac, Stendhal, Flaubert and Zola, Perez Galdós and Clarín, Fontane, Raabe and others.

3-5 units, Win (Gumbrecht)

279D. Structuralism and Deconstruction: Complexity and Self-Reference in the Humanities and the Social Sciences—Undecidability, infinite deferment, structural incompleteness, bifurcation and structural stability, the text as a machine, etc. Interdisciplinary approach; explores conceptual foundations of modern critical theory. Topics: deconstruction of structuralism, the logic of mimetic desire. Readings: Lacan, Derrida, Lévi-Strauss, Girard.

2-3 units, Win (Dupuy)

288A. Limits of Economic Rationality I: The Nature of the Social Bond—(Same as Economics 100B, Political Science 259A.) Confrontation of three ways to account for society in an individualistic framework: the Social Contract (Hobbes, Rousseau); the “Invisible Hand” of the market (Smith, Walras); society as a crowd (Tarde, Freud, Keynes). Comparison with the Durkheimian tradition.

2-3 units, Spr (Dupuy)

289D. Deconstruction Contextualized—(Same as Comparative Literature 369, English 369, German Studies 345.) The reconstruction and philosophical understanding of the intellectual situations in which Deconstruction developed and which have conditioned its reception and institutionalization since the 1960s. Analysis of Jacques Derrida’s early writings, his critique of Husserl, Kant, and Lévi-Strauss, and the intellectual and cultural atmosphere by which his readings were informed (comparison with work of Michel Foucault, Roland Barthes, etc.). The circumstances which, since the 70s, made this philosophical position so appealing for literary critics, the different context of its reception (especially in N. America), and the transformations which its success imposed on Deconstruction. (Contextualizing Deconstruction does not mean refuting Deconstruction.)

3-5 units, Aut (Gumbrecht) T 3:15-5:30

FIRST- AND SECOND-YEAR LANGUAGE

Note—Students registering for the first time in a first- or second-year course must take a placement test if they have had any training in French before entering Stanford. The test will be given Saturday, September 21.

Language courses with an “X” suffix (1-X, 2-X) normally have the same curricular goals as the corresponding number course (French 1, French 2) but are conducted with an experimental teaching and learning component (computer-assisted instruction, use of video, etc.). Entrance and exit testing is conducted for evaluation purposes along with systematic student evaluation of new techniques. These special sections are open to all interested students moving through the first- and second-year language series. Student “+”/No
Credit” option is available. For further information regarding specific experimental courses, when offered, consult the instructor.

Auditing is not permitted in participation language courses.

1. First-Year French (Part 1)—Systematic acquisition of basic French grammar and vocabulary in the immediate reality of the classroom. Class all in French. Multiple approach: listening-comprehension, oral expression, original oral, and written composition.

   5 units, Aut, Win, Spr (Staff) MTWThF

1R. First-Year French (Part 1 Accelerated)—For students who have some previous knowledge of the language, but who must begin their study of French over again. Equivalent to 1. Language lab required.

   3 units, Aut, Win (Staff)


   5 units, Aut, Win, Spr (Staff) MTWThF

2C. First-Year Conversation—French 2 level. Satisfactory/No Credit basis only. Prerequisite: 1 or equivalent.

   2 units, Aut, Win, Spr (Staff)


   5 units, Aut, Win, Spr (Staff) MTWThF

3C. First-Year Conversation—French life and culture: theater, movies, travel, etc. Useful information for students planning travel in France. Satisfactory/No Credit basis only. Prerequisite: 2 or equivalent.

   2 units, Aut, Win, Spr (Staff)

5. Intensive French for Beginners—Accelerated first-year French in which either 2 or 3 quarters of French are covered. Preparation in speaking, writing, and reading the language. All-in-French method. Written exercises, compositions, conversational drills, and daily work in the language lab. See bulletin Summer at Stanford for details. (No auditors.)

   8-12 units, Sum (Staff)

10. Reading French—For graduate students seeking to meet University reading requirement for advanced degrees but open to seniors. Accelerated course specifically for the acquisition of reading ability. No auditors.

   4 units, Aut (Staff)

20C. Second-Year Conversation—Satisfactory/No Credit basis only. Prerequisite: 3 or equivalent.

   2 units, Aut, Win, Spr (Staff)

21R. Grammar Review—For students with previous training in French either in high school (3-5 years) or in other universities, whose progress is best served by a concentrated review of first-year material. Basic French grammar emphasizing written expression with some training in speaking.

   3 units, Aut (Staff) MWF


   4 units, Aut, Win, Spr (Staff) MTWTh


   4 units, Aut, Win, Spr (Staff) MTWTh


   4-5 units, Aut, Win, Spr (Staff)

26. Intensive Intermediate French—(Equivalent to 22 and 23.) Complete grammar review in conjunction with reading of selected French texts. Classroom discussions, entirely in French, focus on the reading material and topics of current interest. Written exercises, oral reports, written compositions, and work in the language lab. No auditors. Prerequisite: one year of college French or equivalent preparation.

   6-8 units, Sum (Staff) MTWTh

29. Business French—(Graduate students register for 129.) 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.

   3-4 units, Aut (Morran)

30C. Conversation and Culture—France as seen through the writings of French and foreign authors. Oral presentations and discussions. May be repeated once for credit after an interval of two quarters. Satisfactory/No Credit basis only. Prerequisite: 23 or equivalent.

   2 units, Aut, Win, Spr (Staff)

UNDERGRADUATE SEMINARS

61. French Culture: Paris in History and Literature—Introduction to history and mythology of Paris in French history and literature (from Villon to V. Hugo, Baudelaire, and Jacques Prévert); illustrated with slides and video films. Taught in French as part of the academic program of the French House but open to those interested in the overseas program in Paris and others.

   3 units, Aut (Bertrand)
French Films—Films subtitled, discussion in English and French.
4 units, Win (Staff)

French Video Workshop.—Planning and production of a French-language video about Stanford, to be exchanged for a similar effort from a group at Réseau Vidéo Correspondance, a video pen-pal service. Collaborative work, in French, surrounding planning and production of video. Viewing and interpretation of a video letter received from another class group. Prerequisite: one year of college-level French or the equivalent, or consent of instructor.
3 units, Spr (Staff)

UPPER DIVISION COURSE
NUMBERING SYSTEM

Only courses numbered 120 and above qualify as Upper Division courses.

Advanced Language: 120; 123-125; 129; 200-206; 210, 211; 293
Undergraduate Literature, Survey Courses: 130 to 132
Undergraduate Literature, Genres: 150-189
Advanced Undergraduate and Graduate Literature, Authors, and Themes: 213/313 to 269/369
Advanced Undergraduate and Graduate Literature, Culture and Theory: 270/370-298/398
Individual Work: 199, 399

Where relevant, the language in which a course is given is indicated in parentheses.

ADVANCED LANGUAGE

120. Advanced Conversation—Conversation and discussion centered on contemporary problems and based on French newspapers, magazines, or films. May be repeated once for credit after an interval of two quarters. Prerequisite: 24 or equivalent.
3 units, Aut, Win, Spr (Staff)

121. Pronunciation and Phonetics—(Graduate students register for 201.)
4 units, Win (Hester)

123. Advanced Grammar and Syntax—Oral and written language, grammar, textual analysis. Prerequisite: 24 or equivalent.
4 units, Aut, Win (Staff)

124. Advanced Stylistics and Composition—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. (In French) Prerequisite: 123 or equivalent.
4 units, Win, Spr (Staff, Hullot Kentor)

125. Contemporary French Usage, Spoken and Written—Prerequisites: 123 and 124, or equivalent.
4 units, Spr (Staff)

129. Business French—(See 29.)
3-4 units, Aut, Spr (Morran)

SURVEY COURSES

130. French Literature I: Middle Ages and Renaissance—Introduction to the literature and culture of France from the 11th to the 16th century. Readings from epics (Song of Roland), medieval romances (Yvain by Chrétien de Troyes), post-Petrarchan poetics (Du Bellay, Ronsard) and prose humanists (Rabelais, Montaigne). (In French) Prerequisite: 24 or equivalent. DR:7(2)
4 units, Aut (Hester)

131. French Literature II: 17th and 18th Centuries—Social introduction to main works of the Age of Louis XIV and the Enlightenment. Focuses on emergence of literature as an art form, relation of literary forms to the cultural and administrative unification of France, emergence of modern writers, representation of women, relation of literature to the social domination of nature. Readings: Corneille, Molière, Racine, Lafayette, Marivaux, Prévoost, Charrière, Laclos, Voltaire, Diderot, B. de Saint-Pierre, Rousseau, Sade. (In French) Prerequisite: 24 or equivalent. DR:7(2)
4 units, Win (Hullot-Kentor)

132. French Literature III: 19th and 20th Centuries—Writers and society from Baudelaire and Flaubert to Camus and Sartre, Ionesco and Beckett, Marguerite Duras, Michel Tournier, Georges Pérec. (In French) Prerequisite: 24 or equivalent. DR:7(2)
4 units, Spr (Bertrand)

LITERATURE

Note—Prerequisites for the following courses are normally 130, 131, or 132, or equivalent.

105. See under "General Courses."
114. See under "General Courses."
138. See under "General Courses."

141. Renaissance II—The Baroque, literary and social commitment in the 16th century. Skepticism and religious revolt. The Baroque poets (d'Aubigné, Sponde), Montaigne. (In French)
4 units, Aut (Hester)

162. Introduction to 18th-Century French Literature—Marivaux, Voltaire, Rousseau,
430 SCHOOL OF HUMANITIES AND SCIENCES

Diderot, Prévost, Beaumarchais and Maréchal. (In French)
4 units, Spr (Apostolidès)

169P. Writing Fiction and History in 18th-Century France—(Same as Overseas Studies-Paris.)
4 units, Win (Roger)

179P. Paris and Modernity: Realism, Surrealism, Phantasmasgoria—(Same as Overseas Studies 179P.)
4 units, Win (Winchell)

4 units, Aut (Newman-Gordon)

188P. See under “General Courses.”

189A. Women and Gender in Modern France—Women’s lives and the importance of gender issues in French politics and society from the late 18th to the early 20th century. Topics: role of women in revolutionary and utopian politics, work and domesticity in an industrializing society, and changing notions of sexuality and sexual difference. DR:9f(5)
5 units, Spr (M. L. Roberts) Th 2:15-4:05

189P. Urbanism à la Parisienne: Utopias and Realities—(Same as Overseas Studies-Paris 189P, Urban Studies 116U.)
4 units, Aut (Winchell)

191. See under “General Courses.”

198. Language Specials—With consent of department only.
1-5 units (Staff)

199. Individual Work—Open only to majors in French with consent of department. Normally limited to 4-unit credit toward the major. See instructor for section number.
1-4 units (Staff) by arrangement

ADVANCED UNDERGRADUATE AND GRADUATE LANGUAGE

4 units, Aut (Newman-Gordon)

201. Pronunciation and Phonetics—Theory study and corrective work: articulation, intonation, rhythm, phonetic alphabet, etc.
4 units, Win (Hester)

206. Introduction to French Linguistics—Overview of linguistics for students of French. Structural accounts of modern French (phonology, morphology and syntax) and descriptions of the French language in use (sociolinguistics, pragmatics, and discourse analysis.)
4 units, Spr (Kinginger)

222. Rabelais.
4 units, Spr (Hester)

231. Corneille: Roman Tragedy—(In French)
2 units, Spr (Serres)

234. Racine—The great tragedies from Andromaque to Athalie. (In French)
4 units, Win (Girard)

238. Molière—Principal works of Molière read from a literary and anthropological perspective. (In French)
4 units, Aut (Girard)

249A. 18th-Century French Literature: Histoire, Histoires—Romantic and historical writing. (In English)
2 units, Aut (Roger)

256. Baudelaire.
4 units, Spr (Cohn)

258. Symbolist Poets—Baudelaire, Mallarmé, Rimbaud, Verlaine, Valéry, Laforgue, Rilke, etc. Readings in French or bilingual texts. Discussion in English.
4 units, Spr (Cohn)

259B. See under “General Courses.”

261. Proust—Reading/discussion of Proust’s A la recherche du temps perdu. Thematic approaches include dream and reality, initiation and the quest, truth and illusion, metaphor and metonymy, art and life. (In French)
4 units, Win (Newman-Gordon)

277A. French Critical Theory—From Valéry to Gérard Genette and from Bachelard to Roland Barthes, an examination of varied approaches in literary criticism as applied to the works of Racine and Flaubert. (In French)
4 units, Aut (Bertrand)

277B. Contemporary Critical Theory—Introduction to influential and contemporary French critical theorists: Foucault, Lacan, Derrida, Deleuze, Lyotard, Kristeva and Hermann; and two Germans important to French thinking: Benjamin and Adorno. Focus: critique of reason and
relation of the form this critique takes to the valuation of literature. (In French)
4 units, Spr (Hullot-Kentor)

279D. See under “General Courses.”

279E. Symbolic Exchange, Reciprocity and Violence (Anthropology and Literary Theory)—One of the debates constitutive of the French Sciences of Man. Lévi-Strauss’s critique of Mauss and Bourdieu’s critique of Lévi-Strauss. The structuralist notion of “quasi-object.” Reading of Corneille’s comedies and Molière’s Dom Juan in light of this debate (In French).
2-3 units, Win (Dupuy)

284K. About Prepositions—(In French)
2 units, Aut (Serres)

288A. See under “General Courses.”

289D. See under “General Courses.”

291. French Cultural History: Politics, Society, and Culture from Napoléon to the Present—(In French)
4 units, Win (Bertrand)

GRADUATE LITERATURE

312. Hagiography—Readings of saints’ lives in French verse from the 9th to the 13th century. Topics: hagiography as literary genre, the representation of sanctity, the saint’s exemplarity. Prerequisite: reading knowledge of Old French.
4 units, Aut (Cazelles)

318A. The Grail: Origin of a Myth—Intensive study of Chrétien de Troyes’ Conte du Graal as the founding narrative of the Grail textual corpus. Topics: place and significance of the Conte du Graal in traditional chivalric culture, rivalry and competition in Chrétien’s narrative, the quest as pursuit for power. Prerequisite: reading knowledge of Old French.
4 units, Aut (Cazelles)

318B. The Grail: 13th-Century Continuations—Close readings of sequels to Chrétien de Troyes’ Conte du Graal, from Robert de Boron’s trilogy to the Queste del saint Graal. Topics: ideological reinscriptions of the Grail legend; exegesis as accusation; the Grail myth after the Middle Ages. Prerequisite: reading knowledge of Old French.
4 units, Win (Cazelles)

322. Rabelais—(See 222.)
4 units, Spr (Hester)

331. Corneille: Roman Tragedy—(See 231.)
2 units, Spr (Serres)

334. Racine—(See 234.)
4 units, Win (Girard)

338. Molière—(See 238.)
4 units, Aut (Girard)

339B. The Rise of the Modern Novel in 16th- and 17th-Century France—(See 239B.)
4 units, Aut (Hullot-Kentor)

349A. 18th-Century French Literature—(See 249A.)
4 units, Aut (Roger)

356. Baudelaire—(See 256.)
4 units, Spr (Cohn)

359B. See under “General Courses.”

361. Proust—(See 261.)
4 units, Win (Newman-Gordon)

4 units, Win (Apostolidèes)

379E. Symbolic Exchange, Reciprocity, and Violence—(See 279E.)
2-3 units, Win (Dupuy)

384K. About Prepositions—(See 284K.)
2 units, Aut (Serres)

397A,B. Colloquium on Research Methods in French and Italian Studies—Acquaints graduate students with general and specialized resources for French and Italian studies. Emphasis on overall strategy for research, but provides an opportunity to explore bibliographical sources in students’ particular fields of interest.
397A. 2 units, Aut (Parrine)
397B. 2 units, Spr (Parrine)

399. Individual Work—Exclusively for graduate students in French working on a thesis or engaged in special work. See instructor for section number.
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.

GENERAL

These courses are open to undergraduate and graduate students, are taught in English, and do not require a knowledge of the Italian language.

248. Machiavelli—(Graduate students register for 348.) Open to all students. In-depth introduction to Machiavelli's work, The Prince, Discourses, Dialogo della Lingua, and the theatrical works, emphasizing Machiavelli's relation to classical and post-classical political theory, and the political institutions of his period.
4 units, Spr (Freccero)

259B. How "Realistic" was European Literary Realism?—(Graduate students register for 359B; same as Comparative Literature 259B, German 293/393, Spanish 295.) See French Division under "General Courses."
3-5 units, Win (Gumbrecht)

269A. Pirandello, Sartre, and Beckett—(Graduate students register for 369A.) 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: Pirandello's Il Fu Mattia Pascal, Così è (se vi pare), and Sei Personaggi; Sartre's La Nausée and Huis Clos; Beckett's Molloy. Lectures in English; readings available in translation.
DR:7(2)
4 units, Aut (Harrison)

281. Novels into Film—(Graduate students register for 381.) Open to all students. Comparative analysis of five contemporary Italian novels and their film adaptations. Considers theoretical questions (narrative structure in fiction and film, point of view, language of cinema, limits of cinematic expression), and the social and historical context of these exemplary 20th-century narratives. Authors: Lampedusa, Moravia, Bassani, and Levi. Directors: Visconti, De Sica, Bertolucci, and Rosi. All films in Italian with English subtitles.
4 units, Win (Springer)

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)—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)—Same as 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)—Same as 1 and 2 with additional cultural and literary readings. Prerequisite: 2 or equivalent.
5 units, Aut, Win, Spr (Staff) MWF

5. Intensive First-Year Italian—Accelerated course in which two or three quarters of First-Year Italian may be covered. 5A counts for 8 units and covers Italian 1 and 2 in 5 and 1/2 weeks. 5B represents 4 additional units and covers Italian 3 in 2 and 1/2 weeks.
8-12 units, Sum (Staff) MTWThF 9-11:50 plus language lab

7A,B,C. Individualized First-Year Italian—Same as 1, 2, 3. For graduate and undergraduate 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 instructor and coordinator of the Italian language program during first week of classes.
1-15 units, Aut, Win, Spr (Staff)
10. 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) MW

30A,B. Italian Conversation—Intermediate and advanced level conversation to improve spoken Italian. 30A is for students who have completed, or are in the process of completing, the first year of Italian. 30B is for students returning from the Florence program and/or who have completed one quarter of second-year Italian. Subject matter varies each term; 30A or 30B may be repeated for credit. Satisfactory/No Credit basis only. Prerequisite for 30A: 2 or equivalent. Prerequisite for 30B: 51 or equivalent.
2 units, Spr (Staff)

51. Second-Year Italian (First Quarter)—Comprehensive review of Italian grammar combined with further study of advanced grammar and Italian culture through literary texts. Prerequisite: 3 or equivalent.
3-4 units, Win (Devine) MWF

52. Second-Year Italian (Second Quarter)—Same as 51 with emphasis on translation, stylistics, and composition. Prerequisite: 51 or equivalent.
3-4 units, Win, Spr (Mussio) MWF

198. Language Specials—With consent of the department only.
1-5 units (Staff)

114. Advanced Stylistics and Composition—Designed to achieve high-level proficiency in written and spoken Italian. Readings of literary and non-literary texts with in-depth textual and grammatical analysis in class, oral reports, and frequent writing assignments. (In Italian) Prerequisite: 52 or consent of the instructor.
4 units, Aut (Viggiano)

115. Economic and Business Italian—For students who need to function and communicate effectively in the Italian-speaking business world. Emphasizes readings from the print media and journals, Italian-English and English-Italian translation, the preparation of business letters, and vocabulary building. (In Italian) Prerequisite: 52 or consent of the instructor.
4 units, Win (Viggiano)

116. Translation—Translation of Italian literary and non-literary texts from the Middle Ages to the present, emphasizing the analysis of syntax, morphology, and style. Regular exercises in Italian to English translation. Prerequisite: 52 or consent of the instructor.
4 units, Spr (Viggiano)

122. Italian Cinema—Aspects of political, social, and cultural history of 20th-century Italy studied via the major monuments of the post-war cinema. (In Italian) Prerequisite: 3 or equivalent.
3 units, Spr (Mussio)

127. 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. (In Italian) Prerequisite: 3 or equivalent.
3 units, Spr (Napolitano)

197. Reading Course on the History of the Italian Language—(Graduate students register for 397.) 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: 52 or consent of instructor. Recommended: some background in Latin.
3 units, Aut, Win, Spr (Staff)

INTERMEDIATE-LEVEL LITERATURE

227. Italian Literature I: The Middle Ages and the Renaissance—Required of all Italian majors. Reading of selected works from the stilnovisti, Dante, Petrarch, and Boccaccio through Machiavelli, Ariosto, and Tasso. (In Italian) DR:7(2)
4 units, Win (Springer)

228. Italian Literature II: From Mannerism through the Modern—Required of all Italian majors. Reading of selected works from Marino, Campanella, Tesauro, Galileo, Vico, Goldoni, Alfieri, Leopardi, Foscolo, Manzoni, Verga, Pirandello. (In Italian) DR:7(2)
4 units, Win (Freccero)

ADVANCED UNDERGRADUATE AND GRADUATE LITERATURE

THE MIDDLE AGES

335-338. Advanced Courses on Dante—Dante's works in light of recent developments in the field. Emphasis is on Medieval theories of language and interpretation and questions of textuality and intertextuality in Medieval literature. Prerequisite for undergraduates: 233 or consent of instructor.

335. Dante's Divine Comedy: Inferno and Purgatorio—Intensive study of the first canti-
cle and first half of the second canticle of Dante’s masterpiece. (In English)
4 units, Aut (Freccero)

336. Dante’s Divine Comedy: Purgatorio and Paradiso—Intensive study of the second half of the second canticle and the final canticle of Dante’s masterpiece. (In English)
4 units, Win (Freccero)

339. Dante: Politics and Poetics—(Undergraduates register for 239; same as Comparative Literature 339.) Advanced undergraduate and graduate-level reading group on the interrelation between poetics and politics in Dante’s writings. Topics: lyric poetry and civil society, language and the court, the christianization of ancient epic. (In Italian)
3 units, Spr (Maurer)

RENAISSANCE

5 units, Spr (Parker)

FROM THE BAROQUE TO THE MODERN

244. Italian Romanticism—(Graduate students register for 344.) 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 Italian)
4 units, Aut (Springer)

266. Italian Women Writers—(Graduate students register for 366.) The traditional canon of Italian literature is an exclusively male domain. Italian anthologies and literary histories rarely make reference to women writers, and bibliographies of critical works seldom acknowledge their existence. Concentrating on works of prose fiction, we gain a sense of the range and creative energy of women writers today. Authors: Banti, Bellonci, Cialenza, Ginzburg, Manzini, Morante, Romano. (In Italian)
4 units, Spr (Springer)

272F. The Italy of Italo Calvino—(Offered in Florence.) Calvino’s development as a writer, analyzing the increasing complexity of his experiments with narrative structure and literary language, and the enduring component of fantasy in all his narrative works. Emphasis on the image, culture, and social aspects of contemporary Italy present in his works.
4 units, Spr (Springer)


340F. Boccaccio’s Decameron—(Offered in Florence.) Virtues of character and characters of virtue in Boccaccio’s masterpiece. Boccaccio’s hero, male or female, embodies a new morality of character which is no longer based on piety but rather on human resourcefulness. The genealogy of this new hero. His or her dominant virtues, e.g., imagination, wit, ingenuity, and beauty. The representation of the city of Florence and the 14th-century Tuscan landscape, the art of storytelling and Boccaccio’s transformation of medieval literary conventions. Also, Boccaccio’s Filostrato, which is the basis of Chaucer’s Troilus and Cressida.
4 units, Spr (Harrison)

369A. See General Courses.

4 units, Win (Harrison)

378. Croce’s Aesthetics—(Graduate students register for 478.) Croce’s Aesthetics as a Science of Expression and General Linguistics. Analysis and discussion of the principal theoretical themes. Other works by Croce, and his influence on Italian 20th-century culture. (In Italian)
4 units, Win (Velotti)

381. See General Courses.

389. Rereading Gramsci—The American reception of Antonio Gramsci has been idiosyncratic and embroiled within various contemporary cultural projects. His key notions, e.g., theory of cultural hegemony and the concept of civil society, have been uncritically appropriated and integrated within extraneous theoretical contexts. The genesis and structure of Gramsci’s thought, from a reexamination of late 19th-century/early 20th-century Italian culture and European politics. Focus is on philosophies of Antonio Labriola, Benedetto Croce and Giovanni Gentile. Gramsci’s thought from his early writings as a journalist, to the Prison Notebooks, emphasizing the dynamics of inter-wars European politics and economic developments.
4 units, Spr (Picone)

397. Reading Course on the History of the Italian Language—See 197 under Advanced Language and Civilization.

399. Individual Work—For undergraduates working on a special project (an honors essay) in the field of Italian studies. May be repeated for credit. See instructor for section number.
1-15 units, Aut, Win, Spr, Sum (Staff)
by arrangement
GRADUATE

460. Graduate Workshop on Pedagogy—Introduction to the theory and practice of teaching Italian, with frequent observations of a demonstration class taught by the master teacher, and regular class visitations.

2 units, Aut (Napolitano)

497A, B. Colloquium on Research Methods in French and Italian Studies—Required of all first-year graduate students, acquainting them with general and specialized resources for French and Italian studies. Emphasis is on overall strategy for research, but provides an opportunity to explore bibliographical sources in each student's particular field of interest.

497A. 2 units, Aut (Parrine)
497B. 2 units, Spr (Parrine)

498. Ad Hoc Graduate Seminars—Initiated by a group of three or more graduate students, ad hoc seminars can be set up under the sponsorship of an interested faculty member to study a subject or an area not covered by the department's regular offerings. Arrangements must be made at least one term in advance.

1-5 units, Aut, Win, Spr, Sum (Staff) by arrangement

499. Individual Work—For graduate students engaged in work on a special project in the field of Italian studies. May be repeated for credit. See instructor for section number.

1-15 units, Aut, Win, Spr, Sum (Staff) by arrangement

500. Dissertation Research—Exclusively for graduate students in Italian working on dissertations.

1-12 units, Aut, Win, Spr, Sum (Staff) by arrangement

OVERSEAS STUDIES

The following are approved for the Italian major and taught overseas at the campus indicated. Students discuss with their major advisers which courses best meet individual educational needs. Descriptions are in the "Overseas Studies" section of this bulletin or at the Overseas Studies Program office, 126 Sweet Hall.

3F. First-Year Italian, Third Quarter—Florence.
5 units, Aut, Win, Spr (Staff)

50F. Second-Year Italian, First Quarter—Florence.
5 units, Aut, Win, Spr (Staff)

54F. Second-Year Italian, Second Quarter—Florence.
5 units, Aut, Win, Spr (Staff)

198F. Individual Advanced Work and Directed Reading—Florence.
3 units, Aut, Win, Spr (Staff)

272F. The Italy of Italo Calvino—Florence.
4 units, Spr (Harrison)

340F. Boccaccio's Decameron—Florence.
4 units, Spr (Harrison)

GERMAN STUDIES

Emeriti: (Professors) Helmut R. Boeninger, Gertrude L. Schuelke; (Adjunct Professor) Gertrude Mahrholz
Chair: Russell A. Berman
Assistant Professor: Frank Schlossbauer
Senior Lecturers: William E. Petig, Kathryn Strachota, Brigitte Turneaure
Lecturers: G. Robert Hamrdla, Henry Lowood
Consulting Professor: J. Alan Pfeffer
Visiting Professors: Bronislaw Baczko (University of Geneva) Autumn; Silvio Borna (University of Basel) Autumn; Jürg Martin Gabriel (Hochschule St. Gallen) Autumn, Winter; Karl Maurer (University of Bochum) Spring; Wolfgang Preissendanz (University of Konstanz) Autumn; Peter Posch (University of Klagenfurt) Winter, Spring; Klaus R. Scherpe (Free University of Berlin) Winter, Spring; Jürgen Trabant (Free University of Berlin) Autumn

The department offers a variety of programs in German language and linguistics, literature, culture, and thought. Courses are open not only to majors but to 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 the Graduate Program in Humanities, Comparative Literature, Modern Thought and Literature, and Linguistics.

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 collec-
tions 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 of the department's own audio-visual equipment, films, tapes, and slides.

On the occasion of the U.S. Bicentennial, the Republic of Austria 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 in 1989 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 Pfefler, 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. Currently, 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, majors normally select at least two German courses per quarter. The total requirement for the A.B. is a minimum of 50 units of work beyond the basic courses (1 through 22 or equivalent), except in the area of German Culture Studies, as described below.

Students have the opportunity to select any one of four areas of concentration without, however, limiting their courses exclusively to that area.

**German Language and Linguistics**—Required courses are 203 (History of the German Language), 211 (Syntax of Modern German), and 212 (Linguistics and the Analysis of German). Further course work may fall into any one of the following fields or a combination of them: (1) contrastive linguistics and language pedagogy (teaching methods, curricular problems, error analysis); (2) historical German and Germanic linguistics (Introduction to the Germanic Languages, Old High German, Middle High German, Old Saxon, Old Norse, etc.); or (3) theoretical linguistics and the analysis of modern German (phonology, syntax, dialectology, etc.). Appropriate courses in the Departments of English and Linguistics may also be taken. Students interested in languages not listed in this department should contact the Special Language Program, Department of Linguistics.

**German Literature**—Required courses are 150 and at least three approved courses at the 160 level. Additional courses may be selected from the 150 series, which focuses on various genres, or from the 170 series, which provides possibilities for studying specific developments and topics of German literature and culture in depth. In addition, students are encouraged to take a course or a seminar in literature on the 200 level.

**German Thought**—Students concentrating in this area should take 150 and must take the Geistesgeschichte series (241-243) and normally one seminar. Students may want to organize elective courses around certain themes or sets of problems according to their interests and choose from among the offerings of German, English, French, philosophy, history, religious studies, and other appropriate disciplines.

**German Culture Studies**—This program allows students to plan a more broadly based major than is possible in the other areas of concentration. The student can combine the study of German language and literature with such fields as art history, musicology, political science, history, economics, anthropology, comparative literature, etc. The requirements are: (1) at least 30 units of German courses beyond the 22 level, including at least four approved courses at the 130 and 160 level (130 may not be counted toward this requirement); and (2) at least 25 units of courses outside the department, but in the Central European field, to be planned and presented to the department by the student. Every student normally participates in at least one Stanford Overseas Program.

**HONORS**

Majors with a minimum letter grade indicator (LGI) of "B+" in German courses are eligible for departmental honors. In addition to require-
ments 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.

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.

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 students 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 and 202. Language and Style.
2. 211/311. 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 Political Science, Economics, Anthropology, and History.

A.M. candidates must take an oral examination toward the end of their last quarter.

MASTER OF ARTS IN TEACHING

The A.M. degree in the Teaching of German is offered jointly by the School of Education and this department. 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. (Not offered 1991-92.)

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
prove the student's admission to candidacy.

During the summer following the first year of graduate study, students research and write a qualifying paper. 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. After completion, before the beginning of the fourth quarter of study, 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 canonical 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 thematic emphasis, problems emerging from a particular genre in various contexts, a major literary movement, institutional setting, or discursive structure.

At least two weeks before the examination date, the student distributes the definitive version of the bibliography as well as a “position paper,” approximately 25 pages in length, addressing a major issue in the area of study. The examination consists of questions regarding this paper and the area of bibliography. The examination lasts at least two hours, permitting each of the four examiners a 30-minute question period and reserving an optional 10 minutes for questions from the chair of the examination.

Within three months of successful completion of the University oral, the student must submit a dissertation proposal to the department, approved by all members of the reading committee. The topic of the dissertation normally is directly related to the area of concentration in the University oral.

Students, regardless of their future fields of concentration, are expected to acquire near-native proficiency in German and thorough knowledge of the grammatical structure of German. Students are urged to take 311, Syntax of Modern German. The department expects Ph.D. candidates to demonstrate teaching proficiency in German; 302, Methods of Teaching German, is required. The teaching requirement is six quarters during the second and third years of study.

The department expects candidates to demonstrate research skills appropriate to their special areas of study. The requirement can be fulfilled in the capacity of either a University Fellow or a Research Assistant.

Graduate students are also advised to start developing skill in the teaching of literature by participating in the teaching of undergraduate literature courses. Students can earn up to 3 units of graduate credit for practice teaching in literature.

During the first year, graduate students planning to continue through the Ph.D. take essentially the same core program, as shown in the following specific suggestions of appropriate work in language and linguistics, literature, or German thought. This flexibility permits students...
to change direction at some later stage, as they develop intellectual identity on the basis of actual experience.

Under any concentration, electives chosen from graduate-level courses in German or approved courses in related fields must be added to accumulate the 36 units of study required for the A.M.

For basic University requirements see the "Degrees" section of this bulletin.

AREAS OF CONCENTRATION

Language and Linguistics—Students choosing this concentration should take the general survey courses 203 (History of the Language), 311 (Syntax of Modern German), and 312 (Linguistics and the Analysis of German) 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, 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 and 202. Language and Style
203. History of the German Language
   or 312. Linguistics and the Analysis of German
208A. Introductory Middle High German
304. Gothic or 305. Old Norse
   or 306. Old High German
   or 307. Old Saxon
311. Syntax of Modern German
313. Transformational Grammar of German
   or 314. Phonology of German
Three courses in German Literature and in German Thought, with at least one course in each.

Literature—Requirements are a minimum of two courses or seminars per quarter for at least four of the six quarters following the first year. Lecture courses and colloquia require final examinations but not term papers. Seminars, of which the student is expected to take a minimum of two after the first year, require research papers. During the first year, students normally take:

201 and 202. Language and Style
203. History of the German Language
   or 311. Syntax of Modern German
   or 313. Transformational Grammar of German.
241. Deutsche Geistesgeschichte I
242. Deutsche Geistesgeschichte II
243. Deutsche Geistesgeschichte III
Three courses in German Literature, one of which should be from the 351-359 series, and one from the 360, 370, or 380 series. One seminar in German Thought (349, 449).

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 (given in English)
Introductory Courses (1-99)
Intermediate Courses (100-199)
Language (100-119)
Culture (130-139)
Literature (150-179)
Courses for Advanced Undergraduates and Graduates:
Language: Skills and older dialects (201-210, 302-310). Special topics in linguistics (211-219, 311-319)
Culture and Civilization (230-239, 330-339)
Thought and Literary Theory (240-249, 340-349)
Literature: Language and Culture I-IX (251-259 or 351-359), Major Authors (260 or 360), Genres (270 or 370), Major Works (280 or 380), Special Topics (290 or 390)
Proseminar (300)
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.

19A. Introduction to the Germanic Languages—(Same as 119, 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, Old Frisian. External history and internal relationships. DR:9(4)
3 units, Spr (Robinson)

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—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)

32A. The Culture of Modernism in Austria and Germany—The birth of modernism in Vienna at the turn of the century, and in the Weimar Republic, emphasizing literature, music, painting, and broad intellectual and historical developments. The works of Hofmannsthal, Mahler, Freud, Schönberg, Kandinsky, Gropius, Brecht, and Mann. DR:7(2)
3 units, Win (Berman)

33A. German Literature and Culture after Fascism—(Same as 133.)
3 units, Spr (Scherpe)

79A. Masterpieces of Modern German Literature in Translation—(Same as 179M.) Introduction to modern German culture and thought through in-depth treatment of eight 20th-century works by Thomas Mann, Hesse, Kafka, Brecht, Dürenmatt, Frisch, Peter Weiss, and Christa Wolf; viewed against their socio-historical background and as part of an intellectual and literary tradition. Readings/discussions in English.
4 units, Win (Schlossbauer)

165A. The Later Thomas Mann—Middle period following Der Zauberberg; resistance to fascism and exile; aftermath of WWII; phases and patterns in international critical reception. Mann as a major essayist and cultural analyst. "Psychology and myth" in the Joseph tetralogy (selected readings), Dr. Faustus, and Felix Krull.
3-5 units, Spr (Gillespie)

190A. Savage Places—(Same as 290S.) Post-Renaissance European and New World fiction about the encounter with non-European peoples and alien or archaic realms. Topics: myth of El Dorado, the noble savage, paganism, cannibalism, woman as divine other, ritual violence. Emphasizes common themes in writers of N. and S. America (e.g., the romance of foundations). Six readings from such authors as Behn, Defoe, Melville, Mérimée, Conrad, Sacher-Masoch, Hearne, Kafka, Malraux, Roth, Camus, Lowry, Carpenter, Garcia-Márquez, Durrell, Barth.
3-5 units, Win (Gillespie)

284A/384A. Joyce, Proust, Mann I—(Same as Comparative Literature 384A.) Themes, structures, and mythopoetic dimensions of the novel in the context of Modernism. Joyce, Proust, and Mann as synthesizers and interpreters of the historical situation ("Decline of the West," contending-isms, WWI, etc.), forms of consciousness (Bergson, Nietzsche, Freud, Jung, et al.), technological revolution and artistic expression (opera, painting, cinema, etc.) of their age.
3-5 units, Aut (Gillespie)

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)

2C. Conversational German—Enables the student to understand, and to express himself in simple, spoken German. Especially for students going to Berlin. Prerequisite: at least one quarter of first-year German. 3 units, Aut, Win, Spr (Staff) MWF

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) MWF

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 (Petig) MTWTh 9 Sum (Petig) MTWThF 9

11. Individually Programmed Beginning German—For those who wish to complete more or less than 5 units a quarter, or have a spotty background, or have scheduling conflicts, or prefer to work independently. Students proceed at their own pace, working on their own with the text and tapes. The instructor is available for consultation on a regular basis. Conversation classes may be attended for listening and speaking practice. 3-12 units, Aut, Win, Spr (Staff)

52A-F. Readings in Other Disciplines—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 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. 3-4 units, Aut (Staff)

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 190X.) 3-4 units, Spr (Staff)

52D. Readings in Political Science and International Relations—(Same as Political Science 112D.) 3-4 units (Lohnes) given 1992-93

52E. Readings in Music and Music History. 3-4 units (Staff) given 1992-93

52F. Readings in Philosophy and Religious Studies—(Same as Religious Studies 52F.) 3-4 units (Staff) given 1992-93

55. Business German—Reading/discussions in German of texts dealing with the business world, i.e., economics, banking, stock market, import-export trade, Common Market. Includes review of basic German structures. Prerequisite: 3 or the equivalent of one year of college German. 3-4 units, Spr (Petig)

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)

20M. Filmkunst aus Mitteleuropa. 1 unit, Aut, Win, Spr (Staff)

Other in-house courses will be announced.

SECOND-YEAR

21. Intermediate German I—Continues the balanced approach of 1, 2, and 3, including the systematic review of German structure, and the reading and discussion of short prose texts. Prerequisite: 3 or 4. 3 units, Aut, Win, Spr (Staff)

21C. Intermediate Conversation—Builds confidence and fluency by practicing communication strategies in everyday situations. Good preparation for overseas. Role playing, small group activities, visits with native speakers, tapes, interactive video. Prerequisite: 3 or the equivalent. 3 units, Aut, Win, Spr (Staff)

22. Intermediate German II—Continuation of 21, with greater emphasis on reading and writing skills. Final course in the introductory sequence. Suggested continuation: 21C, 101, 130, or 150 series. Prerequisite: 21. 4 units, Aut, Win, Spr (Staff)

52A-F. Readings in Other Disciplines—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 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. 3-4 units, Aut (Staff)

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 190X.) 3-4 units, Spr (Staff)

52D. Readings in Political Science and International Relations—(Same as Political Science 112D.) 3-4 units (Lohnes) given 1992-93

52E. Readings in Music and Music History. 3-4 units (Staff) given 1992-93

52F. Readings in Philosophy and Religious Studies—(Same as Religious Studies 52F.) 3-4 units (Staff) given 1992-93

55. Business German—Reading/discussions in German of texts dealing with the business world, i.e., economics, banking, stock market, import-export trade, Common Market. Includes review of basic German structures. Prerequisite: 3 or the equivalent of one year of college German. 3-4 units, Spr (Petig)

70. Intensive German—Given only in Berlin. See “Overseas Studies” section in this bulletin. Aut, Win, Spr
and videotapes, discussions, presentations, vocabulary building exercises, interviews with native speakers. May be taken twice for credit. Prerequisite: 21C or equivalent.

3 units, Aut, Win, Spr (Staff) MWF 10

101. Reading and Writing Modern German I—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. Reading and Writing Modern German II—Continuation of 101.

3 units, Spr (Turneaure)

103. Television News from Germany and Austria—Training in listening comprehension based on TV newscasts from Central Europe.

2 units, Win (Lohnes)

119. Introduction to the Germanic Languages—(Same as 19A, Linguistics 75.) DR:9(4)

3 units, Spr (Robinson)

127D. Germany in the 20th Century—(Same as History 127D.)

5 units, Aut (Sheehan) TTh 1:15-3:05

130. German Newspapers—Articles of current interest in German newspapers read and discussed in German. May be taken twice for credit. Prerequisite: 22 or equivalent.

3 units, Aut (Strachota)

131-133. German Culture and Civilization I-III—(See also 31A-33A.) In addition to attending the lectures in 31A-33A, students with an adequate knowledge of German may register for 131, 132, or 133 and participate in a supplementary section in which further material is read and discussed in German. Students who have received credit for 31A-33A may not repeat courses in this sequence for credit.

131. Central Europe: Geography, Institutions, and Society—Prerequisite: 22, or consent of instructor. DR:9(5)

4 units, Aut (Lohnes)

132. The Culture of Modernism in Austria and Germany—Prerequisite: 22 or consent of instructor. DR:7(2)

4 units, Win (Berman)

133. German Literature and Culture after Fascism—(Same as 33A.) Prerequisite: 22 or consent of instructor. DR:8(3)

3 units, Spr (Scherpe)

150. Introduction to German Literature—Texts (short prose, poetry, and drama) ranging from the classical to the modern period. Introduction to key concepts of major literary periods and of literary criticism. Readings from Lessing, Goethe, Schiller, Hölderlin, Hoffman, Eichendorff, Büchner, Heine, Nietzsche, Thomas Mann, Kafka, Brecht, and Christa Wolf. DR:7(2)

4 units, Aut (Turneaure)

151-157. The 150 series introduces German literature in various genres. Prerequisite: 22 or equivalent.

153. Contemporary German Drama—Study of selected plays representative of major authors and trends in German theater since 1945. Readings from Brecht, Dürrenmatt, Frisch, Weiss, Handke, Kroetz, and Plenzdorf. Performances, films, tapes, and videotapes. DR:7(2)

4 units, Spr (Strachota)

154. Modern Short Prose—Short prose texts from T. Mann, Rilke, Kafka, Brecht, Böll, Wolf, Bachmann, and others. Emphasis is on readings that reflect historical events and cultural tendencies of 20th-century central Europe. DR:7(2)

4 units, Win (Turneaure)

161. The Classical Period—Introduction to the major authors, works, and literary movements of the 18th century in historical context. Emphasis on the Enlightenment and the countermovements of "Storm and Stress." Rise of Weimar classicism against the background of Winckelmann's aesthetics of Greek art ("noble simplicity and quiet grandeur"). Examinations of dramas, narratives, lyric poetry, and essays by Lessing, Lichtenberg, Goethe, Lenz, Schiller, Hölderlin, and others.

4 units, Aut (Mommsen)

162. Romanticism and Realism—Introduction to the major literary trends of the 19th century in their historical context. Romantic lyric, novella, Kunstmärchen, cultural pessimism in the period after Goethe's death, poetic theory and the critique of romanticism, the countermovements of Junges Deutschland and Vormärz; transition to realism, realist theory and prose, new literary forms. Readings from Novalis, Brentano, E. T. A. Hoffmann, Tieck, Heine, Fontane, and others.

4 units, Win (Mommsen)

163. Naturalism to the Present—Introduction to major literary trends since the end of the 19th century emphasizing the changing status of the author. Aestheticism, and expressionism; literature in the Weimar Republic; the impact of fascism and exile culture; the writer in E. and W. Germany and current developments. Readings from Hauptmann, Thomas Mann, G. Heym, Kafka, Sternheim, Brecht, Seghers, Frisch, Böll, and Enzensberger.

4 units, Spr (Schlossbauer)

171-178. Introduces the specific developments and topics of German literature and culture with
some emphasis on methods of literary interpretation. Prerequisites: 22 and two additional courses or consent of instructor.

174D. Friedrich Nietzsche—(Same as Religious Studies 174D.) His theory of culture and religion.

5 units, Spr (Harvey)

179. Special Topics—Explores the possibility of interdisciplinary studies and research in areas of special interest: women authors, social satire, political speeches, Freud and literature, literature in the German Democratic Republic.

179D. Literature and the Institution of Literary Study—(Same as Comparative Literature 100, Classics 100, English 100.) Overview of the emergence of literature as a phenomenon specific to Western culture, of the academic literary disciplines in general, and of theoretical approaches to literature in particular. From ancient Greek Rhetoric and Poetics, tracks the development of ideas of literature and literary study from the Middle Ages through the present multicultural situation. Topics: the material culture of literary study and production (e.g., scribal vs. print vs. media cultures) and the emergence of key concepts of the Western tradition, e.g., "text" and "authorship" and the institutionalizations they underwent.

5 units, Win (Gumbrecht, Selden)

TTh 1:15-3:05

179E. Educational System and Educational Reform Movement in Austria—(Same as 297E; Education 322S.).

3 units, Spr (Posch)


4 units, Win (Hamrdla)

179K. From Kant to Kierkegaard—(Same as Religious Studies 174.) Survey of main currents of theology and religion in Germany, emphasizing themes of the knowledge of God and the problem of alienation.

5 units, Aut (Harvey) TTh 11-12:30

179M. Masterpieces of Modern German Literature in Translation—(Same as 79A.)

4 units, Win (Schlossbauer)

179S. The Fate of the Self—German literature from the Romantic period on has displayed a marked tendency to problematize the concept of the self. One encounters a self whose identity and place in the world are characterized by uncertainty and struggle, alienation and disintegration. Readings: Kleist, Chamisso, Büchner, Schnitzler, Benn, Kafka, Hesse, Musil, Bachmann. Texts in German, discussions in English.

4 units, Aut (Schlossbauer)

199. Individual Reading—36 hours of reading per unit, weekly conference with instructor. May be repeated for credit. Enrollment by consent of the department. Prerequisite: 22 or consent of instructor.

1-2 units, Aut, Win, Spr (Petig)

by arrangement

ADVANCED UNDERGRADUATE AND GRADUATE

201. Language and Style I—Writing exercises on different levels of style; discussion of grammatical problems; introduction to literary stylistics. Prerequisite: qualifying examination.

2 units, Aut (Lohnes)

202. Language and Style II—Continuation of 201.

2 units, Win (Lohnes)

205A. Introduction to Old Norse-Icelandic—(Same as 305A; English 200A.) Grammar and readings from E. V. Gordon, Introduction to Old Norse. Emphasis on the acquisition of reading skills.

5 units, Win (Andersson)

205B. Advanced Old Norse-Icelandic—(Same as 305B; English 200B.) Readings to be determined.

3-5 units, Spr (Andersson)

206. Old High German—(Same as 306.) Introduction to the grammar and documents of the earliest attested stage of High German.

3-5 units, Win (Robinson)

209. Runic Inscriptions in the Older Futhark—Survey of "texts" in the earliest Germanic writing system, origin and uses of the runes, grammatical analysis of the surviving inscriptions, the importance of Runic in the grouping of the Germanic languages. The Younger Futhark is briefly treated.

3-4 units, Aut (Robinson)

212. Linguistics and the Analysis of German—(Same as 312, Linguistics 175.) Introduction to linguistic theory and analysis, emphasizing modern German.

3-5 units, Win (Robinson)

222S. Seminar: Clause Subordination in Early High German—(Same as Linguistics 279.) Investigation of subordinate structures in Old High German primarily based on a study of the Old
High German *Isidor* translation. Secondary sources are also consulted.

3-5 units, *Spr* (Robinson)

### 240. Geistesgeschichte to the Enlightenment Threshold— (Same as 340.) Mystical expression from Meister Echart to Jakob Boehme. Renaissance syncretism, nature philosophy, polemics, and social thought. Origins and branches of Protestantism; Protestantism as a force in social revolution and in the formation of the middle classes; Humanism as a binding element of cultural consciousness. Early modern cosmology, psychology, and anthropology, and varieties of rationalism from Cusanus and Paracelsus to Leibniz.

3-5 units, *Aut* (Gillespie)

### 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. Given in German in alternate years (1992-93).

### 241. Deutsche Geistesgeschichte I—Language and thought from Leibniz to Humboldt.

3-5 units, *Aut* (Trabant)

### 242. Deutsche Geistesgeschichte II—Study of key texts by Hegel, Marx, Nietzsche, and Weber.

3-5 units, *Win* (Staff)

### 243. Deutsche Geistesgeschichte III—German thought in the 20th century. Texts by Dilthey, Husserl, Heidegger, Benjamin, Adorno, Gadamer, and Habermas. Their applicability to cultural and literary studies.

3-5 units, *Spr* (Mueller-Vollmer)

### 249F. The Aesthetic Absolute: German Literature and Philosophy Around 1800— (Same as 349F; Comparative Literature 249F, Philosophy 126.) Fichte, Schelling, Novalis, A. and F. Schlegel, Schleiermacher, Tieck, Wackernroder.

3-5 units, *Win* (Mueller-Vollmer, Forster)

### 251-259. German Literature and Culture I-IX— (Same as 351-359.) The major periods of German literature from the early Middle Ages to the present. Undergraduate prerequisite: consent of instructor.

### 253. German Literature and Culture III— (Same as 353.) Introduction to New High German literature from the waning of the Middle Ages through the Renaissance and Reformation period (circa 1350-1600). Readings in 15th- and 16th-century poetry, drama, fiction, and discursive prose (including selections of Latin works by major German authors, in translation). Early modern poetics and prosodic renewal; the development of genres out of the "Bakhtinian" manifold of popular, regional, and international heritages.

3-4 units, *Win* (Gillespie)

### 254. German Literature and Culture IV— (Same as 354.) From Baroque to Enlightenment (1600-1750). Readings in literary renewal, experimentation, and theorizing of the 17th century; analysis of masterworks of the lyric from Opitz to Günther, and of German baroque world theater, romance, and novel; and modes (e.g., metaphysical, mannerist, baroque, neoclassical, rococo) on the threshold of the Enlightenment; the establishment of Enlightenment tastes, generic expectations, and language.

3-5 units (Gillespie) given 1992-93

### 260-269. Major Authors—In-depth study of a major writer in his or her literary creativity, relation to age, or special achievements and significance. Writers include Walther von der Vogelweide, Grimmelhausen, Wieland, Lessing, Goethe, Novalis, Tieck, Kleist, Fontane, Nietzsche, Hofmannsthal, Thomas Mann, Kafka, Brecht, etc.

### 262. Bertolt Brecht's Dialectical Theater— (Same as 362.) Brecht's dramatic theory and practice from its expressionist beginnings to the final GDR years. Issues: Brecht's theatrical innovations and his influence on modern drama; aesthetics and politics; redefinition of the theater and authorship; the role of the dialectical model, the pleasure principle and popular traditions.

3-5 units, *Spr* (Schlossbauer)

### 264. Seminar: The Essential Goethe— (Same as 364.) Introduction to the poet and thinker, scientist, and statesman. Major dramatic, epical, lyrical and autobiographical works, emphasizing the role of women in Goethe's works. Overviews of the trends, goals, and tools of Goethe research in the German speaking countries and abroad.

3-5 units, *Win* (Mommsen)

### 265. Habermas— (Same as Comparative Literature 265, English 306C.) Survey of the work of Jürgen Habermas. Issues: his account of the public sphere, consensus theory, the transformation of Marxist and Frankfurt-School paradigms, communicative action, the discussion of modernity and post-modernity, and political interventions on, e.g., the *Historikerstreit* and German unification.

3-5 units, *Spr* (Berman)

### 268. G. E. Lessing— (Same as 368.) Lessing's eminent importance as a philosopher, literary theorist, and playwright in the context of 18th-century German literature. Emphasis on the emergence of a new dramaturgy (Bürgerliches Trauerspiel), Lessing's political thought, the context of the enlightenment movement, and
the institutionalization of literature within the public sphere.

3-5 units, Win (Schlossbauer)

269. Georg Büchner—(Same as 369.) The dramas Dantons Tod and Woyzeck, the comedy Leonce und Lena, the novella Lenz, and the pamphlet Der hessische Landbote, Büchner's letters, scientific, and philosophical writings, in the context of Büchner's time, life, and political convictions.

3-5 units, Aut (Mommsen)

270-279. Genres—The development, contents, and formal characteristics of such kinds of writing as lyric poetry, epic drama, novel, Novelle, tale, short story, essay, etc., in various authors or periods. Focuses on medieval drama, baroque "metaphysical" poetry, the diary as a literary form, and autobiography.

275. Lyrik Poetry from the 17th to the 20th Century—(Same as 375.) Analysis of poems in the context of their epochs and in various forms, e.g., Alexandrines, ballads, elegies, free verses, ghazals, odes, ottave rime, sonnets, terzines, Lieder, etc. These forms serve as a means to better understand the cultural climate of the epochs and of the poets' "messages."

3-5 units, Spr (Mommsen)

290-299. Special Subjects and Problems—Variable topics.

290S. Savage Places—(Same as 190A.)

3-5 units, Win (Gillespie)

293. How "Realistic" was European Literary Realism?—(Same as 393; Comparative Literature 259B, French 259B, Spanish 295/395.) Part of the novelistic production in 19th-century European literature presented itself, and has been defined by literary critics, as a "realistic" (i.e., "adequate") description of contemporary social life. A philosophical critique of this claim is applied to the results of such a discussion in different (especially Marxist) traditions of literary historiography and to the poetics of the 19th-century novel. Reconstructs the socio-historical background(s) out of which the need for 'reality effects' (effets du réel) emerged in different national contexts. Possible authors: Balzac, Stendhal, Flaubert and Zola, Perez Galdós and Clarín, Fontane, Raabe and others.

3-5 units, Win (Cumbrecht)

295. History and Practice of Text Editing—(Same as 395; Comparative Literature 295, English 306D.) Historical and systematic survey of important techniques of text reconstruction and editing. Practical problems are discussed with reference to a variety of literatures (not necessarily European, depending on the participants' interests).

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

297E. Educational System and Educational Reform Movement in Austria—(Same as 179E; Education 322S.)

3 units, Spr (Posch) MWF 9

298. Individual Work—Open only to German majors and to students who are working on special projects. Students taking honors in German use this number for the honors essay. May be repeated for credit.

1-15 units, each quarter (Staff) by arrangement

GRADUATE

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, Aut (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.)

2 units, Aut (Petig)

303. Curricular Problems—Given on request only.

3 units (Lohnes) by arrangement

305A. Introduction to Old Norse-Icelandic—(Same as 205A; English 200A.)

5 units, Win (Andersson)

305B. Advanced Old Norse-Icelandic—(Same as 205B, English 200B.)

3-5 units, Spr (Andersson)

306. Old High German—(Same as 206.) Introduction to the grammar and documents of the earliest attested stage of High German

3-5 units, Win (Robinson)

313. Linguistics and the Analysis of German—(Same as 212; Linguistics 175.)

3-5 units, Win (Robinson)

340. Geistesgeschichte to the Enlightenment Threshold—(Same as 240.)

3-5 units, Aut (Gillespie)

345. Deconstruction Contextualized—(Same as Comparative Literature 369, English 369, French 289D/389D.) The reconstruction and philosophical understanding of the intellectual
situations in which Deconstruction developed and which conditioned its reception and institutionalization since the 1960s. Analysis of Jacques Derrida’s early writings, his critique of Husserl, Kant, and Lévi-Strauss, and the intellectual and cultural atmosphere by which his readings were informed (comparison with work of Michel Foucault, Roland Barthes, etc.). The circumstances which, since the 70s, made this philosophical position appealing for literary critics, the different context of its reception (especially N. America), and the transformations which its success imposed on Deconstruction. (Contextualizing Deconstruction does not mean refuting Deconstruction.)

3-5 units, Aut (Gumbrecht) T 3:15-5:30

349F. The Aesthetic Absolute: German Literature and Philosophy around 1800—(Same as 249F; Comparative Literature 249F, Philosophy 126/226.)

3-5 units, Win (Mueller-Vollmer, Förster)

349J. Goethes Schwierigkeiten beim Schreiben seiner Werke—(Same as Comparative Literature 349J.) Survey and analysis of the most important literary text in Goethe’s work as it emerged out of the European intellectual world around 1800. Emphasis on biographical moments and texts which Goethe himself experienced as “problematic” in relation to the totality of his work as a literary and artistic project. (In German)

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

349K. Bertolt Brechts lyrisches Werk—(Same as Comparative Literature 349K.) Brecht’s poetry constitutes one of the largest lyrical works in 20th-century German literature. Seminar analyzes Brecht’s poems from the perspective of their literary and artistic “modernity” and establishes a connection between their literary character and Brecht’s political commitment. (In German)

5 units, Aut (Preisendanz) M 3:45-6

349P. Aesthetischer Humor in narrativer Prosa—(Same as Comparative Literature 349P.) Seminar focuses on the emergence of the concept of “humor” in English Enlightenment, philosophy, and literature. Its transformation in the philosophy of German Idealism and German classical literature. “Humor” as specific communicative modality of narrative prose in European 19th-century literature. (In German)

5 units, Aut (Preisendanz) W 4:15-6:05

349Q. City Narratives in Modern German and European Literature and Philosophy—(Same as Comparative Literature 349Q.)

3-5 units, Win (Scherpe)

349T. Artificial Paradises: Exoticism in German Literature and Theory of the 20th Century—(Same as Comparative Literature 349T.)

3-5 units, Spr (Scherpe)

350. Methods of Teaching Literature—Students may enroll for practice in literature teaching on a voluntary basis.

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

351-359. German Literature and Culture I-IX—(Same as 251-259.) The major periods of German literature from the early Middle Ages to the present. The developing traditions that have shaped German literature. Focusing on a specific period, the literary and non-literary (cultural, social, political, philosophical) contexts are established within which individual authors, works, and movements are situated.

353. German Literature and Culture III—(Same as 253.)

3-5 units, Win (Gillespie)

354. German Literature and Culture IV—(Same as 254.)

3-5 units (Gillespie) given 1992-93

360-369. Major Authors—In-depth study of a major writer in his literary creativity, relation to his age, or special achievements and significance, i.e., Walther von der Vogelweide, Grimmshausen, Wieland, Lessing, Goethe, Novalis, Tieck, Kleist, Fontane, Nietzsche, Hofmannsthal, Thomas Mann, Kafka, Brecht.

362. Bertolt Brecht’s Dialectical Theater—(Same as 262.)

3-5 units, Spr (Schlossbauef)

364. Seminar: The Essential Goethe—(Same as Comparative Literature 364.)

3-5 units, Win (Mommsen)

368. G. E. Lessing—(Same as 268.)

3-5 units, Win (Schlossbauef)

369. Georg Büchner—(Same as 269.)

3-5 units, Aut (Mommsen)

370-379. Genres—The development, contents, and formal characteristics of lyric poetry, epic, drama, novel, novelle, tale, short story, essay, etc., in various authors or periods. Focuses on medieval drama, baroque “metaphysical” poetry, the diary as a literary form, and autobiography.

375. Lyrik Poetry from the 17th to the 20th Century—(Same as 275.)

3-5 units, Spr (Mommsen)

377. Realism and the Novel—(Same as Comparative Literature 377, English 309H.) Examination of the realistic novel in several distinct national and historical contexts. Emphasis is on the transformation of the generic and ideological components of realism from the mid-19th century through the encounters with naturalism, socialism, and post-colonialism. Is-

3-5 units, Aut (Berman)

390-399. Special Subjects and Problems.
393. How “Realistic” was European Literary Realism?—(Same as 293; Comparative Literature 259B, French 259B, Spanish 295/395.)
3-5 units, Win (Gumbrecht)

395. History and Practice of Text Editing—(Same as 295; Comparative Literature 295, English 306D.)
5 units, Spr (Maurer)

ADVANCED GRADUATE

400. Dissertation Research—Exclusively for graduate students in German working on dissertations.
1-12 units, Aut, Win, Spr, Sum (Staff)
by arrangement

449. Seminars.

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.

70. Intensive German—Berlin.
6 units, Aut, Win, Spr (Staff)

80. Intermediate German—Berlin.
4 units, Aut, Win, Spr (Staff)

2 units, Aut, Win, Spr (Staff)

90. Advanced German—Berlin.
4 units, Aut, Win, Spr (Staff)

2 units, Aut, Win, Spr (Staff)

HISTORY


Chair: David M. Kennedy


Associate Professors: Joel Beinin, Stephen H. Haber, Kennell A. Jackson, Jr., Nancy S. Kollmann, Timothy Lenoir, Richard Roberts, Aron Rodrigue

Assistant Professors: Philippe Buc, James E. Ketelaar, Mary Louise Roberts, Karen Sawislak

Courtesy Professors: Paul David, Albert E. Dien, Michael Jameson, Susan M. Treggiari, Gavin Wright

Senior Lecturer: Joseph J. Corn

Modern Europe Lecturers: Matthew Levinger, Margaret Malamud, J. Ronald Shearer, Laura Smoller, Jacob Thiessen

Lecturers: Margo Horn, S. Ryan Johansson, Robert Kleiman, Jack Kollmann

Acting Assistant Professors: Shulamith S. Magnus, Diane C. Margolf, Bertrand M. Patenaude

Visiting Professors: Brenislaw Baczko, Leon G. Campbell, Stephen Ozment, Ann Waswo

Visiting Associate Professor: Sandra E. Greene

Visiting Assistant Professor: Kathleen Canning

Irvine Fellow: Henry J. Gutierrez

Mellon Fellows: Jamsheed K. Choksy, Paul K. Longmore

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.
The program for the undergraduate major in History emphasizes both breadth of training and concentration of studies in a selected field of history.

Each candidate for the A.B. in History should: (1) declare a major in 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 a thematic concentration must have the approval of both the adviser and the departmental Committee on Undergraduate Studies.

Since History majors are required to complete an introductory seminar exposing students to the practices of the historian and an undergraduate research seminar in which the student conducts research, completion of the major requires planning. Students planning to major in history must enroll at the Department of History office, where detailed information on requirements is available.

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 get details of 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 during the Spring Quarter of the student's junior year and must be submitted no later than November 1 of the senior year. Applicants must meet the same general standards as those seeking admission to the A.M. program; they must submit a written statement of purpose, a transcript, and three letters of recommendation, at least two of which should be from members of the Department of History faculty. The decision on admission rests with the Graduate Admissions Committee. Students must meet all requirements for both degrees. They must complete 15 full-time quarters (or the equivalent), or three full-time quarters after completing 180 units, for a total of 216 units. During the senior year they may, with the consent of the instructors, register for as many as two graduate courses. In the final year of study, they must complete at least three courses that fall within a single Ph.D. field.

GRADUATE PROGRAMS

ADMISSION

Applicants for admission to graduate work must take the General Test of the Graduate Record Examination. It may be taken at most American colleges and in nearly all foreign countries. For details see the "Guide to Graduate Admission," available from 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. (Not offered in 1991-92.)

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. Upon enrollment in the graduate program in History, the student will have 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 early 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 a major field of study from the list below in which to concentrate their study and later
take the University oral examination. The major fields are:
Europe, 300-1400
Europe, 1400-1789
Europe since 1700
Jewish History
Jewish History: Ancient and Medieval
Jewish History: Modern
Russia
Russia to 1800
Russia since 1800
Eastern Europe
Eastern Europe to 1800
Eastern Europe since 1800
Middle East
Middle East to 1800
Middle East since 1800
Africa
Africa, Precolonial
Africa, Colonial and Post-Colonial
China before 1600
China since 1600
Japan before 1600
Japan since 1600
England, 450-1460
Britain and the British Empire, 1460-1714
Britain and the British Empire since 1714
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

2. The department seeks to provide a core colloquium in every major field, 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 field. Normally, research seminars are taken in the second year.
4. Each student, in consultation with the adviser, defines a secondary field. This requirement may be met in one of three ways: (1) a field selected from the list below; (2) a European national history of sufficiently long time to span chronologically two or more major fields—for example, students may elect to offer the history of France from about 1000 to the present; (3) a comparative study of a subject across countries or periods. The secondary fields are:
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
Jewish History: Ancient and Medieval
Jewish History: Modern
Russia to 1800
Russia since 1800
Eastern Europe to 1800
Eastern Europe since 1800
Middle East to 1800
Middle East since 1800
Africa, Precolonial
Africa, Colonial and Post-Colonial
China before 1600
China since 1600
Japan before 1600
Japan since 1600
England, 450-1460
Britain and the British Empire, 1460-1714
Britain and the British Empire since 1714
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

5. Each student, in consultation with the adviser, defines a tertiary field. This requirement may be satisfied by taking two courses outside the Department of History related to the student’s training as a professional historian.
6. Each student, before conferral of the Ph.D., is required to satisfy the department’s teaching requirement.
7. 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 fields where appropriate. The faculty in the major field prescribes the necessary languages. In no field 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 field. In either case, certification of language competence must be accomplished before a student takes the University oral examination.
8. The student is expected to take the University oral examination in the major field early in the third graduate year.
9. 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, please 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. For description of that program, 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 include the following.

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, on Eastern Europe including the Soviet Union, on East Asia (runs of important newspapers and serials and extensive documentary collections, especially for the period of WWII) and on 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.

COURSES

See Time Schedule for changes in course offerings each quarter. The department also maintains a bulletin board with updated information.

INTRODUCTORY

1, 2, 3. Europe: From Antiquity to the Present—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, innovations emerging with modern industrial society, and global consequences of European and American developments. Meets three hours weekly with lecturers from the regular history faculty and two hours a week for colloquia in small groups led by postdoctoral fellows. Enrollment limited; students intending to apply the sequence toward their Area 1 requirement are given priority.

1. Europe: Antiquity to 1550—Survey and interpretation of the main developments of European history and its sources from the first cities and empires in the Middle East to the Protestant Reformation. Emphasis is on the variety of European societies and cultures and the interaction of Europe with the world beyond its borders, as foreign people and ideas influence Europe and as European people encounter other cultures through trade, crusades, wars, and exploration. DR: 1, three-quarter sequence

5 units, Aut (Ozment) lectures
plus two-hour colloquium

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

5 units, Win (Baker) lectures
plus two-hour colloquium

3. Europe: 1789 to the Present—European and American history since 1789 has been a persistent attempt to come to terms with the promise and perils of the great revolutions of the 18th century. Emphasis is on the divergent paths of European and American democracies
set against a variety of political, social, and ideological movements. DR:1, three-quarter sequence
5 units, Spr (Kennedy, Sheehan)
lectures plus two-hour colloquium

24A. Russian Civilization from 9th to 17th Centuries—Interdisciplinary approach to Russian history and culture; examines literature, society, institutions. DR:2(*) or 9(5*)
5 units, Spr (Kollmann) MTWTh 10

30S. Introductory Seminar: Men’s Voices, Women’s Voices—Sex and Revolution in 18th-Century France—Relationship between gender and the Enlightenment and French Revolution. How did Enlightenment thinkers write about gender? What roles did gender play in the social and cultural milieu of the philosophies? The ways in which Enlightenment conceptions of gender were enacted and transformed by the French Revolution. Was the French Revolution inherently gendered?
5 units, Spr (Staff) W 1:15-3:05

80. Culture, Politics, and Society in Latin America—(Same as Latin American Studies 80.) Interdisciplinary survey of the development of Latin America from the conquest to debt crisis. Emphasis is on the relationship between economic growth, social change, and the structure of political systems. DR:9(5)
5 units, Win (Haber) TTh 1:15-3:05

SEMINARS

These are intended to introduce the undergraduate major or prospective major to the processes of historical investigation and interpretation by which archival material becomes narrative description and explanation, and by which interpretation itself becomes open to disagreement and revision. The object is to take the beginning student into the historian’s workshop and to provide first hand experience in interpreting documents, in constructing a coherent story from them, in interpreting their larger implications, and in discovering why it is possible to agree on the facts but to disagree on what they mean. These courses are numbered 1 through 99 followed by the letter “S.”

7S. Introductory Seminar: Joan of Arc.
5 units, Spr (Langmuir) Th 2:15-4:05

12S. Introductory Seminar: The Influence of Rome on Anglo-Saxon England—What elements of Roman culture survived the Anglo-Saxon invasions? What elements were reimported? How did the Anglo-Saxons adapt Roman ideas and institutions to meet the needs of their own Germanic society? Primary sources and modern works; students reconsider the historical debates over the Roman contribution to Anglo-Saxon society. Topics: the legend of King Arthur, conversion to Christianity, canon and secular law, kingship and governance, education and literature.
5 units, Aut (Staff) M 1:15-3:05

15S. Introductory Seminar: The Medieval Church and Violence—Opposition 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, seminar 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, Win (Buc) Th 2:15-4:05

25S. Introductory Seminar: History and Modern Ideology—Ivan the Terrible in Historical Interpretation—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, Win (Kollmann) W 1:15-3:05

33S. Introductory Seminar: Law and Society in Early Modern Europe—Introduction to themes, readings, and primary sources in the legal history of early modern England and France, focusing on how historians can use legal documents, procedures, and institutions to study European society during this period.
5 units, Win (Margolf) W 1:15-3:05

5 units, Aut (M. L. Roberts) T 1:15-3:05

43S. Introductory Seminar: Britain’s Finest Hour?—WWII was formative for late 20th-century British culture. Attention to the interplay between political and military events and domestic social and economic trends. Historical approaches and source materials uncover the effects of the war on the development of mass culture, attitudes towards the role of the state, the role of women in British society, and Britain’s post-war economic decline.
5 units, Win (Staff) Th 2:15-4:05
53S. Introductory Seminar: Asian American Family History—How Asian American family values have been affected by racism, exclusion movements, immigration restrictions, labor experiences, and the development of Asian American communities from 1870 to the present. Assimilation, acculturation, and ethnic solidarity. The experiences of different Asian American groups, Asian American men and women, and different generations.
5 units, Aut (Staff) W 1:15-3:05

54S. Introductory Seminar: The Environment and American Society since 1900—The evolution of American attitudes toward the environment. Topics: wilderness and species preservation, management of our national parks, strategies of environmental activism, etc. Readings/discussions cover primary documents, historical treatments, and some fiction. Authors: John Muir, Samuel Hays, John McPhee, Rachel Carson, Edward Abbey, and David Brower.
5 units, Win (Staff) Th 2:15-4:05

64S. Introductory Seminar: History of American Indians Since 1900—Introduction to topics in 20th-century Native American history, including early pan-tribal movements, the Indian Reorganization Act, termination and relocation, Indian activism in the 1960s and 70s, and contemporary issues.
5 units, Aut (Staff) T 3:15-5:05

67S. Introductory Seminar: Social Change in Industrializing America—A Case Study of Chicago—Chicago offers a vivid context for an examination of the social and cultural transformations of American society between 1870 and 1920. Topics: immigration and assimilation, creation and experiences of a new industrial workforce, machine politics, architecture and city planning, social reform, and race relations. Readings from contemporary materials (fiction, photographs, memoirs, municipal records, and social criticism.)
5 units, Aut (Sawislak) Th 1:15-3:05

ADVANCED UNDERGRADUATE

100 through 199 are primarily lecture courses.

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. History of Greece—(Enroll in Classics 101.)
4-5 units, Aut (Hanson)

102. Greek and Roman History from Alexander to Caesar—(Enroll in Classics 102.)
4-5 units, Win (Treggiari)

102A. Family, Sex, and Marriage in the Late Roman Republic and Principate—(Enroll in Classics 190.)
3-4 units, Spr (Treggiari)

103. History of the Roman Empire—(Enroll in Classics 103.) DR:7(2)
5 units, Win (Brown, Staff)

105A. Introduction to Medieval Culture—(Enroll in English 165A, Medieval Studies 165.)
DR:7(2)
4-5 units, Win (Staff)

3-4 units, Aut (Bloomer)

113. Art, Religion, and Society in Late Antiquity—(Enroll in Classics 107.)
5 units, Aut (Cleason)

MEDIEVAL AND RENAISSANCE EUROPE

107. Politics and Society in the High Middle Ages: France and Germany, 950-1250—Analyzes the divergent fates of the two major politics borne out of the dissolution of the Carolingian Empire. The crisis of the 11th century (French feudal revolution and dissolution of the German synthesis), the origins of German particularism and of French centralism, ethnic and national consciousness, transformations in society, in lordship, and in administration. DR:9(5)
5 units, Win (Buc) MTWTh 10

108. The Christianization of Western Europe, 500-1350—How the Europeans came to believe in Christ, why the thought and conduct associated with that belief changed so radically, why different forms of religiosity and dramatic conflicts developed, how religious beliefs affected social organization, and how social changes modified religiosity.
5 units, Aut (Langmuir) MTWTh 10

HISTORY OF TECHNOLOGY

104. Historical and Ethical Issues in Population Studies—(Same as Ethics in Society 85.) Populations are composed of majorities and minorities
who compete for power, resources, and relative welfare. Intrinsic is the power to determine basic values (what it is morally right and wrong for groups and individuals), and what “the government” should or should not do about regulating human reproduction, health, death, and migration. Issues: sexuality, contraception, abortion, the control of epidemic diseases, the regulation of private consumption (alcohol, smoking, and drugs) the right to die, and the general freedom to enter or leave a national population. Interdisciplinary, introducing moral history and ethical dimensions of making decisions about moral issues, focusing on how history and ethics combine to influence past and present demographic policies. Moral negotiation is practiced through discussion, and spoken and written argument in ethical discourse.

4-5 units, Aut (Johansson) MTW 9

115. Technology, Science, and European Expansion, 1500-Present—(Same as VTSS 121, History of Science 121.) The interplay between the growth of science and technology since the Renaissance and expansion of European influence. Topics: military technology and empire building; science and technology in the periphery or how the creation of botanical gardens, observatories, and similar institutions served the needs of empire builders; and Europeanizing the world or how the transfer of European cultural traditions and institutions changed their imperial holdings. DR:9(5)

4 units, Aut (Pang) MWF 1:15

116A. History of Biological Thought—(Same as History of Science 62, Philosophy 62, VTSS 127.)

4 units, Aut (Smocovitis) MW 2:15-3:30

EASTERN EUROPE AND RUSSIA

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

122B. Soviet Foreign Policy since 1917—(Same as Political Science 136.) 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. DR:9(5)

5 units (Dallin) given 1992-93

123A. Soviet Politics and Society since 1917—(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, Aut (Dallin) MTWTh 11

125. 20th-Century Eastern Europe—Major historical trends in 20th-century Eastern 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

WESTERN EUROPE

127D. 20th-Century Germany—The political, social, economic, and cultural developments of “Germany” from the eve of WWI to the 1990 unification. The German’s search for political democracy and national identity.

5 units, Aut (Sheehan) TTh 1:15-3:05

131. Society and State in Early Modern France, 1500-1789—Surveys political, social, economic, and religious developments in early modern France from the Reformation up to the eve of the French revolution, emphasizing the formation of the “absolutist” French state.

5 units, Spr (Margolff) MTWTh 10

132A. The French Revolution—Focuses on the political culture of the French Revolution, analyzing the creation of revolutionary political discourse and its relation to the political discourse of the Old Regime, the political dynamic introduced in 1789 by the revolutionaries’ efforts to break with the past, and the problems that led the Revolution from representative democracy to the terror.

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

132B. France in the 19th and 20th Centuries—Survey of major political, social, and cultural developments in France between 1815 and WWII. Themes: working out of the revolutionary legacy of ’89; upheavals of 1830, 1848 and 1870; rise of a consumer society; challenges to the third Republic; and the catastrophe of two world wars. Emphasis on primary sources; readings in Tocqueville, Marx, Balzac, Maupassant, Benda, Bloch. DR:9(5)

5 units, Win (M. L. Roberts) MTWTh 11

135. Emancipation of the Jews—Why did modern European states and England “emancipate” the Jews? Legal and philosophical debates over Jewish civic status, societal forces which propelled or retarded movement toward Jewish equality, legislative enactments, and the different course which Jewish emancipation took in England, France, Germany, and Austria.

5 units, Win (Magnus) MTWTh 10

136. Women in 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.

5 units, Spr (Magnus) MTWH 10


5 units, Win (Robinson) MTWH 10

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) MWF 2:15

138D. Origins of Life—(Same as History of Science 156, Philosophy 150.)

4 units, Spr (Lenoir) TTh 2:15-3:30


138A. Ancient Period—DR:8(3); also satisfies Area 4(6) when taken in sequence with 138B or 138C.

4 units, not given 1991-92

138B. Science and Technology in the Scientific Revolution—(Same as VTSS 124.)

DR:8(3); also satisfies Area 4(6) when taken in sequence with 138A.

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

138C. Newton to Einstein—DR:8(3); also satisfies Area 4(6) when taken in sequence with 138A.

4 units, Spr (Staff) MWF 2:15

138D. Topics in the History of Mathematics: From Antiquity to the 17th Century—(Same as History of Science 140, 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.

3 units, not given 1991-92

139. Scientific Revolution—(Same as History of Science 145, Philosophy 145, VTSS 125.) Social, intellectual, and institutional background of the 17th-century period that established modern science. Theories of matter and motion, Galileo, Descartes, Bacon, Boyle, and Newton. Historical controversies: Yates’ thesis on hermeticism and magic, Merton on Protestantism and science, Hessen on the economic basis of scientific change. Readings from era texts and modern historical studies. Interpretations of the revolution and what is meant by science and revolution.

DR:8(3)

5 units, Win (Galison) TTh 11-12:15

BRITAIN

141. Yorkist and Tudor England—The transition from the late medieval realm to the Renaissance monarchy, Henry VIII, the English Reformation, and the new conservatism of the Elizabethan regime.

5 units, Aut (Seaver) MTWH 11

145. Britain, 1815-1914—Aspects of British society: political, cultural, social, and literary. DR:9(5)

5 units, Spr (Stansky) MTWH 11

AFRICA

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, Aut (Jackson) MTWH 9

148C. Africa in the 20th Century—Transformation of African societies during colonial rule. Resistance to colonial conquest; decline of the old elite and rise of the new one; conflicting ideologies and consciousness; nationalism; decolonization. DR:2(*)

5 units, Spr (R. Roberts) MTWH 11

THE UNITED STATES

152. Introduction to Material Culture—(Same as American Studies 152.) American history through the evidence of things. Introduction to methods of interpreting or “reading” artifacts and to different categories of material culture, including folk art, industrially produced artifacts and vernacular architecture and landscape.

5 units, given 1992-93

154. Peace Studies—(Same as Sociology 108, Political Science 133, Psychology 142, Education 173X, Religious Studies 158.) 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, psy-
chological, and moral perspectives. Goal: illustrate the current and potential contributions of various academic disciplines and critical analyses to the study of peace, 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.

156. The History of Human Differences: The Disability Minorities in America—Reconceptualizations of “disability” as socially constructed. Examination of historical experience of the disability minorities in confronting a common set of stigmatizing values that define their social identities. Ideological history of “disability” in policy, medicine, rehabilitation, social welfare, and the arts and media. Contemporary social and political movements redefining identities of people with disabilities.

5 units, Win (Longmore) MTWTh 10

157. Introduction to Afro-American History—DR:3

3 units, Aut (Carson) MTW 10

158. History of Education in the United States—(Same as Education 201.) Analysis of selected turning points in education in relation to religion, political socialization, race relations, immigration, and urbanization.

3 units (Tyack) not given 1991-92

158B. Politics and Policy for Children, Youth, and Families—(Same as Education 105, Political Science 188K.)

3 units, Aut (Kirst) MWF 2:15

159. Introduction to Asian American History—The historical experience of people of Asian ancestry in the U.S. Immigration, labor, community formation, family, culture and identity, and contemporary social and political controversies. Readings: interpretative texts, primary material, and historical fiction. Lectures/discussion. DR:3

4-5 units, Aut (Chang) MTWTh 10

163A. Transformation of American Thought and Culture, 1865 to the Present—(Same as American Studies 151.) DR:8f(3)

5 units, Win (Gillam) MTWTh 9

164. Race and Ethnicity in American Experience—(Same as American Studies 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 major minority populations. Focuses on developments during the past two centuries. DR:3

5 units, Spr (Camarillo, Fredrickson)

MWF 11-12:15

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.

165A. Colonial and Revolutionary America—In alternate years emphasis is on the political and social history of the Revolutionary era (1991-92), or on the development of American society prior to the Revolution.

5 units, Aut (Rakove) MTWTh 11

165B. 19th-Century America.

5 units, Win (Sawislak) MTWTh 11

165C. 20th-Century America.

5 units, Spr (Bernstein, Camarillo) MTWTh 1:15

172A. America since 1945—Analyzes foreign policy and politics, and deals with social themes and intellectual history. DR:9f(5)

4-5 units (Bernstein) given 1992-93

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:9f(5)

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

173C. Introduction to Feminist Studies: Issues and Methods—(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:9f(5)

5 units, Win (Freedman) MWF 1:15-3:05

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 (Bouwer) MTWTh 10

MIDDLE EAST

184. The History of Iran: Achaemenids to the 20th Century—Iran from ancient times through the Muslim conquest to the 20th century. Focus is on political and social history, the relationship between secular and religious institutions, numismatics and trade, the status of minorities, and Iranian influences on Greece, Anatolia, Arabia, and Central Asia, Achaemenid, Seleucid, Parthian, sasanian, 'Umayyad, 'Abbasid, Seljuk, Mongol, Safavid, Qajar, and Pahlavi dynasties, and the Islamic republic.

5 units, Spr (Choksy) TTh 2:15-4:05

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(*) or DR:8(3)

5 units, Win (Beinin) MTWTh 9


5 units, Win (Mancall) MTWTh 10


5 units, Spr (Mancall) MTWTh 9

187B. The Modern Middle East: 1718-Present—From the emergence of regional Arab entities and the commercial penetration of Europe to the present. DR:2(*) or DR:9(5*)

5 units, Aut (Beinin) MTWTh 9

188B. Jewish History from 1492 to the Present—Social, political, religious, and intellectual developments from the late middle ages to the present. Jewish messianism, the structure of Jewish communal life, the transformation of religious patterns, emancipatory and postliberal (e.g., Jewish nationalist, Zionist) politics, the phenomenon of "non-Jewish Jews" (Marx, Trotsky, Freud), antisemitism, the Holocaust, and the reconstruction of postwar Jewish life. Stresses Europe and 20th-century America.

5 units, Aut (Zipperstein) TWH 1:15

189A. Zionism and the State of Israel—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; relationships with the Palestinians and their responses to Zionism; the revolt against the British; establishment of the State of Israel.

5 units, Aut (Mancall) MTWTh 9

189B. The State of Israel: 1948 to the Present—Political, social, economic, and cultural history of the State of Israel; its international relations and its relations with Jewish communities outside of Israel.

5 units, Win (Mancall) MTWTh 9

EAST ASIA

192A. China from Earliest Times to the 9th Century—(Same as Asian Languages 156.) DR:2(*)

5 units, Aut (Dien) MTWThF 11

192C. Modern and Contemporary Chinese History—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

193. Science and Technology in Traditional China—(Same as Asian Languages 153, History of Science 153.) Technological achievements and scientific undertakings of traditional China, and ideological and social factors which aided or hindered such enterprises. DR:2(*)

5 units (Dien) given 1992-93

194A. Early and Medieval Japan to 1500—Prehistoric origins of the people and culture, emergence of the first polity, Chinese influences, flowering of the native culture, the samurai, and feudal government.

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) MTWTh 9

194C. The Rise of Modern Japan—DR:2(*)
5 units, Spr (Waswo) MTWTh 1:15

195. Nomad Empires of Inner Asia—(Same as Asian Languages 152.) DR:2(*)
4-5 units, Win (Dien) MTWThF 2:15

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 encourage discussion and debate on 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. The final paper should be about 20 pages in length.

Courses 200 through 299 are primarily for juniors and seniors majoring in history. Admission to seminars and colloquia is by consent of the instructor.

200A,B,C. Senior Honors.
units by arrangement (Staff)

200H. History Honors Colloquium.
3 units, Spr (Emmons)

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.)

201. Undergraduate Colloquium: Theaters of Power—Considers aspects of historical constitution of power. General and theoretical approaches to the question; construction and uses of ritual, history, and the social in the constitution and representation of power. Examples from Japanese and French history.
5 units, Spr (Baker, Ketelaar) T 1:15-4:05

202. Undergraduate Colloquium: Introduction to Problems of Historical Interpretation and Explanation—(Also listed as 200H and 302A.)
5 units, Spr (Emmons) W 2:15-4:05

205. Undergraduate Colloquium: Mycenaean Greece—(Enroll in Classics 178/378.) The rise, economic and administrative structure, and collapse of Mycenaean civilization in the Bronze Age Aegean. Interdisciplinary approach. Topics: relationship between Mycenaean and Minoans, international trade and diplomatic relations in the Late Bronze Age Mediterranean, and the nature of later Greek legends about their heroic Mycenaean past.
3-4 units, Spr (Munn)

206. Undergraduate Colloquium: Magna Carta—The background, nature, and immediate results of the most famous document in English history. The importance of English common law for the character of Magna Carta and the importance of Magna Carta for the emergence, by the end of the 13th century, of Parliament.
5 units, Win (Langmuir) T 2:15-4:05

206S. Senior Research Seminar: The Churches and the Kingdoms—Secular and Ecclesiastical Powers in Conflict and Dialogue, 300-1350—Open to advanced majors or by 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, and the place of ecclesiastical lordship in the world of the secular aristocracy.
5 units, Spr (Buc) W 1:15-3:05

218. Undergraduate Colloquium: Stalin and Stalinism—Western and Soviet interpretations of the rise and rule of Stalin. Topics: relation of Bolshevism and Stalinism, "revolution from above" in 1929, origins and outcome of the Great Purge, Stalin in WWII, and the meaning of Stalin cult. Readings from the major biographies and from the recent work of social historians; survey of revelations and re-interpretations in the Soviet Union since 1985.
5 units, Spr (Patenaude) W 1:15-3:05

219. Undergraduate Colloquium: Major Problems in Soviet History—(Same as Political Science 226C.) Critical reading of diverse interpretations of, e.g., 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, Aut (Dallin) T 2:15-4:05
220. Undergraduate Colloquium: Religion and Politics in Russian and Soviet History, 1864 to Present—The interaction between religion and politics during the late Imperial and Soviet periods, focusing on the relationship between the politics of the “center” (the regime or national political party), and the everyday religious life of the “common people.” Topics: Populists’ and Democrats’ assessment of religion (especially sectarian movements), the cults of Lenin and Stalin, the anti-religious campaign of the 1920s and 30s, and Stalin’s accommodation with the Russian Orthodox Church during WWII.

5 units, Aut (Young) Th 2:15-4:05

220S. Senior Research Seminar: Topics in U.S.-Soviet Relations—Survey of the major issues in U.S.-Soviet relations from 1917 to the end of the Brezhnev era, including the historical background of Russian-American relations. Woodrow Wilson and the Russian Revolution, the period of “non-recognition” to 1933, the “strange alliance” in WWII, key moments in the development of the Cold War, and the rise and fall of detente. Students research primary documents in the Hoover Institution archives and incorporate their findings into seminar papers.

5 units, Spr (Patenaude) T 1:15-3:05

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 the peace. The relationship between social changes and political movements. The complex nationality issues involving Poles, Jews, Germans, Russians, and Ukrainians.

5 units, Win (Naimark) W 2:15-4:05

224. Undergraduate Colloquium: Stalinism in Eastern Europe—The origins and history of Stalinism in Eastern Europe. The ways Eastern European countries have confronted the Stalinist past. Readings focus on historical and literary representations of Stalinist theory and practice.

5 units, Spr (Patenaude) W 2:15-4:05

230A. Undergraduate Colloquium: Women and Gender in Modern France—(Same as French 189A) Women’s lives and the importance of gender issues in French politics and society from the late 18th to the early 20th century. Topics: role of women in revolutionary and utopian politics, work and domesticity in an industrializing society, and changing notions of sexuality and sexual difference. DR:9(5)

5 units, Spr (M. L. Roberts) Th 2:15-4:05

231A. Undergraduate Colloquium: The Historiography of Reformation Europe 1450-1650—(Same as 331A) For upper-level undergraduates. Introduction to the variety of scholarship on Reformation Europe. Classic and especially recent studies read and discussed. Attention to national traditions and major historiographical controversies.

5 units, Aut (Ozment) W 1:15-3:05

233A. Undergraduate Colloquium: Modern Jewry—Its rise from poverty to middle-class prosperity, its passage from traditionalism to modernity and its unique contributions: Jewish Enlightenment, Reform, the “scientific study of Judaism,” “Historical-Positive Judaism,” Neo-Orthodoxy, organized feminism. Its painful conflict over “Ostjuden,” and its political choices and fate in Weimar, until the Nazi takeover.

5 units, Win (Magnus) W 1:15-3:05

234. Undergraduate Colloquium: The Family in Early Modern Europe—Readings/discussion about the family in European history during the 16th-through the 18th-centuries, including marriage, childrearing, and the family’s place in the political and economic structures of early modern society. DR:9(5)

5 units, Aut (Margolf) Th 1:15-3:05

235. Undergraduate Colloquium: War in European Society—Traces the development of European military theory and practice from the early 19th century to 1945, relates this to changes in European society, and shows how the history of war illuminates our contemporary predicament.

5 units, Spr (Sheehan) W 2:15-4:05

236. Undergraduate Colloquium: Crime and Social Order in Early Modern Europe—(Same as 336) Readings/discussion about crime in France and England during the 16th through the 18th centuries, focusing on how historians study criminality as a facet of early modern political and social relations.

5 units, Spr (Margolf) T 1:15-3:05

237A. Undergraduate Colloquium: The Theory and Practice of Jewish Community in Modernity—The breakdown and re-integration of individual and communal identity after the fall of the ghetto and abolition of Jewish communal autonomy in western and central Europe. Through organizational histories, biography, autobiography, and at least one novel from the period, studies ideologies of assimilation and continuity; Jewish “self-hate,” ambivalence and national consciousness; religious and self-defense institutions.

5 units, Spr (Magnus) W1:15-3:05

238. Undergraduate Colloquium: Sigmund Freud—Introduction to the life and thought of Sigmund Freud as the most influential thinker of the 20th century. Readings: Ernest Jones’ biography, Introductory Lectures on Psychoanalysis, two famous case histories, Freud’s most impor-
tant writings on female psychology, and a selection of his historical and cultural works.

5 units, Aut (Robinson) W 2:15-4:05

239. Undergraduate Colloquium: Gender, Class, and Social Transformation in Modern Europe—How gender and class shaped social transformations in Europe 1850 to 1945: industrialization, middle-class and working-class formation, social and political movements (socialist, religious, middle-class reform movements), WWI, the rise of Nazism in Germany, the emergence of the welfare state. Focusing on England, France, and Germany, analyzes and compares how class, gender, and sexuality shaped these processes and the extent to which definitions of masculinity and femininity were transformed by them.

5 units, Aut (Canning) Th 2:15-4:05

241S. 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 shape the investigation, and critiques a draft of the research paper.

5 units, Win (Seaver) T 2:15-4:05

246. Undergraduate Colloquium: Black Hair as Culture and History—(Same as 346.) The evolution of black hair styles through time; how black hair has intersected with politics, urbanization, art, and collective psychology.

5 units, Spr (Jackson) Th 2:15-4:05

247. Undergraduate Colloquium: East Africa and its Historical Writing—(Same as 347.) The area has generated rich, dynamic historical literature, particularly for the colonial period. Survey of this literature; what drives the production of history in E. Africa.

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

248. Undergraduate Colloquium: Culture Contact and Cultural Transformations in Precolonial Africa—(Same as 348.) Focuses on the dynamics of culture contact and the transformational impact these contacts had on the cultures of those African societies which were recipients of new ideas, peoples and/or material cultures. Cultural contacts include those which have occurred among different African communities, and those between different African, Islamic, and European cultures. The social implications of the cultural changes.

5 units, Aut (Greene) T 1:15-3:05

248D. Undergraduate Colloquium: Law in Colonial Africa.

5 units, Spr (R. Roberts) Th 2:15-4:05

248S. Senior Research Seminar: Colonial State and Society in Africa.

5 units, Win (R. Roberts) T 2:15-4:05

249S. Senior Research Seminar: The Colonial State and Society in Africa.

5 units, Spr (R. Roberts) T 2:15-4:05

250. Core Seminar: The American Character—(Same as American Studies 200.) DR:3

5 units, Aut (Cilliam) TTh 1:15-4:05

250A. Undergraduate Colloquium: The Constitution in American Politics—(Same as American Studies 225.) 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, Win (Rakove) Th 1:15-4:05

251S. Senior Research Seminar: Poverty and Homelessness in America—Students participate in a research and/or administrative internship with the Emergency Housing Consortium, the primary agency providing shelter for homeless people in Santa Clara and San Mateo counties, applying classroom learning about homelessness to the internship. Must interview with the professor before enrolling.

5 units, Win (Camarillo) T 2:15-4:05

252. Undergraduate Colloquium: The Rhetoric of Technology in 20th-Century America—(Same as American Studies 221, VTSS 157.) Technical artifacts as sites around which groups construct and contest cultural meaning. The rhetoric employed in popular media to discuss technologies (e.g., telephone, airplane, and computers) to illuminate changes in the autonomy or dependency of individuals and particular groups in society; the relative authority and power of technical experts and amateurs; and in the values, beliefs and practices of individuals and groups vs. machines.

5 units, Aut (J. Corn) W 3:15-5:05

253. Undergraduate Colloquium: U.S.-European Relations, 1945-1991—Students analyze and debate case studies in American diplomacy and in the transatlantic policy issues, 1945-1991, persisting in: relations with Moscow; the 45-year division (and current reunification) of Germany and Europe; NATO’s strategy, burden-sharing, and build-up (and prospective build-down) of nuclear and conventional forces; negotiations on strategic arms and Star Wars; U.S. trade deficits, Europe’s Common Market and the roller-coaster dollar. Challenges ahead for Europe (and “declining” America); Gorbachev in the East, 1992 in the West and reshaping of Europe, the roles of the U.S. and a reunified Germany after the Revolution of 1989

5 units, Spr (Kleiman) Th 2:15-5:05
253A. Undergraduate Colloquium: Topics in the History of the American West—(Same as American Studies 225.) Thematic study of the American West since 1850, emphasizing social and cultural history. Topics: Indian-Anglo relations; labor systems of a resource-intensive economy; the impact of federal policies; efforts to control the region's environment; the experience of Westward migration; the ideology of the frontier in American Culture.
5 units, Aut (Sawislak) W 2:15-4:05

255. Undergraduate Colloquium: The Religious Dimensions of American History—Major themes in American religious experience. Major role of religion in individualistic and pluralistic society in defining relationships of individuals to community and in working out cultural differences and unifying values.
5 units, Spr (Longmore) Th 1:15-4:05

257. Undergraduate Colloquium: The Cultures of Early America—In 17th- and 18th-century N. America, a Native, European, and African peoples collided and cooperated to create the several regional cultures that became the U.S. Readings in recent literature in social and cultural history and historical geography explore processes of culture creation.
5 units, Spr (Longmore) T 1:15-3:05

260A. Undergraduate Colloquium: The American Character—(Same as American Studies 200.) Descriptions of historical, literary, psychological, and sociological insights into the American character since the 17th century. DR:3
5 units, Spr (Rakove) Th 1:15-3:05

261. Undergraduate Colloquium: Nuclear Weapons and International Relations—Theories and History—(Same as Political Science 246.) Theories of arms racing, deterrence, and nuclear diplomacy, evaluating these in light of the emerging field of nuclear history. Based on the experience of the main nuclear weapons states.
5 units, Spr (Holloway, Bernstein)
Th 2:30-4:30

262. Undergraduate Colloquium: The American 1960s—Thought, Protest, and Culture—(Same as American Studies 214.) DR:3†
5 units, Spr (Gillam)

262A. Undergraduate Colloquium: Race and Ethnicity in American Cities—History and Public Policy—Given at Stanford in Washington.
5 units, Aut (Camarillo) by arrangement

264S. Senior Research Seminar: Martin Luther King and Civil Rights.
5 units, Aut (Carson) T 1:15-3:05

265A. Undergraduate Colloquium: Sexuality in American History—For graduate students and senior History or Feminist Studies majors. Readings on the social construction of sexuality, primarily U.S., in the 19th and 20th centuries. Topics: the histories of contraception and abortion, prostitution, homosexuality, race and sexuality, social and political movements shaping sexual values and practices. Enrollment limited to 15. Prerequisite: consent of instructor; apply for admission in writing by the end of Winter Quarter.
5 units, Spr (Freedman) Th 2:15-4:05

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, Spr (Chang) W 2:15-4:05

266S. Senior Research Seminar: Oral History.
5 units, Aut (Longmore) T 1:15-3:05

5 units, Aut (Fredrickson) M 1:15-3:05

273. Undergraduate Colloquium: The History of Mental Illness in the U.S.—(Same as 373.) Mental illness as a medical and social phenomenon. English and European background in the 17th century; the U.S. chronologically to the mid-20th century. The relativity of changing conceptions of madness and sanity by linking these to socially defined behavioral norms and notions of deviance. Cases of "madness in social context" examine how certain types of behavior were interpreted in different historical periods; how specific settings promoted or found problematic certain symptoms or personality types. The rise of the scientific understanding of mental illness and medical therapeutics to treat it, and the emergence of institutions and professions to promote mental health and care for the mentally ill.
5 units, Win (Horn) W 2:15-4:05

277. Undergraduate Colloquium: Latin American Dictatorship in Historical Perspective—Survey of the persistent phenomenon of the Latin American Caudillo, or dictator, from colonial times to the present. Whether caudillism is indigenous to Latin American political culture, the conditions under which it flourishes and relationship between personality and power. Case stud-
ies of Santa Anna, the Perons, Porfirio Diaz, Fidel Castro, Juan Manuel Noriega, and others.

5 units, Win (Campbell) W 1:15-3:05

279. Undergraduate Colloquium: Resistance and Rebellion in Latin America—Surveys important rebellions in Latin America during the 18th and 19th centuries in an effort to determine the underlying causes of resistance to the state; the social, economic, and political consequences of these protests; and the relationship between disorder and progress. Case studies of rebel movements are supplemented by films and original source materials.

5 units, Spr (Zipperstein) MTWTh 9


5 units, Win (Haber) T 3:15-5:05

284. Undergraduate Colloquium: History, Gender, and Religion—Women in Muslim and Zoroastrian Societies—Historical and comparative examination of female images and roles of women in medieval and contemporary Islamic and Zoroastrian communities. Seminar focuses on methodological issues with specific examples. Topics: representation of feminine models in scripture, functions ascribed to female spiritual beings, aspects of sanctity and sexuality, gender-based differences in attitudes toward women, and sex-based inequalities in influence and authority. Examples from Jewish and Christian communities supplement the discussions.

5 units, Win (Choksy) T 2:15-4:05

285S. Senior Research Seminar: Origins of the Persian Gulf War—For advanced undergraduates. Some background in history or politics of the Middle East or U.S. foreign policy. Prerequisite: consent of the instructor.

5 units, Spr (Kahn) W 1:15-3:05

288. Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict—The Palestine-Zionist conflict from 1882 to the present through reading and comparing representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948.

5 units, Spr (Beinin) W 2:15-4:05

288C. Undergraduate Colloquium: Russian and Soviet Jewish History—Themes in Russian and Soviet Jewish historiography, emphasizing social and cultural trends, e.g., the transformation of leadership, occupational, and demographic patterns, from late 18th century until the consolidation of Stalinism in 1929. Emergence of modern Jewish social and political ideologies (e.g., Jewish socialism, Zionism) with attention to the social background to ideological change.

5 units, Spr (Zipperstein) MTWTh 9

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, Win (Rodrique) W 2:15-4:05

290S. Senior Research Seminar: The Taiping Rebellion—Practical training in historical research methods. Emphasis on oral history interviewing. Weighing, interpreting, and combining evidence from oral, written, and non-verbal sources.

5 units, Aut (Kahn) W 1:15-3:05

293. Undergraduate Colloquium: China's Inner Asian Borderlands—The relationship with China of three Inner Asian regions—Tibet, Eastern Turkestan (Chinese Xinjiang), and Mongolia—from the mid-17th century to the mid-20th, (the Qing and to the Republican periods). Readings/discussion of minority policy and ethnic/regional separatism under the People's Republic.

5 units, Spr (Staff) M 3:15-5:05

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, Spr (Ketelaar) Th 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, Aut (Kahn) T 1:15-3:05

300W. Graduate Directed Reading.

units by arrangement (Staff)
301. Graduate Colloquium: Theaters of Power—(Same as 201.)
   5 units, Spr (Baker, Ketelaar) T 1:15-3:05

302A. Graduate Colloquium: Introduction to Problems of Historical Interpretation and Explanation.
   5 units, Spr (Emmons) W 2:15-4:05

   5 units, Aut (Haber) T 3:15-5:05

304A. Graduate Colloquium: Historiography of Colonial Spanish America.
   5 units, Aut (Bowser) W 2:15-4:05

304B. Graduate Colloquium: Historiography of Colonial Spanish America.
   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.
   5 units, Aut (Bowser) Th 3:15-5:05

304D. Graduate Colloquium: Core Seminar in Latin American Studies.—(Same as Latin American Studies 251.)
   5 units, Win (Staff) Th 4:15-6:05

306. Graduate Colloquium: The Language of Politics in the Western Middle Ages.
   5 units, Spr (Buc) Th 1:15-3:05

307. Graduate Core Colloquium in Medieval History.
   5 units, Aut (Buc) Th 1:15-3:05

308. Graduate Colloquium: The Religious Crisis of the 11th and 12th Centuries.
   5 units, Spr (Langmuir) Th 2:15-4:05

313. Graduate Colloquium: The Renaissance.
   5 units, Win (Brown) T 1:15-3:05

317. Graduate Colloquium: War and Postwar Poland.
   5 units, Win (Naimark) W 2:15-4:05

319A. Graduate Colloquium: Major Problems in Soviet History and Politics.
   5 units, Aut (Dallin) T 2:15-4:05

320A. Graduate Colloquium: Topics in Early Modern Russian History.
   5 units, Win (Kollmann) M 1:15-3:05

320B. Graduate Colloquium: Topics in Modern Russia.
   5 units, Spr (Emmons) by arrangement

321. Graduate Colloquium: Sources and Methods in Early Modern Russian History.
   5 units, Aut (Kollmann) T 2:15-4:05

328A. Graduate Colloquium: The German Question.
   5 units, Win (Sheehan) T 2:15-4:05

330. Graduate Colloquium: The Old Regime and the French Revolution.
   5 units, Aut (Baker) T 1:15-3:05

331A. Graduate Core Colloquium: The Historiography of Reformation Europe 1450-1650—
   (Same as 231A.)
   5 units, Aut (Osment) W 1:15-3:05

331B. Graduate Core Colloquium on Modern Europe—Examination of various topics in the history of women and gender in Europe, particularly France and Britain. Emphasis on theory and methodology, family, revolutionary politics, class, sexuality, and gender ideology.

331D. Graduate Core Colloquium on Modern Europe.
   5 units, Aut (Baker) W 2:15-4:05

331E. Graduate Core Colloquium on Modern Europe.
   5 units, Win (Sheehan) W 2:15-4:05

331F. Graduate Core Colloquium on Modern Europe.
   5 units, Spr (M. L. Roberts) W 2:15-4:05

335. Graduate Colloquium: War and Society.
   5 units, Spr (Sheehan) W 2:15-4:05

336. Graduate Colloquium: Crime and Social Order in Early Modern Europe—(Same as 226.)
   5 units, Spr (Margolf) T 1:15-3:05

337A. Graduate Colloquium: Technologies and Practices of "Recording," 1860-1940—(Enroll in History of Science 237, Comparative Literature 260.)
   3-5 units, Aut (Gumbrecht, Lenoir)
   Th 3:15-6:05

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

344A. Graduate Colloquium: Problems in Modern British Society.
   5 units, Aut (Stansky) M 2:15-4:05

346. Graduate Colloquium: Black Hair as Culture and History—(Same as 246.)
   5 units, Spr (Jackson) Th 2:15-4:05

347. Graduate Colloquium: East Africa and Its Historical Writing—(Same as 247.) The area has generated rich, dynamic historical literature, particularly for the colonial period. Survey of this literature; what drives the production of history in E. Africa.
   5 units, Win (Jackson) Th 3:15-5:05
347B. Graduate Core Colloquium: African History—The Colonial Period.
5 units, Win (R. Roberts) Th 2:15-4:05

348. Graduate Colloquium: Culture Contact and Cultural Transformations in Precolonial Africa.
5 units, Aut (Greene) T 1:15-3:05

348A. Graduate Colloquium: End of Slavery in Africa and the Americas.
5 units (R. Roberts) not given 1991-92

348C. Graduate Colloquium: Problems in the Economic History of West Africa.
5 units (R. Roberts) not given 1991-92

348D. Graduate Colloquium: Law in Colonial Africa.
5 units, Spr (R. Roberts) Th 2:15-4:05

349A. Graduate Colloquium: Africa Since 1945.
5 units, Spr (Jackson) W 2:15-4:05

350. Graduate Colloquium: American Working-Class History.
5 units, Spr (Sawislak) T 1:15-3:05

351A, B, C, D, E, F. Graduate Core Colloquium in American History.
30 units

351A. Graduate Core Colloquium: American History—Part I.
5 units, Aut (Rakove) TF 2:15-4:052

351B. Graduate Core Colloquium: American History—Part II.
5 units Aut (Freedman) TF 2:15-4:05

351C. Graduate Core Colloquium: American History—Part III.
5 units, Win (Fredrickson) TF 2:15-4:05

351D. Graduate Core Colloquium: American History—Part IV.
5 units, Win (Chang) TF 2:15-4:05

351E. Graduate Core Colloquium in American History—Part V.
5 units, Win (Kennedy) TF 2:15-4:05

351F. Graduate Core Colloquium in American History—Part VI.
5 units, Spr (Bernstein) TF 2:35-4:45

352. Graduate Colloquium: Decision-Making in International Crises.
5 units, Win (Bernstein) T 2:15-4:30

353. Graduate Colloquium: U.S.-European Relations, 1945-1991—(Same as 253.)
5 units, Spr (Kleiman) Th 2:15-5:054

361. Graduate Colloquium: Nuclear Weapons and International Relations—Theories and History—(Same as 261.)
5 units, Spr (Holloway, Bernstein) Th 2:30-4:30

365A. Graduate Colloquium: Sexuality in American History.
5 units, Spr (Freedman) Th 2:15-4:05

373. Graduate Colloquium: The Social History of Mental Illness in the U.S.—(Same as 273.)
5 units, Win (Horn) W 2:15-4:05

381. Graduate Colloquium: Agrarian Structure and Agrarian Change in Europe and Latin America.
5 units, Aut (Haber) M 1:15-3:05

382. Graduate Colloquium: Labor in Brazil—Workers, labor, and culture in Brazil.
5 units, Spr (Prado) W 1:15-3:05

387. Graduate Colloquium: Imperialism, Underdevelopment, and Revolution in the Modern Middle East.
5 units, Win (Beinin) W 2:15-4:05

388A. Graduate Colloquium: Problems in Jewish History.
5 units, Aut (Mancall)

390B. Graduate Colloquium: Topics in Late Traditional and Modern Chinese History.
5 units, Win (Van Slyke) T 1:15-3:05

390C. Graduate Colloquium: Topics in Late Traditional and Modern Chinese History.
5 units, Spr (Van Slyke) T 1:15-3:05

395A. Graduate Colloquium: Early and Medieval Japan.
5 units, Aut (Mass) W 2:15-4:05

395B. Graduate Colloquium: Medieval and Early Modern Japan—Examination of historical and historiographical issues, orthodox and heterodox, germane to the period and its modern interpretations.
5 units, Win (Ketelaar) Th 1:15-4:05

395C. Graduate Colloquium: Modern Japan.
5 units, Spr (Waswo) Th 3:15-5:05

5 units, Win (Mass) by arrangement

399. Graduate Colloquium: The Institutions of Medieval Japan.
5 units, Spr (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)

5 units, Win (Jackson) Th 3:15-5:05
408. Graduate Seminar in Medieval History.
5 units, Spr (Langmuir) T 2:15-4:05

420. Graduate Seminar: Topics in Modern East
European History.
5 units, Spr (Naimark) T 2:15-4:05

421B. Topics in Russian History.
5 units, Spr (Emmons)

422A. Introduction to Graduate Research on
Soviet History—(Same as Political Science
237A.)
5 units, Win (Dallin) W 2:15-5:05

429. Graduate Seminar: History of German De-

corative Republic.
5 units, Spr (Naimark) Th 1:15-3:05

430. Graduate Seminar: Topics in French His-
tory.
5 units, Win (Baker) Th 2:15-4:05

430A. Graduate Seminar: Topics in French History.
5 units, Spr (Baker) by arrangement

433A. Graduate Seminar: 19th-Century Europe.
5 units, Aut (Sheehan)

442. Graduate Seminar: Early Modern
Britain—England.
5 units, Win (Seaver) Th 2:15-4:05

5 units, Spr (Stansky) Th 1:15-3:05

448. Graduate Seminar: Colonial State and So-
ciety in Africa.
5 units, Win (R. Roberts) T 2:15-4:05

449. Graduate Seminar: Colonial State and So-
ciety in Africa.
5 units, Spr (R. Roberts) T 2:15-4:05

454. Graduate Seminar: Culture and Ideology in
19th-Century America.
5 units, Spr (Fredrickson) Th 2:15-4:05

456A. Graduate Seminar: United States in the
20th Century.
5 units, Win (Kennedy) by arrangement

456B. Graduate Seminar: United States in the
20th Century.
5 units, Spr (Kennedy) by arrangement

479. Graduate Seminar: Economic History of Latin America.
5 units, Spr (Haber) M 3:15-5:05

490A. Graduate Seminar: Modern China.
5 units, Win (Van Slyke) W 3:15-5:05

490B. Graduate Seminar: Research in Modern and Contemporary China.
5 units, Spr (Van Slyke) by arrangement

498. Graduate Seminar: Japanese Historical Texts—(Same as Asian Languages 251.)
5 units, Win (Mass) W 2:15-4:05

OVERSEAS STUDIES
These courses are approved for the History major and taught overseas at the campus indicated. Students should discuss with their major advisers which courses would best meet individual needs. Descriptions are in the "Overseas Studies" section of this bulletin or at the Overseas Studies office, 126 Sweet Hall.

102V. International Politics in the Era of Two World Wars—Oxford. DR:9(5)
5 units, Spr (Moshaver)

106V. Italy: From an Agrarian to a Post-Industrial Society—Florence. DR:9(5)
4 units, Win (Mammarella)

120V. History of Eastern Europe—Krakow. DR:9(5)
4 units, Spr (Baran)

134V. History of the European Community— Flore.
5 units, Aut (Mammarella)

140V. English Social History from 1800 to the 1980s—Oxford.
5 units, Win (Tyack)

5 units, Spr (Darwin)

227V. Introduction to German History: Politics and Culture from the Middle Ages to the Uni-
ification of Germany, 900 to 1870—Berlin. DR:9(5)
4 units, Aut (Neckenig)

228V. A Century of Media Technology in Ger-
many: 1840-1940—Berlin.
4-5 units, Aut (Neckenig)

230B. Berlin: Its History, Politics, and Cul-
ture—Berlin. DR:9(5)
4 units, Spr (Neckenig)

DR:9(5)
4-5 units, Win (Green)

240V. History and Archaeology of the British Landscape—Oxford. DR:9(5)
4 units, Aut (Miles, Rowley)
466 SCHOOL OF HUMANITIES AND SCIENCES

PROGRAM IN THE HISTORY OF SCIENCE

Professors: Peter Galison, Wilbur Knorr (on leave Autumn, Winter)
Associate Professor: Timothy Lenoir
Committee in Charge: Peter Galison (Philosophy and Physics), Wilbur Knorr (Classics and Philosophy), (Co-Chairs); James Adams (Engineering), Barton Bernstein (History), John A. Dupré (Philosophy), Francis Everitt (Physics), Marcus W. Feldman (Biological Sciences), Alexander Fetter (Physics), Timothy Lenoir (History), Burton Richter (SLAC), James J. Sheehan (History)
Affiliated Faculty: Joseph J. Corn (on leave), Albert E. Dien (Asian Languages), Peter Godfrey-Smith (Philosophy), Hans Ulrich Cumbrecht (Comparative Literature), Henry Lowood (Curator, Germanic Collections)
Visiting Faculty: Vassiliki Smocovitis

The Program in the History of Science serves as a focus for activities at Stanford relating to the historical and contemporary aspects of science. This includes sponsoring a series of colloquia in which speakers from history of science and technology, history, philosophy, medicine, and the sciences address current problems in the history of science. The program collaborates with the University libraries' special collections in the history of science and cooperates with other departments and programs in the administration of undergraduate and graduate majors. History of Science courses at the undergraduate and graduate level are offered covering the period from antiquity through the 20th century. Instruction is designed to accommodate a wide range of students' preparations in the humanities, social sciences, and sciences.

The structure of the program requires students to define and pursue their own areas of investigation according to the rubrics of an individually designed major under the administration of the Dean of Undergraduate Studies' Advisory Committee on Individually Designed Majors. It is also possible for students with philosophical interests to concentrate in history and philosophy of science as a sub-major of Philosophy; see the "Philosophy" section of this bulletin.

Members of the History of Science Committee are available to serve as a faculty advisory group for any student wishing to design a History of Science major. A list of appropriate courses is available from the History of Science office, Bldg. 200, room 33.

COURSES

60. The Growth of Scientific Knowledge—(Same as Philosophy 60.) Positivism, Popper and the old "received view" of scientific theories. Kuhn and the radical turn. Recent attempts to reconstruct moderate empiricist and realist positions: Salmon, Van Fraassen, Hacking, Laudan, and others. The relation between history and philosophy of science. Case study in the "synthesis" of Darwinism and genetics which produced modern evolutionary theory. DR:8(3)
5 units, Win (Godfrey-Smith) TTh 11-12:15

62. History of Biological Thought—(Same as Philosophy 62, History 116A, VTSS 127.) Central issues in biological thought since Darwin: teleological vs. mechanistic explanations, vitalism, reductionism, the units and levels of biological organization, the origins of life, development, inheritance, and evolution.
4 units, Aut (Smocovitis) MW 2:15-3:30

121. Technology, Science, and European Expansion, 1500-Present—(Same as History 115, VTSS 121.) The interplay between the growth of science and technology since the Renaissance and expansion of European influence. Topics: military technology and empire building; science and technology in the periphery or how the creation of botanical gardens, observatories, and similar institutions served the needs of empire builders; and Europeanizing the world or how the transfer of European cultural traditions and institutions changed their imperial holdings. DR:9(5)
4 units, Aut (Pang) MWF 1:15

122. History of High Technology—(Same as VTSS 122.) What is high technology? Who creates it? What is its place in contemporary social, political, and economic life? Topics: the rise of the engineering profession, the place of skilled workers in high-tech industry, the emergence of technocratic ideology in Western societies, and the development of the nuclear industry and space programs in Western and non-Western societies.
4 units, Win (Hecht) MW 11-12:15

123. Researching 20th-Century Technology—(Same as VTSS 123.) Seminar on problems that arise in researching the recent history of technology. Surveys methods used in the historical literature and primary sources: oral interviews, popular media, professional journals, company archives, government publications, etc. Emphasis on research and writing; required research paper on a 20th-century technology.
3 units, Spr (Hecht) W 3:15-5:05

138A,B,C. Introduction to Cosmology—(Same as Classics 138A, B, C; History 138A, B, C; Philosophy 138A, B, C.) Three-quarter sequence on the
history of the exact sciences, emphasizing cosmology. Technical aspects of the classical theories (Ptolemaic and Copernican), including mathematics, astronomy, physics and chemical theory, and more speculative aspects in natural philosophy and theology.

138A. Ancient Period—DR:8(3); also satisfies Area 4(6) when taken in sequence with 138B or 138C.

4 units, given 1992-93

138B. Science and Technology in the Scientific Revolution—(Same as VTSS 124.) DR:8(3); also satisfies Area 4(6) when taken in sequence with 138A.

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

138C. Newton to Einstein—DR:8(3); also satisfies Area 4(6) when taken in sequence with 138A.

4 units, Spr (Staff) 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.

3 units, given 1992-93

145. Scientific Revolution—(Same as History 139, Philosophy 145/245, VTSS 125.) Social, intellectual, and institutional background of the 17th-century period that established modern science. Theories of matter and motion, Galileo, Descartes, Bacon, Boyle, and Newton. Historical controversies: Yates' thesis on hermeticism and magic, Merton on Protestantism and science, Hessen on the economic basis of scientific change. Readings from era texts and modern historical studies. Interpretations of the revolution and what is meant by science and revolution. DR:8(3)

5 units, Win (Galison) TTh 11-12:15

147. Science in the Enlightenment—Scientific ideas and institutions in Europe during the 18th century, from Newtonianism to criticisms of Enlightenment science based on romanticism and historicism. The expression of the "analytic spirit" in rational mechanics, chemistry, geology, and systematic biology, including interactions with philosophy and literature. Relationship of science to the Industrial Revolution. The social diffusion of science through academies, societies, popularization, and new publishing forms; the Encyclopédie and the moral weeklies. Enlightened absolutism and the cameral sciences in Germany. Readings from 18th-century texts and recent historical studies (Hanks, Hahn, Baker, Darnton, Gillispie, Paul, Hufbauer.) DR:8(3)

4 units, given 1992-93

152. The Darwinian Revolution—(Same as Human Biology 152, Philosophy 152, VTSS 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.

4 units (Lenoir) given 1992-93

153. Science and Technology in Traditional China—(Same as Asian Languages 153, History 193.) Technological achievements and scientific undertakings of traditional China, and ideological and social factors which aided or hindered such enterprises. DR:2(*)

5 units (Dien) given 1992-93

154. The Rise of Scientific Medicine—(Same as Human Biology 151, VTSS 128.) 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 institutional structure of the medical profession differed according to its local context.

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

155. The Sociology of Scientific Knowledge—(Same as Anthropology 158, VTSS 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, etc., 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 1992-93
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. The 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, Spr (Lenoir) TTh 2:15-3:30

157. Biology, Life Philosophy, and Henri Bergson—Henri Bergson’s life philosophy within the context of major movements in the history of biology. Goal: assess the extent to which Bergson drew from, and reacted to, the larger movements in the biological sciences which brought into relief the age-old tension between mechanistic and vitalistic conceptions of life. How biologists in turn responded to Bergson. The spread of positivism, the revival of occultism and mysticism, and degenerational views of Western culture. Focus is close reading of Bergson’s written work, primarily Creative Evolution.

3 units, Spr (Lenoir) TTh 2:15-3:30

168. History and Philosophy of Physics—(Same as Philosophy 168, VTSS 126.) Philosophical questions raised by historical developments in 20th-century physics. 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. What is meant by “unified” field theories in contemporary physics? Readings: scientific, historical, and philosophical texts. DR:8(3)

5 units, Spr (Galison) TTh 2:15-3:30

231B. Science, Patronage, and Court Culture: 1500-1700—(Same as VTSS 224.) Research seminar analyses the connections between the emergence of political absolutism, court culture, and the rise and legitimation of modern science.

4 units, Win (Biagioli) M 5:15-7:05 p.m.

237. Technologies and Practice of “Recording” 1860-1940—(Same as Comparative Literature 260.) “Recording” devices are capable of preserving and reproducing perceptions of the human body beyond the moment they occur. The period 1860-1940 was characterized by inventions such as the gramophone, film, and television which impacted on the basic dimension of the “human condition.” Focusing on unexploited primary material, seminar investigates the historical conditions out of which new technologies and practices of recording emerged and on the processes of their institutionalization dealing with the effect on more traditional cultural forms and with the intellectual discourses which reacted to them.

5 units, Aut (Lenoir, Cumbrecht) Th 3:15-6:05

238. The Technology of Modernism and Postmodernism—(Same as Philosophy 238.) Theoretical inquiry into the nature of science and technology in their relation to the wider cultural movements of modernism and postmodernism. Logical positivism and modernism on architecture and art. Modernism in mathematics (the Hilbert program) and physics (Einstein and Bohr). Creation of the computer in the 1940s, electronics and simulations. Image of technology in literature and films. Readings: the Vienna Circle, Einstein, Hilbert, von Neumann, Lyotard, Baudrillard, Gibson, and current work in science studies.

5 units, Win (Galison) T 4:15-6:05

239. Physics After World War II—Graduate seminar on the history and philosophy of postwar physics. Effects of war work on the rise of pragmatism in physics. The creation of computer simulations, high-energy physics, experiments, symmetries, renormalization, and the creation of gauge physics. Philosophical questions on the changing understanding of “particle theory,” “unification,” and “experimental demonstration.” Source readings: Bethe, von Neumann, Feynman, Gell-Mann, Weinberg; and historical, sociological, and philosophical work in recent science studies. Enrollment by consent of the instructors.

5 units, Spr (Galison, Dresden) T 4:15-6:05

241. Science and the Writer—For graduate students. "People have said I have no passions, but that is because I have a passion for clarity." (Bertrand Russell) This course is a workshop in clarity, particularly the written presentation of science and history of science to readers who are not themselves scientists. Enrollment limited to 6. Prerequisite: consent of instructor.

5 units, Win (Judson) W 3:15-5:05

270. Undergraduate Colloquium: The Early Nuclear Age, 1939-1953

5 units, Spr (Bernstein) W 1:15-3:30

OVERSEAS STUDIES

190I. Seeing and Measuring Human Differences: Historical Perspective in Human
Science, 1800-1940—(Same as Psychology 112X) Florence. DR:8(3)
4 units, Aut (Guarnieri)

191) Medicine, Psychiatry, and Art in Renaissance Florence—Florence.
5 units, Aut (Koran)

PROGRAM IN HUMAN BIOLOGY

Chair: H. Craig Heller
Faculty: Sandra Archibald (Food Research Institute), Brian Arthur (Food Research Institute), J. Myron Atkin (Education), Clifford Barnett (Anthropology), Carol Boggs (Biological Sciences), Gail Butterfield, Roland Ciaranello (Psychiatry), Ruth Cronkite (Sociology), William Dement (Psychiatry), Carl Djerrassi (Chemistry), Sanford Dornbusch (Sociology), William H. Durham (Anthropology), Anne Ehrlich, Shirley Feldman (Center for Youth Development), Russell Fernald (Psychology), James Fox (Anthropology), Henry Greeley (Law), Lori Hagar (Anthropology), Albert H. Hastorf (Psychology), H. Craig Heller (Biological Sciences), Mark Hlatky (Health Research and Policy), Herant Katchadourian (Psychiatry), Donald Kennedy (President), Abby King (Stanford Center for Research in Disease Prevention), Timothy Lenoir (History of Science), Seymour Levine (Psychology, Psychiatry), Sharon Long (Biological Sciences), Michael Marmor (Ophthalmology), Sherri Matteo (Institute for Research on Women and Gender), Joseph Miller (Biological Sciences), Lorraine Morgan, Ellen Porzig, John Rick (Anthropology), Mark Rosekind (Psychiatry), Robert Sapolsky (Biological Sciences), Robert Scott (Center for Advanced Study in the Behavioral Sciences), Robert Siegel, Frank Stockdale (Medicine), Dolores Thompson (Education), Arthur B. Wolf (Psychiatry), Gwendolynne Yeo, Edward Zalta (Philosophy)

Director of Academic Programs: Lorraine Morgan

Student Advisors: Wesley Cole, Wendy Drucker, David Feiock, Camille Falkner, Erica Pan, Gregg Raab, Sheila Scheel

The Program in Human Biology is an inter-school, interdepartmental, undergraduate major. Its purpose is to provide an interdisciplinary perspective of the relationship between the biological and social aspects of humanity’s origin, development, and prospects. The program has three goals:

1. To provide a broad and rigorous introduction to the biological and behavioral sciences and their interrelationships.
2. To relate these sciences to the problems raised by the relationships of human beings to one another and to their environment.
3. To help each student achieve a high level of understanding of one aspect of the biological and behavioral sciences and its application.

The curriculum draws faculty from various University departments and schools. To complete the requirements for the major, students must take courses from the offerings of the program and from the listings of other University departments. The program culminates in an A.B. in Human Biology.

Although there is no graduate program in Human Biology at Stanford, students are well prepared for advanced training in biology, the behavioral and social sciences, medicine, law, education, or public policy, depending on their choice of upper division courses. Undergraduates in Human Biology can enter co-terminal master degree programs in a number of other University departments.

Additional information about the major may be obtained from the program’s offices.

UNDERGRADUATE PROGRAMS

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 course must be taken for a minimum of 3 units. In select cases, up to 5 units of honors units may be included. Final approval of the concentration rests with the student’s faculty adviser. All area of concentration courses must be taken for a grade.

4. Upper-Division Courses: students must take three Human Biology upper-division courses. 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 "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 MWF 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. To fulfill requirements for DR:5(7), the entire sequence 2A, 3A, 4A must be completed. Majors must take core courses for a grade.

2A,B. Genetics, Evolution, and Ecology—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); entire sequence 2A, 3A, 4A must be completed.

4 units, Aut (Boggs, Staff) MWF 9

2B. Culture, Evolution, and Society.

4 units, Aut (Rick, Staff) MWF 10

3A,B. Cell Biology and Human Development: Adaptation and Development of Social Processes—3A: basic principles of biology of cell-biochemistry of energetics and metabolism, nature of membranes and organelles, hormone action, plant biochemistry and development, and immunology. Principles of human developmental biology. 3B: adaptation and maladaptation during infancy, childhood, and adolescence. Concepts from social and developmental psychology, and sociology are introduced as individual, institutional, and societal contributors to adaptation. Prerequisite: 2A,B.

3A. Cell Biology and Human Development—DR:5(7); entire sequence 2A, 3A, 4A, must be completed.

4 units, Win (Stockdale, Staff) MWF 9

3B. Adaptation and the Development of Social Processes.

4 units, Win (Feldman, Hasto) MWF 10

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. Satisfactory/No Credit only. Enrollment limited to 35.

1 unit, Win, Spr (Feldman, Rothenberg) by arrangement

4A,B. The Human Organism: Development in Adulthood—4A: organ system physiology, beginning with coverage of basic principles of neurobiology and endocrinology and the functions of body organs. The understanding of neurobiology and endocrinology leads to discussion of mechanisms of control, regulation, and integra-
tion of organ systems function. 4B: theories and stages of adult development, defense mechanisms and adaptation at individual and social levels. Interaction between 4A and 4B is illustrated by physiological and behavioral homeostasis, relationships between hormones and behavior, stress and health, and the biology and psychosocial aspects of aging.

4A. The Human Organism—DR:5(7); sequence 2A, 3A, 4A must be completed
4 units, Spr (Heller, R. Fernald) MWF 9

4B. Adaptation and Social Control.
4 units, Spr (Katchadourian, Staff) MWF 10

ADDITIONAL OFFERINGS

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

40. Public Decision Making Regarding Human Health—(Same as Health Research and Policy 220.) Goals: understand the role and limits of health care in the U.S.; plan and carry out analyses of problems in health policy, and assess validity of analyses carried out by others; understand the logical basis of clinical decision making (especially under uncertainty), and the resulting implications for policy.
4 units, Spr (Hlatky) MWF 11

60. Colloquium on Population Studies—(Same as Biology 183, Food Research 188/288.) Series of talks by distinguished speakers introducing a variety of topics in population studies.
1 unit, Win (Feldman, Arthur) W 4:10-5:30

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, Win (Boggs) MWF 1:15

104. Psychosocial Aspects of Aging—(Same as Education 104.) Survey on common stressors of middle age and later life (e.g., retirement, changing family roles, bereavement) and discussion of more vs. less adaptive ways of coping with these changes. Common health problems of aging (e.g., diabetes) and how physical and mental health interact to determine quality of life for older persons. The importance of accurate assessment and treatment of common mental health problems (e.g., depression and dementia) and the role of family caregivers in maintaining impaired elders at home or in the community. Successful interventions used with elders and their families to reduce burden and stress. Required fieldwork in agencies serving seniors provides a "real-life" learning experience.
4 units, Win (Thompson)

105. Ethnogerontology and Mental Health—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 Afro American experts in ethnogerontology. Prerequisite: Human Biology core or consent of instructor.
4 units, Win (Thompson, Yeo)
106. Human Origins—(Same as Anthropology 6.) Evidence for the evolution of humankind from its beginnings several million years ago to the emergence of Homo sapiens. Emphasizes fossil hominid remains from their discovery to their interpretations for elucidating human origins. DR:5(7) 5 units, Spr (Hager)

108. Sociology of Mental Health—(Same as Sociology 107.) 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)

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. Prerequisite: Biology or Human Biology core.

4 units, Aut (Heller, Staff) not given 1991-92

112. Educational Policy—Factors which influence the decisionmaking process at local, state, and federal levels of American public and private education. Writing intensive course; students utilize peer review and collaborative techniques to develop papers which confront contemporary issues. Students plan and participate in a simulated, video-taped, professional conference. Lectures/discussion. Prerequisite: Human Biology core.

3 units, Aut (Morgan)

113. 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) alternate years, given 1992-93

114. Evolutionary Anthropology—(Same as Anthropology 181.) Seminar on relationships between genetic and cultural evolution in human populations. Reviews new works relating genes, culture, and human diversity, including sociobiology, cultural transmission theory, Darwinian culture theory, and coevolution; emphasizes theory and supporting examples. Teams of students conduct original research projects and report to the class. Prerequisite: 1 or consent of the instructor.

4 units (Durham) not given 1991-92

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. Prerequisite: Human Biology core or consent of instructor.

4 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 literature review on a specific topic. Emphasis on development of critical reading, analysis, experimental design, and interpretation of data. Students give 3-5 oral presentations based on their reading. Discussion on student questions and critique. Prerequisite: 115A or equivalent.

4 units, Spr (Siegel)


3 units, Aut (Marmor)

117. Policy and Research in Science Education—(Same as Education 355.) Controversial
topics in science education (e.g., teaching of evolution, teleology and anthropomorphism, gender bias, text selection, recruiting and retraining qualified teachers, goals of science teaching for different populations). The substance and style of formulating policy for science education in the U.S., now and in recent past. Emphasis on issues for local, state, and federal authorities, particularly appropriate governmental roles in selection of content, improvement of teaching, and research. Attention to primary, secondary, and the undergraduate programs; and use of museums and media in programs to improve science education. International comparisons where appropriate.

4 units, Win (Atkin)

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, Spr (Boggs, Launer)

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) MWF 11

122. Biological and Social Perspective on Tobacco—(Same as Biology 67/167.) Tobacco is an instructive example of how biology and culture interact. Tobacco and tobacco use from the perspectives of biology, medicine, history, economics, psychology, and law. Topics: botany and biochemistry of plant family Solanaceae; physiological effects of tobacco use, and nature of limits of epidemiological evidence of those effects; agricultural, industrial, and financial history of tobacco product manufacture and distribution; legal, policy and political issues presented by tobacco problem in the U.S. Enrollment limited to 50.

3 units (Long, Greely) not given 1991-92

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, Aut (Heller, Miller)


3-5 units, Spr (Charnley)


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

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, Spr (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. Prerequisite: Human Biology core or consent of instructor.

3 units (Levine) alternate years, given 1992-93

147. Controversies in Human Nutrition—Two weeks of lectures, student participation in discussions. Research paper on topics chosen with instructor's guidance and approval. Enrollment limited to 16.

2 units (Butterfield) not given 1991-92

148. Environmental Policy—Important environmental issues of today and the future, how to deal with them technically and 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. Enrollment limited to 15 Human Biology seniors. Prerequisites: Human Biology core, 40, or consent of instructor.

3 units, Spr (A. Ehrlich)

150. Seminar: Gender-Specific Perspectives on Birth Control—(Same as Feminist Studies 145.) 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 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. Limited to 20 seniors; junior standing considered in exceptional circumstances. Pre-registration essential; forms available from Human Biology or Feminist Studies office.

6 units (Djerassi) not given 1991-92

151. The Rise of Scientific Medicine—(Same as VTSS 128, History 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 institutional structure of the medical profession differed according to local context.

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

152. The Darwinian Revolution—(Same as History of Science 152, Philosophy 152, VTSS 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.

4 units (Lenoir) not given 1991-92

153. Interaction of U.S. Agriculture with the Environment—(Same as Food Research 145/245.) Agriculture in the U.S. is shaped by biological and economic influences. Issues: plants and genetic manipulation, soil and water conservation, pest control, agroecosystems, and food processing and preservation technologies. Focus: assessing long-run biological, environmental, and economic consequences of agricultural practices, their interactions, and how policy affects these practices. Prerequisite: Economics 1.

4-5 units, Spr (Archibald) TTh 9-10:50

156. Biological, Medical, and Social Aspects of Normal and Abnormal Human Development—Preference given to Human Biology seniors. The human as a developing biological system. Topics: specification of cell fate, aneuploidy, sex determination and differentiation, eye development, limb pattern formation, growth control and dwarfism, fertilization, embryo transfer and aging. Enrollment limited to 30. Prerequisite: Human Biology core or Biology core.

3 or 5 units, Spr (Forszig)

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, Aut (R. Fernald) TTh 8:40-9:55

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: weight control, smoking, Type-A behavior, and exercise. Prerequisite: Human Biology core or consent of instructor.

4 units, Aut (King)

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 (Ciaranello, 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)

171. Adolescence—Adolescence from anthropological, sociological, psychological, and psychiatric perspectives. Topics: physical, psychological, 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 units (Feldman) alternate years, given 1992-93

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, Aut (Zalta)

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 and long term. Emphasis on data needed to formulate policy changes. Enrollment limited.

4 units, Aut (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, Spr (Barnett)

181. Women in Human Origins Research—(Same as Anthropology 183, Feminist Studies 147B.) Seminar on the role of women as agents of evolutionary change and as researchers in the field of paleoanthropology. Women in studies of fossils, the interpretation of early hominid social behaviors, and the earliest evidence for a sexual division of labor in humans.

5 units, Win (Hager)

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 New World provides examples of how archeological data reconstructs the cultural systems of extinct hunter-gatherers. DR:9(5*)

5 units (Rick) not given 1991-92

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. Prerequisite: Human Biology core, or consent of the instructor.

3 units, Win (Levine)

196. Molecular Neurobiology Seminar—(Same as Psychiatry 270.) Advanced topics in neurochemistry, emphasizing molecular biological approaches to studying the nervous system. Students select topic, critically read the cited literature and additional relevant papers, and prepare a presentation reviewing the primary references
list. Prerequisite: introductory course in neurochemistry (i.e., 167, Neurobiology 200).
3 units (Wong) not given 1991-92

197. Internship in Human Biology—Limited to Human Biology majors. Required of all program majors. Combines course work with a supervised field, community, or lab experience of their own choosing. Must be arranged in advance and initiated at least three quarters prior to graduation. Satisfactory/No Credit only.
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. 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 20-minute oral presentation followed by a brief question and answer session.
1-15 units (Morgan)

199. Directed Reading/Special Projects—Independent study. Students must consult with program's course coordinator for requirements.
(Staff) by arrangement

HUMANITIES SPECIAL PROGRAMS

Emeriti: (Professors) Paul H. Kocher, Lawrence V. Ryan
Chair: Paul Robinson
Professor: Kurt Mueller-Vollmer (German Studies and Humanities)
Teaching and Program Coordinator; Lecturer: Helen Brooks

Honors Program Committee in Charge: Paul Robinson (Chair); Helen Brooks, Robert Harrison, Herbert Lindenberger, Marsh McCall, Andrea Nightingale, Alice Rayner

Graduate Program Committee in Charge: Paul Robinson (Chair); Theodore M. Andersson, Karol Berger, Helen Brooks, Eckart Förster, Hester Gelber, Susan Imhoff, Jonathan Ivry, 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, aesthetic, literary, historical, social, and ethical.

ADMISSION

Interested freshmen and sophomores may obtain information from the program office. Applications should be submitted at the earliest opportunity, preferably Spring Quarter of the freshman year, and in every case before the junior year. Students must meet the following entrance requirements before being admitted to the program:

1. Completion of all three quarters of the Cultures, Ideas, and Values (CIV) Area 1 requirement, except in the case of transfer students, who must petition for exception. (Students may apply to the program while enrolled in the third quarter of CIV.)
2. A letter grade indicator (LGI) of at least 3.3 (B+) in all course work in the humanities. Such course work includes any CIV track and all freshman English sections; all courses in the Departments of Art, Drama, and Music (except studio or performance courses); all courses in the Departments of Asian Languages, Classics, English, French and Italian, German Studies, Slavic Languages and Literatures, and Spanish and Portuguese (except first-year language courses); all courses in the Departments of Comparative Literature, History, Philosophy, and Religious Studies; and all courses in the Programs in Feminist Studies and Modern Thought and Literature.

After admission to the program, students may enroll as Humanities honors majors through one of the following alternatives:

1. Choose a major in Humanities honors concentrating in 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 concentrating in Modern Thought and Literature and submit a study plan approved by one of the designated Modern Thought and Literature undergraduate advisers (see the “Modern Thought and Literature” section in this bulletin).
3. Propose and receive approval of a 40-unit concentration of interdepartmental course work
constituting a unified program of study that is not encompassed by any other undergraduate major at Stanford.

Students who wish to major in Humanities honors should enter the program and receive approval of their concentrations before the end of the first quarter of the junior year. Competence in reading a foreign language is required of all Humanities honors majors and must be certified by appropriate course work or equivalent.

REQUIREMENTS
1. Humanities 90: 5 units, sophomore year. Prerequisite: completion of Area 1 requirement (CIV).
2. Unless students have strong intellectual reasons for doing otherwise, they must fulfill their “World Cultures” (Area 2) and “American Cultures” (Area 3) requirements from courses offered in humanities disciplines.
3. In order to develop the requisite knowledge and methodological background to write a Humanities honors essay, students must take, during their sophomore and junior years, the required Humanities honors courses and additional humanities courses in disciplines of their interest.
4. Two different Humanities honors seminars in the series 190-198: 10 units, usually junior year. Prerequisite: 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. The A.M. program in Humanities normally requires a two-year residency at Stanford, begun Autumn Quarter of the first year and completed in Spring Quarter of the second year.

During the first year, the typical candidate for the A.M. degree takes 301-303 (the first three courses in the series “The Western Traditions”), plus at least one of three required seminars or proseminars in an established discipline (for example, art history, classics, philosophy, etc.). During the second year, the student takes 304-306 (the remaining three courses in “The Western Traditions”) and at least one of the three required seminars or proseminars in the chosen discipline. The third seminar or proseminar may be taken in either the first or second year. At the end of the second year a written comprehensive examination is required.

The minimum number of units for the A.M. degree is 36. Additional elective units may be taken at the option of the student.

Under “Statement of Purpose” on the application form, the candidate must indicate the established field from which the three required seminars will be chosen. Once admitted the student submits a proposed study program to the chair, specifying the courses chosen to fulfill the seminars or proseminars requirement.

The proposed program is approved on its own merits to ensure that the chosen seminars and proseminars are suited to the A.M. in Humanities. Since reading knowledge of a foreign language appropriate to the department in which specialized work will be pursued is required, language proficiency must be noted on the application form.

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, Education, 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. Although the GPH draws upon the important texts and ideas which have traditionally been of common concern and interest to all humanistic disciplines, seminars usually focus on specific topics or sets of problems and then attempt to strike a balance among historical, literary, philosophical, and other possible orientations. 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. The normal pattern of the program involves one Humanities seminar in each of six successive quarters culminating in the GPH student sympo-
sium. Students must have the chair's consent to take seminars out of sequence.

Graduate students who are not GPH members may enroll, by consent of the chair, in offerings whose enrollments are not filled by GPH members.

REQUIREMENTS
1. Continued satisfactory work in the student's major field, in accordance with departmental requirements.
2. Completion of the six historical seminars (301-306) in the Western Traditions series. To qualify for candidacy, students should complete at least three of these seminars in the first two years of graduate residence. Exemption from, or permission to audit, one or two of the seminars may be secured by petition to the Committee-in-Charge if the student can show coverage of the material at an advanced level.
3. Participation in the GPH student symposium at the end of the second year of GPH course work.
4. At least one quarter of teaching for the Program in Humanities, 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.
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 (Edwards, Staff)
62. The Middle Ages and the Renaissance—DR:1; three-quarter sequence.
   5 units, Win (Andersson, Brooks, Wack, Staff)
63. The Enlightenment to the Present—DR:1; three-quarter sequence.
   5 units, Spr (Lyons, Staff)

90. 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 (Rayner)
   Win (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: 90.
191. History and the Humanities.
   5 units, Win (Stansky)
192. The Arts and the Humanities.
   5 units, Win (Dreyfus)
193. Philosophy and the Humanities.
   5 units, Aut (Guttmann)
   Spr (Nightingale)
194. Literature and the Humanities—Critical study of major texts; theory and practice of criticism.
   5 units, Spr (Palumbo-Liu)
   5 units, Spr (Mueller-Vollmer)
196. Modernism and the Humanities.
   5 units, Aut (Ruotolo)
   Win (Dupré)
197. Modern Culture and the Humanities.
   5 units, Aut (Selden)

200A, B, C. Honors Essay—A critical essay of about 15,000 words. Limited to Humanities honors students.
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

299. Internship.
1-3 units (Brooks) by arrangement

301-306. The Western Traditions—Required of students in the graduate program in Humanities. Open to other graduate students only by consent of the director.

301. The Greek Period.
4 units, Aut (Rehm) TTh 4:15-6:05

302. The Roman Period.
4 units, Win (Gleason) TTh 4:15-6:05

303. The European Middle Ages.
4 units, Spr (Lerer) TTh 4:15-6:05

304. The Early Modern Period.
4 units, Aut (M. Ryan) MW 4:15-6:05

305. From Enlightenment to Modernism: The 18th and 19th Centuries.
4 units, Win (Mueller-Vollmer) MW 4:15-6:05

306. The 20th Century.
4 units, Spr (Robinson) MW 4:15-6:05

INTERNATIONAL POLICY STUDIES (IPS)

Chair: Barton J. Bernstein (History)

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. Met 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 prescribed undergraduate preparation. In such cases, it would be necessary for the student to make up the missing undergraduate work, and the time required to qualify for the A.M. degree would increase correspondingly.

2. Completed satisfactorily all requirements for the A.M. degree in International Policy Studies. These are described in detail in the aforementioned statement on International Policy Studies, and set forth in "Degree Requirements: Fields and Courses." The requirements involve specified courses and seminars normally to be completed in the space of five years (four undergraduate and one graduate). Forty-five of these units must be completed while enrolled for three terms with graduate standing at Stanford. Course work done in fulfillment of requirements for the undergraduate major may not be used to meet the 45-unit master's degree requirement. Twenty-five of the 45 units used to complete the master's degree must be at the graduate level; these are normally taken during a coterminal student's fourth or fifth year. Students entering the program at the graduate level, however, can receive degree credit for these 25 units only if the work has been done during their graduate enrollment at Stanford. Students are expected to include in their program at least one graduate-level course or seminar that requires a substantial research paper.

3. Completed and filed the Program Proposal for the Master's Degree before the last day of classes of the first quarter of enrollment as a graduate student. On this form, students should list no more than 45 units fulfilling the IPS field requirements. Coterminal students must be sure to list 45 unduplicated units, i.e., units for courses not counted toward the undergraduate degree.

4. Completed and filed at the Graduate Degree Support Section of the Registrar's Office, by the appropriate deadline, the Notice of Intention to Complete Advanced Degree Requirements.

FINANCIAL AID

Undergraduate financial aid is not normally available for graduate students entering the IPS program.

GRADE REQUIREMENTS

During enrollment in the IPS program, students may take only one of the two required "skills" courses for Satisfactory/No Credit, and they may also take one other course in IPS for Satisfactory/No Credit. Not counting "skills" courses, IPS students must maintain at least an average LGI of "B-" and grades under "B-" except in "skills" courses cannot be used toward the 45 units normally required in IPS.

The records of IPS students are normally reviewed during the summer after the beginning of their course work, and students who are not making adequate progress will receive a warning. In cases where the record is poor, the student's participation in the program may be terminated.

INTERNATIONAL RELATIONS

Chair: Barton J. Bernstein
Committee in Charge: Barton J. Bernstein (History), Partha Dasgupta (Philosophy and Economics), Peter Duus (History), Terry Karl (Political Science), Stephen Krasner (Political Science), Scott Pearson (Food Research Institute), Jeffrey Williams (Food Research Institute)

Affiliated Faculty: David Abernethy (Political Science), W. Brian Arthur (Food Research Institute), Joel Beinin (History), Barton J. Bernstein (History), Frederick Bowser (History), Albert Camarillo (History), George Collier (Anthropology), Alexander Dallin (History and Political Science), Partha Dasgupta (Philosophy), Albert Dien (Asian Languages), Sanford Dornbusch (Sociology), Charles Drekmeier (Political Science), Peter Duus (History), Marcel Fafchamps (Food Research Institute), Richard Fagen (Political Science), Walter Falcon (Food Research Institute), Geoffrey Garrett (Political Science), Kurt T. Gaubatz (Political Science), James Gibbs (Anthropology), Judy Goldstein (Political Science), Akhil Gupta (Anthropology), Stephen Haber (History), Nina Halpern (Political Science), Robert Hamerton-Kelly (International Strategic Institute), G. Robert Hamrlda (German Studies), Donald Harris (Economics), David Holloway (Political Science), Harry Huizinga (Economics), Kennell Jackson, Jr. (History), Timothy Josling (Food Research Institute), Harold Kahn (History), Terry Karl (Political Science), James Ketelaar (History), Anjini Kechar
UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The A.B. in International Relations requires completion of at least 50 units in the major, including both Political Science 35, International Politics, and one course in American foreign policy. In addition, each student is required to demonstrate proficiency in a language other than English, equivalent to at least two years of university-level instruction. All majors in International Relations are expected to have an overseas study experience (as in the Stanford Overseas Studies Program) or its equivalent. International Relations majors are also required to take at least two courses from the Department of Economics. To fulfill this requirement, both courses may be in Cluster C; or one may be in Cluster C and either Economics 51 or 52, or both, may be counted in "related" work. Economics 51 or 52 may not be counted in Cluster C. One course within the major may be taken for a Satisfactory/No Credit grade. Finally, International Relations majors are required to complete a minimum of 10 units in related work either in social science or history courses dealing with the student's geographical or topical area of concentration, or in economic analysis (Economics 51, 52 or both).

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 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 one of the two remaining areas, and three courses in the other.

The International Relations major must be declared before the senior year by submission of an acceptable proposal to the chair of the program. Students completing a double major or fulfilling International Relations as a secondary major also are required to file a proposal before the senior year.

Students who have already been accepted as majors in the program may petition for credit for courses not listed in this section of the bulletin or in the updated course lists in the International Relations office. Petitions should contain as much information as possible about the course in question: syllabi, reading lists, examinations, papers, etc. No course should be proposed for inclusion in the major unless more than half the course work deals with international materials. ("International" here means "transactional," that is, dealing with real-life relationships among national or cultural units as distinguished from re-

(Economics), Nancy Kollmann (History), Stephen D. Krasner (Political Science), Gavin Langmuir (History), John Lewis (Political Science), Walter Lohnes (German Studies), Bruce Lusignan (Electrical Engineering), Mark Mancall (History), Robert McGinn (VTSS), Ronald I. Mckinnon (Economics), Lincoln Moses (Statistics), Norman Naimark (History), Rosamond Naylor (Institute for International Studies), Daniel Okimoto (Political Science), Robert Packenham (Political Science), Scott Pearson (Food Research Institute), Bill Perry (Engineering-Economic Systems), Clark Reynolds (Food Research Institute), Richard Roberts (History), Paul Robinson (History), Aron Rodrigue (History), Renato Rosaldo (Anthropology), Lee Ross (Psychology), Scott Sagan (Political Science), Philippe Schmitter (Political Science), James Sheehan (History), Clint Smith (Latin American Studies), Robert Staiger (Economics), Hans Weller (Political Science), Jeffrey Williams (Food Research Institute), Sylvia Wynter (Spanish and Portuguese), Pan Yotopoulos (Food Research Institute)

Affiliated Visiting Faculty: Michael Chamberlain (History), Naushad Forbes (VTSS), Jurg Martin Gabriel (Political Science), Sandra Greene (History), Sung-Joo Han (Institute for International Studies), Elemor Hankiss (Political Science), Robert Kleiman (History), Shulamith Magnus (History), William Nasson (History), Solomos Solomou (Economics), Rodolfo Stavenhagen (Political Science)

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 first to take Political Science 35, International Politics. Following that, prospective majors develop their own programs, in conjunction with advisers, as outlined below.
relationships that exist only in the mind of the observer, such as comparisons.)

Extradepartmental courses and freshman and 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, demonstrate an ability to conduct independent research, and write a formal thesis proposal. In their senior year, students write the thesis with a first draft due early in the Spring Quarter. Seniors 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 advisers in both departments or programs to make sure they fulfill the degree requirements in both fields. For information on the A.M. program in International Policy Studies, see the “International Policy Studies” section in this bulletin.

COURSES

Course offerings often change after this bulletin is sent to the printer. For updated information, see the quarterly Time Schedule and course lists available in the International Relations office.

Political Science 35, International Politics, (Cluster A) is required for all majors.

CLUSTER A: POLITICAL-HISTORICAL EMPHASIS

25. Colonialism and Nationalism in the Third World—(Enroll in Political Science 25.) 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 system. 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)

52D. Readings in Political Science and International Relations in German—(Enroll in Political Science 112D.) Open to undergraduates and graduate students. For students with a knowledge of German (one year or equivalent) who want to acquire reading proficiency in international relations. Reading materials include excerpts from scholarly works and professional journals. Students may introduce material they need to read for course work or research.

3-4 units (Lohnes) given 1992-93

113A. Politics and Development in Latin America—(Enroll in Political Science 113A.) Survey of
major political systems in Latin America (normally Brazil, Mexico, Cuba, and Argentina), the patterns of economic and social development associated with them, and their historical and international contexts. (Counts for Cluster A or C.)

DR:9(5)

5 units, Spr (Packenham)

115. European Economic History—(Enroll in Economics 115.) History of the European economies between 1870 and WWII. Topics: long-term economic growth and its determinants; variations in economic growth and business cycles; sectoral growth and structural change; inflation and deflation; living standards and real incomes; the Great Depression, 1873-96; the Belle-epoque, 1899-1914; the post-war reconstruction, 1918-29; the world depression and recovery, 1929-39. Emphasizes Britain, France, and Germany. Small European economies are considered in the context of particular issues. Quantitative approach, integrating economic analysis to historical issues.

5 units, Aut (Solomou)

116. Politics in the People's Republic of China—(Enroll in Political Science 115.) DR:2(*) or 9(5*)

5 units, Win (Halpern)

116C. The Integration of Europe—(Enroll in Political Science 116C.) Analysis of efforts reducing national barriers to trade and investment, promoting social exchange and geographic mobility, and creating common institutions and supra-national authorities in Europe since the 1950s. Emphasis on the European Coal and Steel Community, the European Economic Community, the European Free Trade Association, and to the recent commitment to "complete Europe's Internal Market" by 1992. Lectures/discussion sections. Computer-assisted instruction introduces the quantitative analysis of data on the unity and diversity of European countries. (Counts for Cluster A or C.)

5 units (Schmitter) given 1992-93

117A,B. Eastern Europe in Transition—(Enroll in Political Science 117A,B.) Analyzes the social, political, and economic development of European societies since 1945. Hungary is focus and serves as reference for the analysis of similar and contrasting developments in Poland and Czechoslovakia, the Soviet Union, and other E. European countries.

5 units, Win, Spr (Hankiss)

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.

5 units, Win (Rice)

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, problems in stimulating economic development, and cases of cooperation and conflict among African states.

5 units (Abernethy) given 1992-93

118B. Southern Africa: Race, Class, and Political Change—(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. Attention to domestic politics and foreign policy of South Africa. DR:2(*) or 9(5*)

5 units, Spr (Abernethy)

119. Aristocracy and Absolutism: Early Modern Eastern Europe—(Enroll in History 119.) Societies and cultures of E. Europe (Poland, Ukraine, Belorussia, Bohemia, Hungary) in the late medieval and early modern periods. The conflict of aristocratic parliamentary governments with absolutist states (Russia, Prussia, Austria-Hungary). Eastern Europe's close development is contrasted to the Russian historical experience.

DR:9(5)

5 units (Kollman) given 1992-93

124. Seminar: Latin American Dependency—(Enroll in Political Science 124.) Basic concepts and theoretical frameworks, single-country case studies, and research and political strategies regarding dependency and development in Latin America. (Counts for either Cluster A or C.)

5 units, Win (Packenham)

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 seminar on 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. (Counts for either Cluster A or C.)
5 units, Aut (Lewis, Okimoto, Lau)

127D. 20th-Century Germany—(Enroll in History 127D.) The political, social, economic, and cultural developments of "Germany" from the eve of WWI to the 1990 unification. The Germans' search for political democracy and national identity.
5 units, Aut (Sheehan)

127R. Ethnic Conflicts and Nation-States in the Contemporary World: The Ethnic Question in Comparative Perspective—(Enroll in Political Science 127R.) Overview of the major ethnic conflicts in the world: who is involved, what are the issues, how are they being handled. The re-emergence of ethnic movements and the challenge to the nation-state. Principal theories accounting for ethnic conflicts and their critique. The question of individual and collective human rights. The international system (the UN and its specialized organs). Case studies from Eastern and Western Europe, Asia, Africa, Latin America, Canada, and the U.S.
5 units, Win (Stavenhagen)

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, religious antagonisms are rising. The art of creating and maintaining peace is analyzed from historical, social, psychological, and moral perspectives.
5 units, Spr (Bernstein, Bland, Dornbusch, Drekmeier, Moses, Noddings, Ross)

134A. Strategy, War, and Politics—(Enroll in Political Science 134A.) 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 (Sagan)

134B. American Foreign Economic Policy—(Enroll in Political Science 134B.) Developmental approach analyzes American foreign economic policy, centering on an 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. (Fulfills American Foreign Policy requirement.) 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 development of the ICBM and SLBM after Sputnik, the decisions made in the wake of the energy crisis in the 70s, the space program, and current issues, e.g., high-density TV, the human genome project, and the SDI program. Also, briefly, how decisions to develop the A- and H-bombs were made in the U.S.S.R. and China, and comparison of the role of the U.S. and Soviet governments in their respective space programs. Focus: the process by which technical issues are synthesized into the decision process, and how they are explicated for the policymaker with no background in technology; the role of technical agencies, governmental committees, and science advisory boards and the way these groups interact to bring a broad spectrum of informed advice to the senior policymakers. Guest specialists from business, technological, and government areas provide key lectures. (Counts for either Cluster A or C.)
3 units, Aut (Perry)

135. Emancipation of the Jews—(Enroll in History 135.) Why did modern European states and England "emancipate" the Jews? Legal and philosophical debates over Jewish civic status, societal forces which propelled or retarded movement toward Jewish equality, legislative enactments, and the different course which Jewish emancipation took in England, France, Germany, and Austria.
5 units, Win (Magnus)

136. Soviet Foreign Policy since 1917—(Enroll in Political Science 136.) 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 1992-93

137. The Holocaust—(Enroll in History 137.) 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 killing in the East. Deportations and ghettos. The mass extermination of European Jewry.
5 units, Spr (Rodrique)

138A. Security and Global Order—(Enroll in Political Science 138A.) Introductory survey of international security relations since 1945, from
the breakdown of the WWII alliance through recent political and military changes in the Soviet Union, Europe, and Asia. Development of nuclear weapons, arms competition, and efforts at arms control and disarmament in post-WWII period. The political, technological, and conceptual problems of security policies and emerging world order.

5 units, Win (Lewis, Staff)

138B. Seminar: Security and Diplomacy—(Enroll in Political Science 138B.)

5 units, Aut, 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 the two superpowers and the Third World. Prerequisite: Political Science 115 or equivalent, or consent of the 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 (Okamoto) given 1992-93

142C. Theories of International Relations: A European Perspective—(Enroll in Political Science 142C.) For students with an interest in theories of international relations. Presents classical and contemporary texts, focusing on perennial underlying issues of international politics. Establishes conceptual clarity and pulls together theories characterizing the field. Based on basic concepts, students try theory-building.

5 units, Aut (Gabriel)


5 units, Win (Sagan)

143K. Seminar: Democracy and International Relations—(Enroll in Political Science 143K.) The influence of democracy and democratization on international relations. Role of public opinion in the formation and conduct of foreign policy. Relationship between domestic and international constraints on democratic decision-makers. Prerequisite: 35 or consent of instructor.

5 units, Spr (Coubatz)


5 units, Win (Goldstein)

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, Aut (Jackson)

148C. Africa in the 20th Century—(Enroll in History 148C.) Transformation of African societies during colonial rule. Resistance to colonial conquest; decline of the old elite and rise of the new one; conflicting ideologies and consciousness; nationalism; decolonialization. DR:2(*)

5 units, Spr (Roberts)

165C. 20th-Century America—(Enroll in History 165C.) (Fulfills the American Foreign Policy Requirement in 1991-92.)

5 units, Spr (Bernstein, Camarillo)

172A. America since 1945—(Enroll in History 172A.) Analyzes foreign policy and politics, and deals with the intellectual history and social themes. (Fulfills the American foreign policy requirement.) DR:9(5)

4-5 units (Bernstein) given 1992-93

176. Spain in America, 1492-1825—(Enroll in History 176.) DR:9(5)

5 units, Aut (Bouwer)


4 units, Win (Hamrda)

187B. The Modern Middle East: 1718-Present—(Enroll in History 187B.) From the emergence of regional Arab entities and the commercial penetration of Europe to the Present. DR:2(*) or 9(5*)

5 units, Aut (Beinin)

189A. Zionism and the State of Israel—(Enroll in History 189A.) 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; relationships with the Palestinians and their responses to Zionism; the
revolt against the British; establishment of the State of Israel.

5 units, Aut (Mancall) MTWTh 9

194C. The Rise of Modern Japan—(Enroll in History 194C.) DR:2(*)
5 units, Spr (Waswo)

195. Nomad Empires of Inner Asia—(Enroll in History 195.) Inner Asia as an arena of conflict between agricultural and nomadic societies and the traces of cultural diffusion.
4-5 units, Win (Dien)

212P. The Politics of Regional Cooperation and Integration—(Enroll in Political Science 212P.)
Open to advanced undergraduates and graduate students. Theory and practice of "regionalism"; bilateral and multilateral efforts to resolve conflicts between countries peacefully, to increase mutual exchanges, and to create supra-national institutions. The European Community, the U.S.-Canadian Free Trade Area, and recent experiences in Latin America.
5 units, Spr (Rice)

219. Undergraduate Colloquium: Major Problems in Soviet History and Politics—(Enroll in History 219.)
5 units, Aut (Dallin)

220S. Senior Research Seminar: Topics in U.S.-Soviet Relations—(Enroll in History 220S.)
Survey of the major issues in U.S.-Soviet relations from 1917 through the end of the Brezhnev era, including the historical background of Russian-American relations. Woodrow Wilson and the Russian Revolution, the period of "non-recognition" to 1933, the "strange alliance" in WWII, key moments in the development of the Cold War, and the rise and fall of detente. Students research primary documents in the Hoover Institution archives and incorporate their findings into seminar papers.
5 units, Spr (Patenaude)

221. Education and Political Change—(Enroll in Political Science 221.)
The relations between education and politics from a comparative perspective. Topics: different theoretical approaches to the study of education and politics; problems of legitimacy in educational policy; international factors in educational development; the politics of educational reform; processes and conditions of political learning.
5 units, Win (Weiler)

221S. Senior Research Seminar: Wartime and Postwar Poland—(Enroll in History 221S.)
5 units, Win (Naimark)

222. Decolonization in Asia and Africa, 1940-80—(Enroll in Political Science 222.)
Comparison of the dynamics of decolonization and "new state" formation. Factors affecting the timing, speed, nature, extent of violence in the decolonization process, and the character of the regime ruling the new state. Case studies: India/Pakistan, Indonesia, Indochina, Ghana, Ivory Coast, Algeria, Angola, and Zimbabwe.
5 units, Spr (Abernethy)

224O. Undergraduate Colloquium: Stalinism in Eastern Europe—(Enroll in History 224.)
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)

227H. Seminar: The Question of Freedom in Western and East European Societies—(Enroll in Political Science 227H.)
For graduate students in political science with background in philosophy, the history of ideas, cultural history, European studies, or E. European politics and sociology. The meaning and social role of freedom in various historical and social contexts. Topics: concepts of freedom in philosophy and social history, political vs. economic vs. social vs. spiritual freedom, the meaning and role of freedom in 20th-century Western and E. European societies, the "shock of freedom" in contemporary E. European societies.
5 units, Spr (Hankiss)

227P. Seminar: Democratization East, West and South—(Enroll in Political Science 227P.)
Open to advanced undergraduates and graduate students. Comparison of political changes 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 eventual institutions and practices.
5 units, Spr (Hankiss) given 1992-93

235. Undergraduate Colloquium: War and European Society—(Enroll in History 235.)
5 units, Spr (Sheehan)

236. The Soviet Union and the International System—(Enroll in Political Science 236.)
The emergence of the Soviet Union as a superpower, and its possible decline. Domestic sources of Soviet power and policy, and the effects of international rivalry of the Soviet System. Topics: economic and technological bases of power, ide-
ology and foreign policy, the armed forces and military doctrine, the Soviet Union in the world economy, Gorbachev’s “new thinking,” Eastern Europe and Soviet security. Prerequisites: Political Science 136, History 122B, or consent of instructor.

5 units (Holloway) given 1992-93

242G. Seminar: The Neutrals in a Uniting Europe—(Enroll in Political Science 242G.) European integration and the challenges and problems it poses for the neutral countries (Sweden, Austria, and Switzerland in particular). Neutrality’s long history in Europe as part of the traditional balance of power system is coming under increasing pressure with the advent of integration, particularly with the end of the Cold War. Graduate seminar familiarizes students with specific issues confronted by the European neutrals. Prerequisite: general knowledge of European politics and economics. Recommended: command of French and German.

5 units, Win (Gabriel)

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. 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—(Enroll in Political Science 243B.) Examines theories of decision making and strategic interaction in international security affairs. Prerequisite: 243 or consent of instructor.

5 units, Win (Gabatzen)

243C. Seminar: Theoretical Issues in International Political Economy—(Enroll in Political Science 243C.) Examines major contemporary theories affecting global economic relations and related national policies.

5 units, Spr (Krasner)

246. Colloquium: Nuclear Weapons and International Relations—Theories and History—(Enroll in Political Science 246.) Theories of arms racing, deterrence, and nuclear diplomacy, evaluating these in light of the emerging field of nuclear history. Based on the experience of the main nuclear weapons states.

5 units, Spr (Holloway, Bernstein)

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, 243A, or consent of instructor.

5 units, Spr (Gabatzen)

248S. Senior Research Seminar: Colonial States and Society in Africa—(Enroll in History 248S.)

5 units, Win (R. Roberts)

249A. Africa since 1945—(Enroll in History 249A.) Africa’s political and economic evolution since WWII; nationalism and decolonization. 

5 units (Jackson) not given 1991-92

249S. Senior Research Seminar: The Colonial States and Society in Africa—(Enroll in History 249S.)

5 units, Spr (Gabatzen)

250. Undergraduate Colloquium: Modern Mexico—(Enroll in History 250.)

5 units, Win (Haber)

285. Undergraduate Colloquium: Origins of the Persian Gulf War—(Enroll in History 285S.) For advanced undergraduates. Some background in history or politics of the Middle East or U.S. foreign policy. Prerequisite: consent of the instructor.

5 units, Aut (Beinin)

288. Undergraduate Colloquium: Palestine and Arab-Israeli Conflict—(Enroll in History 288.) 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, Spr (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)

CLUSTER B: HUMANITIES EMPHASIS

77. Ethics in International Relations: Topic—World Destitution—(Enroll in Philosophy 77.) Focuses on the phenomena of hunger and malnutrition in poor countries, including analytical and empirical material drawn from moral and political philosophy, economics, and nutritional science. Develops methods of quantitative assessment of the extent and distribution of well-being and basic needs in a society. Readings from
contemporary sources. Prerequisite: Philosophy 30.

4 units (Dasgupta) given 1992-93

80. Culture, Politics, and Society in Latin America—(Enroll in History 80.) Interdisciplinary survey of the development of Latin America from the conquest to debt crisis. Emphasis is on the relationship between economic growth, social change, and the structure of political systems. DR:9(5*)

5 units, Win (Haber)

103. Mesoamerican Communities, Ethnicities, and Nations—(Enroll in Anthropology 103.) Survey of Mayas, Aztecs, and their prehistoric neighbors; of how they fared under Spanish colonial rule; and of their descendants today. DR:2(*)

3-5 units (Collier) given 1992-93

108. The Christianization of Western Europe, 500-1350—(Enroll in History 108.) How the Europeans came to believe in Christ, why the thought and conduct associated with that belief changed so radically, why different forms of religiosity and dramatic conflicts developed, how religious beliefs affected social organization, and how social changes modified religiously.

5 units, Aut (Langmuir)

109. 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: 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 (Gibbs) not given 1991-92

110. Philosophical and Ethical Issues in Public Policy—(Enroll in VTSS 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 nature 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 repatriation of artistic patrimony); 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. (Counts for either Cluster B or C.) DR:8(3).

5 units, Win (McCinn)

121W. Seminar: Politics, Literature, and Film in Germany—(Enroll in Political Science 121W.) Writers and filmmakers reveal different aspects of politics and social change, and provide new and often startling interpretations. Uses (in English translation) novels by Grass, Böll, Wolf, Lenz, Heym, and others, and contemporary German films, to analyze key political issues in the German states: the legacy of the past; the changing role of women; and challenges to secular and religious authority.

5 units (Weiler) given 1992-93

126F. Seminar: Politics and the Novel—(Enroll in Political Science 126F.) Open only to junior and seniors. Preference given to Political Science and International Relations majors. Examination of "realist" 20th-century works of fiction that deal with key political and social issues of our time. American and European novels are read with a view to understanding the conditions which produced them and their impact.

5 units, Spr (Pagen)

128R. Agrarian Change, Marginality, and Human Rights in Latin America—(Enroll in Political Science 128R.) Introduction to agrarian change, trends, and urban marginality in Latin America, focusing on the characteristics of traditional peasant societies, and tenure systems, agrarian reforms and revolutions, peasant movements, agricultural modernization, rural to urban migrations, urban marginality and the informal sector, the problem of natural resources and ecological deterioration, foreign investments and state policies regarding the agricultural sector, the state and policies of urbanization. The relation of the above to the changing power structures, and the human rights of peasants, immigrants, indigenous peoples, and urban squatters.

5 units, Aut (Stavenhagen)

136. European Thought in the 19th Century—(Enroll in History 136.) DR:8(3)

5 units, Win (Robinson)

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)

184. The History of Iran—(Enroll in History 184.) Iran from ancient times through the Muslim conquest to the 20th century. Focuses on political and social history, the relationship between secular and religious institutions, numismatics and trade, the status of minorities, and Iranian influ-
ences on Greece, Anatolia, Arabia, and Central Asia. Covers the Achaemenian, Seleucid, Parthian, Sassanian, Umayyad, Abbasid, Seljuk, Mongol, Safavid, Qajar, and Pahlavi dynasties, and the Islamic republic.

5 units, Spr (Choksy)

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. DR:2(*) or DR:8(3)

5 units, Win (Beinin)

188B. Jewish History from 1492 to the Present—(Enroll in History 188B.) Social, political, religious, and intellectual developments from the late middle ages to the present. Jewish messianism, the structure of Jewish communal life, the transformation of religious patterns, emancipatory and postliberal (e.g., Jewish nationalist, Zionist) politics, the phenomenon of “non-Jewish Jews” (Marx, Trotsky, Freud), anti-semitism, the Holocaust, and the reconstruction of postwar Jewish life. Stresses Europe and 20th-century America.

5 units, Aut (Zipperstein)

201. Ethics, International Security, and Arms Control—The nature of moral reasoning in the context of the discussion of grand strategy; the case for and against arms control; weapons of mass destruction; the moral evaluation of strategic alternatives, with reference to the actual decisions made by major participants in the debate; special reference to the thought of Kennan, McNamara, and Drell.

5 units, Spr (Hamerton-Kelly)

248. The Caribbean Americas: An Introduction to Their Literature, Thought, and Cultural Worlds—(Enroll in Spanish 248.)

3-5 units, Aut (Wynter)

249. Undergraduate Colloquium: Culture Contact and Cultural Transformations in Precolonial and Colonial Africa—(Enroll in History 248.) Focuses on the dynamics of culture contact and the transformational impact these contacts had on the cultures of those African societies which have been the recipients of new ideas, peoples, and/or material cultures. Cultural contacts include those among different African communities, and between different African Islamic and European cultures. The social implications of the cultural changes.

5 units, Aut (Greene)

288. Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict—(Enroll in History 288.) (Counts for either Cluster A or B.)

5 units, Spr (Beinin)

298A. Undergraduate Colloquium: Visions of Utopia—Travellers in China—(Enroll in History 298A.) The predispositions and reflections of travelers to China from the 9th to the 20th century. Is China reinvented every time a foreign traveler brings home a description? What, if anything, did a medieval Japanese monk, a British diplomat, a woman missionary, an aesthete, and adventurer have in common? Prerequisite: consent of instructor.

5 units (Kahn) not given 1991-92

CLUSTER C: POLITICAL-ECONOMIC ISSUES AND POLICY ANALYSIS

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.

5 units, Win (Falcon, Naylor)

106. The Political Economy of Commodity Markets—(Enroll in Economics 127.) History, politics, and theoretical analyses of domestic and international markets for basic commodities. Topics: government regulation of private trading, public trading through buffer stocks and marketing boards, international commodity agreements, rationing and famine relief, and the changing views of the social value of private speculation. Examples from 18th century to present.

5 units, Spr (Williams)

110. Philosophical and Ethical Issues in Public Policy—(Enroll in VTSS 110.) See Cluster B for course description. (Counts for either 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 tech-
113A. Politics and Development in Latin America—(Enroll in Political Science 113A.) See Cluster A for course description. (Counts for either Cluster A or C.) DR:9(5)
5 units, Spr (Packenham)

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, Win (Karl)

115. European Economic History—(Enroll in Economics 115.) See Cluster A for course description. (Counts for either Cluster A or C.)
5 units, Aut (Solomou)

116C. The Integration of Europe—(Enroll in Political Science 116C.) See Cluster A for course description. (Counts for either Cluster A or C.)
5 units (Schmitter) given 1992-93

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: 51.
5 units, Spr (Kochar)

121. Development and Population Interactions in the Third World—(Enroll in Economics 119.) 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. Interactions and causal effects between economic development and population growth.
5 units, Win (Yotopoulos)

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. Theoretical approaches examined: Classical, Marxian, Schumpeterian, Keynesian, and Neoclassical. DR:9(5)
5 units, Spr (Harris)

122G. Problems in Contemporary European Politics—(Enroll in Political Science 122G.) Analysis of two issues of fundamental importance in contemporary W. European politics: political responses to economic decline and the balance of power between Left and Right—Thatcherism, Mitterand's socialist experiment, and the decline (?) of Scandinavian social democracy; and the politics of economic integration and the European free market of 1992—the tensions between domestic politics, the dynamics of the European Community, and broader international competition (the U.S. and E. Asia).
5 units (Garrett) given 1992-93

123. Economic Development in Latin America—(Enroll in Economics 123; open to advanced undergraduate students, with the consent of instructor.) Historical approach to the political economy of development. 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, Aut (Reynolds)

124. Seminar: Latin American Dependency—(Enroll in Political Science 124.) See Cluster A for course description. (Counts for either Cluster A or C.)
5 units, Win (Packenham)

5 units, Aut (Pafchamps)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Units</th>
<th>Quarter</th>
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<tr>
<td>125O</td>
<td>The Rise of Industrial Asia—(Enroll in Political Science 125.) See Cluster A for course description. (Counts for either Cluster A or C.)</td>
<td>5 units, Aut (Lewis, Staff)</td>
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<tr>
<td>126K</td>
<td>Seminar: The United States and Central America—(Enroll in Political Science 126K.) The crisis of development in Central America and the challenge it poses for U.S. policy towards Latin America. Emphasis on the historic roots of the crisis and the emergence of specific policy dilemmas in the issue areas of democratization, national security, and human rights.</td>
<td>5 units (Karl) given 1992-93</td>
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<td>127R</td>
<td>Ethnic Conflicts and Nation-States in the Contemporary World (The Ethnic Question in Comparative Perspective)—(Enroll in Political Science 127R.)</td>
<td>See Cluster A for course description. (Counts for either Cluster A or C.) 5 units, Win (Stavenhagen)</td>
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<tr>
<td>134P</td>
<td>The Role of Technology in National Security—(Enroll in Political Science 134P.)</td>
<td>See Cluster A for course description. (Counts for either Cluster A or C.) 3 units, Aut (Perry)</td>
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<tr>
<td>140A,B,C</td>
<td>Ethics of Development in a Global Environment (EDGE)—(Enroll in Political Science 140 A,B,C.) Seminar with a series of speakers on current development issues emphasizing problems of poorer nations. Autumn Quarter: basic world resources, energy, food, housing, population, and environment, and the political development and dependencies of developing regions. Winter Quarter: international institutions and their roles in international banking, international businesses, U.S. and foreign universities, East-West political policies, and organizations of developing countries. Spring Quarter: the roles of individuals in national and international institutions dealing with the problems of developing countries. Speakers present a range of political, professional, and national backgrounds and present candid and differing points of view. Gives students who plan to work in developing countries or in institutions dealing with developing countries a better knowledge of the challenges and issues. One unit credit for attendance of the speaker lecture series; 3 units additional credit for optional workshops treating selected issues more in depth. (4 units required for IR major.)</td>
<td>1-4 units, Aut, Win, Spr (Lusignan)</td>
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<td>146</td>
<td>Economic Policies of the European Community—(Enroll in Economics 142.) Analysis of the current economic policies of the European Community and the planned completion of the internal market by 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.</td>
<td>5 units, Aut (Josling)</td>
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<td>165</td>
<td>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.</td>
<td>5 units, Win (Huizinga)</td>
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<td>166</td>
<td>International Trade Policy—(Enroll in Economics 166.) Effects of selected government policies affecting international trade. Trade policy and economic welfare, exchange rate policy, government responses to competition from imports, issues underlying international negotiation of reductions of barriers to trade and special trade arrangements for developing countries. Prerequisite: Economics 165.</td>
<td>5 units, Spr (Pearson)</td>
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<td>167</td>
<td>European Economic Integration—(Enroll in Economics 167.) Theory of Customs Union and Free Trade Areas; trade creation and trade diversion; origin, development, and working of the European Common Market; the European common agricultural policy; Theory of Optimum Currency Areas and economic integration. A European parallel currency? Origin, development, and working of the European Monetary System (EMS) and relationships to other currency blocs. Prerequisite: Economics 165 or consent of instructor.</td>
<td>5 units, not given 1991-92</td>
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<td>169</td>
<td>Development and Technology in the Third World—(Enroll in VTSS 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, &quot;appropriate&quot; technology, factors affecting choice of technology, technological capabil-</td>
<td>5 units, Spr (Pearson)</td>
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ity, and the relationship between technology and
culture. Limited enrollment.

4 units, Aut (Forbes)

191. Undergraduate Seminar in United States-
Mexico Relations—(Enroll in Latin American Studies 191.) The principal problem areas in the
complex relationship between the U.S. and Mex-
ico. U.S./Mexico economic and social relations,
immigration, narcotics, trafficking, foreign trade
and investment, and intergovernmental relations,
e.g., differing perspectives on foreign policy is-
issues. Enrollment limited to 15 with prior consent
of instructor. Contact Center for Latin American
Studies for pre-enrollment procedure. DR:9(5)

5 units, Aut (Smith)

196. Environmental Issues in International Re-
lations—Designed for and offered to declared IR
majors; others may attend if space is available.
Introduction to the growing field of environmen-
tal 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.

4-5 units, Spr (Naylor)

215. Economic Development—(Enroll in
Economics 215.) Dual economy models: involun-
tary unemployment and surplus labor in agricul-
ture, rural land and credit institutions, industri-
alization and parastatals, urban labor markets,
and rural-urban labor migration. Taxation and
public finance.

5 units, Win (Kochar)

215A. Japanese Political Economy—(Enroll in
Political Science 215A.) Japanese corporations
and its industrial system; Japanese industrial pol-
icy; and the future performance of Japan’s politi-
cal economy.

5 units (Okimoto) given 1992-93

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 1992-93

217. Money and Finance in Economic Develop-
ment—(Enroll in Economics 217.) The banking
system, interest rate determination, and produc-
tivity of capital in developing countries. Price
inflation, fiscal policy, protectionism, and mon-
tary control. Macroeconomic stabilization. Liber-
alization of domestic and foreign trade with ap-
lications to socialist economies in transition.

5 units, Spr (McKinnon)

224. Seminar: Political Economy of Latin
American Development—(Enroll in Political
Science 224.) Theoretical readings, comparative
analyses, and case studies assess strategies of
economic, social, and political development in
Latin America. Emphasis on recent trends away
from socialism and state capitalism toward more
liberal policies and models.

5 units, Spr (Packenham)

225. Political Economy of Socialist Reform—
(Enroll in Political Science 225.) The political
economy of reform in selected socialist countries,
including the U.S.S.R., China, and Eastern
Europe. The political economy of the original
Stalinist model, past efforts at economic reform in
these countries, and the implications of recent
political changes for the future of economic re-
form in the socialist world.

5 units, Spr (Halpern)

265. International Finance—(Enroll in
Economics 265.) Exchange rates and use of na-
tional monies in international trade. Hedging and
speculation. Balance of payments adjustments.
Monetary and fiscal policies in open economies.
Portfolio models of exchange and interest rate
determination under floating exchange rates.
Target zone for exchange rates, capital controls,
and currency inconvertibility.

5 units, Aut (Huizinga, McKinnon)

266. International Trade Theory—(Enroll in
Economics 266.) Determinants of trade and com-
parative advantage. Income distribution and the
Gains from trade. International tax issues. Com-
mercial policies: tariffs and quotas. Increasing
returns. Strategic trade theory.

5 units, Win (Huizinga, McKinnon)

267. Special Topics in International Economics—
(Enroll in Economics 267.) Trade and endo-
genous growth. Theory of U.S. trade policy. Al-
ternative international monetary standards: the
19th-century gold standard, postwar Bretton
Woods, and the European Monetary System. The
dollar as an international reserve currency, the
world business cycle, and U.S. monetary policy.
Prerequisites: Economics 265, 266.

5 units, Spr (R. Staiger)

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.
3-5 units, any quarter (Staff)

OVERSEAS STUDIES

Descriptions of courses may be found in the “Overseas Studies” section of this bulletin.

BERLIN
Introduction to German History: Politics and Culture from the Middle Ages to the Unification of Germany, 900-1870—(Enroll in History 227V.) Cluster A. DR:9(5)
4 units, Aut (Neckenig)
The New Germany: Internal and External Aspects of the Political System—(Enroll in Political Science 129X.) Cluster A. DR:9(5)
4-5 units, Spr (Jakobiet)
East-West Relations in Europe—(Enroll in Political Science 135X.) Cluster A. DR:9(5)
5 units, Win (Jakobiet)
From Socialism to Capitalism in East Germany: A Political Economy Approach—(Enroll in Political Science 153X or Economics 126X.) Cluster A or C. DR:9(5)
4-5 units, Aut (Krueger)

FLORENCE
5 units, Win (Carnoy)
The Political Economy of Industrial Change: Italy and Europe in a Global System—(Enroll in Economics 159X.) Cluster C. DR:9(5)
5 units, Spr (Bianchi, Bellini)
History of the European Community—(Enroll in History 134V.) Cluster A. DR:9(5)
5 units, Aut (Mammarella)
The U.S. and Western Europe After WWII—(Enroll in Political Science 121X.) Cluster A. DR:9(5)
4 units, Spr (Mammarella)
Contemporary West European Politics—(Enroll in Political Science 125X.) Cluster A. DR:9(5)
4 units, Spr (D’Alimonte)
European Integration and 1992—(Enroll in Political Science 218X.) Cluster A or Cluster C. DR:9(5)
4-5 units, Win (D’Alimonte)

KRAKOW
Efficiency of the Capitalist and Socialist Economies and the Polish Crisis—(Enroll in Economics 123X.) Cluster C. DR:9(5)
5 units, Spr (Wojtyna)

History of Eastern Europe—(Enroll in History 120V.) Cluster A. DR:9(5)
4 units, Spr (Baran)

OXFORD
5 units, Win (Crafts)
International Politics in the Era of Two World Wars—(Enroll in History 102V.) Clusters A. DR:9(5)
5 units, Spr (Moshaver)
International Politics since 1945—(Enroll in Political Science 35X.) Cluster A. DR:9(5)
5 units, Aut (Moshaver)
International Relations of the Middle East—(Enroll in Political Science 40X.) Cluster A. DR:9(5)
5 units, Win (Moshaver)
5 units, Aut (Thomas)

PROGRAM IN JEWISH STUDIES

Director: Steve 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, Dianne Middlebrook, Norman Naimark, Aron Rodrigue, Peter Stansky

The Program in Jewish Studies brings to focus the various courses given on campus relating to Jewish history, thought, literature, and culture from biblical times to the present.

The program committee, in consultation with the committee of the Individually Designed Major (undergraduate), has worked out a pattern for students interested in devising a Jewish Studies Program within the Individually Designed Major. Such students are required to participate in at least two Jewish Studies seminars. Faculty affiliated with the program are available to advise undergraduates who are interested. Contact the office of the Program in Jewish Studies for information, (415-723-7589).

Graduate students enroll in the program through either the Department of Religious Studies or the Department of History and must meet the requirements of that department as well as those of the program. They participate in a central seminar in Jewish Studies offered yearly.
A series of guest lectures and conferences are an integral part of the program and its course of study.

HONORS PROGRAM

The honors program will interest 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 will be 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

ENGLISH

164A. The Biblical Presence in Modern Poetry—The presence of biblical scripture (people, place names, narratives, prophecy, liturgical, and lexical elements from the Hebrew Bible) in British, American, European, and Israeli poetry. DR:7(2)
5 units, Win (Felstiner)

HISTORY

135. Emancipation of the Jews—Why did modern European states and England “emancipate” the Jews? Surveys legal and philosophical debates over Jewish civic status, societal forces which propelled or retarded movement toward Jewish equality, legislative enactments, and the different course which Jewish emancipation took in England, France, Germany, and Austria.
5 units, Win (Magnus) MTWTh 10

136. Women in 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.
5 units, Spr (Magnus) MTWTh 10

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) MWTh 1:15

188B. Jewish History from 1492 to the Present—Social, political, religious, and intellectual developments from the late middle ages to the present. Jewish messianism, the structure of Jewish communal life, the transformation of religious patterns, emancipatory and postliberal (e.g., Jewish nationalistic, Zionist) politics, the phenomenon of “non-Jewish Jews” (Marx, Trotsky, Freud), antisemitism, the Holocaust, and the reconstruction of postwar Jewish life. Stresses Europe and 20th-century America.
5 units, Aut (Zipperstein) TTh 1:15

189A. Zionism and the State of Israel—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; relationships with the Palestinians and their responses to Zionism; the revolt against the British; establishment of the State of Israel.
5 units, Aut (Mancall) MTWTh 9

189B. The State of Israel: 1948 to the Present—Political, social, economic, and cultural history of the State of Israel; its international relations and its relations with Jewish communities outside of Israel.
5 units, Win (Mancall) MTWTh 9

233A. Undergraduate Colloquium: Modern Jewry—Its rise from poverty to middle class probity, its passage from traditionalism to modernity and its unique contributions: Jewish Enlightenment, Reform, the “scientific study of Judaism,” “Historical-Positive Judaism,” Neo-Orthodoxy, organized feminism. Its conflict over “Ostjuden,” and its political choices and fate in Weimar, until the Nazi takeover.
5 units, Win (Magnus) W 1:15-3:05

237A. Undergraduate Colloquium: The Theory and Practice of Jewish Community in Modernity—The breakdown and re-integration of individual and communal identity after the fall of the ghetto and abolition of Jewish communal autonomy in western and central Europe. Through organizational histories, biography, autobiography, and at least one novel from the period, studies ideologies of assimilation and continuity: Jewish “self-hate,” ambivalence, and national consciousness; religious and self-defense institutions.
5 units, Spr (Magnus) W 1:15-3:05

489A,B. Graduate Seminar: East European Jewry Across Space and Time.
5 units, Win, Spr (Zipperstein) T 2:15-4:05
LINGUISTICS, FOREIGN LANGUAGES

626A,B,C. Beginning Yiddish.
4-5 units, Aut, Win, Spr (Berman)

627A,B,C. Intermediate Yiddish.
4-5 units, Aut, Win, Spr (Berman)

628A,B,C. Beginning Hebrew.
4-5 units, Aut, Win, Spr (Ben-Meir Sikuler)

3 units, Aut, Win, Spr (Ben-Meir Sikuler)

630A,B,C. Advanced Hebrew.
3 units, Aut, Win, Spr (Ben-Meir Sikuler)

RELIGIOUS STUDIES

15. The Bible—Diverse literature of ancient Israel read in translation: prose narrative, epic poetry, civil and ritual law, hymns, prophetic oracles. Primary historical, cultural, and religious factors informing biblical composition and transmission.
4 units, Win (Bach) MWF 1:15

23. Judaism—Historical development of Jewish religious thought and practice, from biblical period to the present. Texts reflecting that development: scriptural, liturgical, midrashic, legal, historical, and philosophical. DR:8(3)
4 units, Aut (Eilberg-Schwartz)
TTh 11-12:30

53. Jews and Judaism in America—Examination of the interaction between the character of the American Jewish community and the forms of Judaism developed in this country, against the background of American ethnicity. Historical, literary, sociological, and theological materials used. DR:8(3)
4 units, Spr (Eisen) TTh 11-12:15

112. Women in the Ancient World—Biblical characters (Sarah, Hagar, Naomi and Ruth, Deborah, and Esther); postbiblical texts (Judith, Joseph and Asenath, Paul and Thecla, and Susanna). Attitudes toward women and women's religious activities and beliefs in the Greco-Roman world. Feminist analysis of attitudes toward women in biblical traditions and scholarly reconsiderations of images of women in antiquity.
5 units, Aut (Bach) MW 11-12:15

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

5 units, Win (Eilberg-Schwartz)
TTh 2:15-4:05

NOT OFFERED 1991-92

8. Encounters Between Modern Philosophy and Judaism.
13. Literature of the Holocaust.
15. Jewish Literature and Society.
18. Genesis of Anti-Semitism
22. Introduction to Jewish Law.
24. Introduction to Hebrew Literature.
26. Topics in Modern Hebrew Literature.
38. Contemporary Jewish Thinkers.
40. Religions of Late Antiquity.
42. Anthropology of Ancient Judaism.
43. Women in Judaism.
44. Jewish Studies Seminar.
46. Graduate Colloquium: Problems in Jewish History.
47. Religious Ritual.
48. The Book of Job.
History: Frederick Bowser, Albert Camarillo, Stephen Haber, John D. Wirth (on leave 1991-92)

Law, School of: John Barton, William Gould, Thomas Heller, Bill Hing, Gerald Lopez

Linguistics: Gregory Guy (on leave 1991-92), Shirley B. Heath, John Rickford

Medicine, School of: Paul Basch, Yvonne Maldonado, Julie Parsonnet, Gary Schoolnik

Political Science: Richard Fagen (on leave Autumn), Terry Karl, Stephen Krasner, Robert Packenham, Philippe Schmitter (on leave 1991-92)

Sociology: Alex Inkeles, Seymour Martin Lipset, John Meyer, Szonja Szelenyi

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 Professors: Monica Hirst (Winter), Rodolfo Stavenhagen

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 Latin Americanist faculty and students on the two campuses to meet and work together.

The principal programs administered by the Center for Latin American Studies (the bachelor’s degree, the honors certificate program, summer field research grants, the master’s degree, and joint degrees with Law, Medicine, and Education) 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 offers qualified undergraduates the opportunity to pursue an individualized, interdisciplinary study of Latin America, culminating in the preparation of a senior thesis written under the guidance of a faculty sponsor.

To declare a major in Latin American Studies, a student must apply to the Center’s Subcommittee on Undergraduate Programs no later than the beginning of the second quarter of the junior year; exceptions are made only in unusual circumstances.

Requirements for the major include the following:

1. Completion of a coherent interdisciplinary program of at least 55 units, based on an individualized plan of study achieved in consultation with the student’s adviser and approved by the Center’s Subcommittee on Undergraduate Programs. The curriculum ordinarily includes:
   a) At least two courses (10 units) surveying Latin America comprehensively, whether historically, from the perspective of a discipline, or in an explicitly interdisciplinary framework. Appropriate courses are Anthropology 103; Economics 123; History 177; Latin American Studies 80; Political Science 113A.
   b) At least five courses (25 units) focused on a theoretical problem or disciplinary approach.
   c) Up to 15 units (LAS 169 or 198) devoted to work on the senior research paper (see 3, below).
   d) Remaining courses must be at the 100-level or higher and focus directly on Latin Americanist faculty and students on the two campuses to meet and work together.

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. 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.
Honors in Latin American Studies—Recommended for students who have completed a strong and well-designed program, have achieved a letter grade indicator (LGI) of "B+" or better in course work for the major, and have submitted a senior research paper judged to be of honors quality by the student’s faculty sponsor and the Subcommittee on the Undergraduate Programs.

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. 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) 152, is required the Spring Quarter before departure, and an extensive written report is submitted the following Autumn Quarter for the independent research seminar, LAS 153. 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 Support 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 assistant 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. Three units.
   c) Three or four courses that qualify as graduate level in a single base discipline or academic concentration.
   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, 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, Education, Law, and Medicine to allow students to simultaneously pursue concurrent degrees in LAS (A.M.) and the respective professional field (J.D., M.D., M.A.T., M.B.A.). 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 informa-
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, Politics, and Society in Latin America—(Same as History 80.) Interdisciplinary examination of the development of Latin America from the conquest to debt crisis. Emphasis is on the relationship between economic growth, social change, and the structure of political systems. DR:959

5 units, Win (Haber) TTh 1:15-3:05

95. Contemporary Latin America—Preparatory for, but not restricted to, students bound for the Santiago Center through the Overseas Studies Program. Introduction to the culture of everyday life in contemporary urban Latin America, emphasizing Santiago, Chile. Films, lectures, and discussions with Latin American professors, artists, and students.

2 units, Win (Staff) Th 7-9 p.m.

128. Agrarian Change, Marginality and Human Rights in Latin America—Introduction to agrarian change trends and urban marginality in Latin America, focusing on the characteristics of traditional peasant societies, land tenure systems, agrarian reforms and revolutions, peasant movements, agricultural modernization, rural to urban migrations, urban marginality and the informal sector, the problem of natural resources and ecological deterioration, foreign investments and state policies of urbanization. Their relation to changing structures of poverty and the human rights of peasantries, migrants, indigenous peoples and urban squatters.

5 units, Aut (Stavenhagen) MW 2:15-4:05

152. Undergraduate Seminar in Research—(Same as Anthropology 93.) Prepares students for 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 in the community, research ethics, interpersonal dynamics, and the reflexive aspects of fieldwork.

5 units, Spr (Thompson)

153. Undergraduate Independent Research—(Same as Anthropology 94.) Helps undergraduates analyze and write about material gathered during summer fieldwork. Readings/discussion on power issues in fieldwork and ethnographic writing, thus setting craft concerns within broader political contexts.

5 units, Aut (Streicker)

169. Directed Individual Study—(Graduate students enroll in 269.) For students engaged in special interdisciplinary work that cannot be arranged by department.

1-5 units, Aut, Win, Spr (Staff) by arrangement

180. Ethnic Conflicts and Nation-States in the Contemporary World: The Ethnic Question in Comparative Perspective—(Same as Anthropology 141, Political Science 127R.) Overview of the major ethnic conflicts in the world: who is involved, what are the issues, how they are being handled. The reemergence of ethnic movements and the challenge to the nation-state. Principal theories accounting for ethnic conflicts and their critique. The question of individual and collective human rights. The international system (the UN and its specialized organs). Case studies from Eastern and Western Europe, Asia, Africa, Latin America, Canada and the U.S.

5 units, Win (Stavenhagen) T 2:15-4:05


5 units, Aut (Smith) W 7-9 p.m.

195. Senior Thesis—Restricted to undergraduate majors and those writing the honors thesis in LAS.

1-10 units, Aut, Win, Spr (Staff) by arrangement

250,251,252. Core Seminar in Latin American Studies—(Same as History 304C,D.) Restricted to A.M. degree students, or consent of instructor. Interdisciplinary analysis of topics and issues related to the Latin American region.

5 units, Aut (Bouwer) Th 3:15-5:05

Win, Spr (Staff) Th 4:15-6:05

260. Latin American Bibliography—Introduction to research use of Stanford library collections on Latin American topics.

3 units, Aut (Breedlove) Th 12-1:15

317. Indigenous Peoples and the UN System—The political impact of indigenous social movements. Constitutional changes and universal declarations, collective human rights, peoples' rights
and the right to self-determination. Seminar explores these issues and relates them to current theoretical concerns about social movements, the nation-state and international relations.

5 units, Spr (Stavenhagen)

DEPARTMENT OFFERINGS

See respective department listings for course descriptions and Distribution Requirement (DR) information.

AFRICAN AND AFRO-AMERICAN STUDIES


5 units (Wynter)

ANTHROPOLOGY

73A,B,C. First Year Spoken Yucatec Maya.

3 units (Fox)

103. Mesoamerican Communities, Ethnicities, and Nations.

3-5 units (G. Collier)

106. Afro-Latin American Peoples and Cultures.

5 units (Streicher)

109. Dance and Culture in Latin America—(Same as Dance 177.)

2-4 units (Cashion)

203A,B,C. Culture and Power in Contemporary Mesoamerica.

1-5 units (G. Collier)

239. Cultural Approaches to Education and Development—(Same as Education 306C.)

5 units (Rohlen)

251. Issues in Cultural Studies.

5 units (Rosaldo)

262. Topics in Political Economy.

5 units (Gupta)

264. Advanced Ecological Anthropology.

5 units (Durham)

BUSINESS


5 units (Meier)

DANCE

75/175. Mexican Dance and Folklore I, II.

2 units (Cashion)

77. Dances of Latin America.

1 unit (Cashion)

178. Mexican Dance Performance.

2 units (Cashion)


2 units (Osumare)


2 units (Osumare)

ECONOMICS

106. The World Food Economy—(Same as Food Research 103.)

5 units (Falcon, Naylor)

118. The Economics of Development.

5 units (Kochar)

119. Development and Population Interactions in the Third World—(Same as Food Research 121.)

5 units (Yotopoulos)

122. The Theory of Capitalist Development.

5 units (Harris)

123. Economic Development in Latin America—(Same as Food Research 218.)

5 units (Reynolds)

165. International Economics.

5 units (Huizinga)


5 units (Kochar)

220. Marxian Economic Theory.

5 units (Harris)

266. International Trade Theory.

5 units (Huizinga, McKinnon)

267. Special Topics in International Economics.

5 units (R. Staiger)

315A,B,C. Workshop in Economic Development.

10 units (Staff)

365A,B,C. Workshop in International Economics.

10 units (Staff)

EDUCATION

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

2-5 units (Carnoy)

207. Seminar: The Politics of International Cooperation in Education—(Same as Political Science 248.)

5 units (Weiler)

242X. First Year Proseminar in Language, Literacy, and Culture.

4 units (Sperling, McDermott, Calfee)

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

5 units (Weiler)
306D. Sociology of Development and Education—(Same as Sociology 306.)
   5 units (Ramirez)

   5 units (Weiler)
   alternate years, not given 1992-93

315. Cultural Transmission: Education in Cross-Cultural Perspectives—(Same as Anthropology 266.)
   3-5 units (G. and L. Spindler)

   2-5 units (Meyer, Ramirez)

FOOD RESEARCH INSTITUTE

106/206. The Political Economy of Commodities Markets—(Same as Economics 127.)
   5 units (Williams)

136/236. Population Perspectives in the Third World—(Same as Economics 136, Human Biology 136, Sociology 53.)
   5 units (Arthur)

166/266. International Trade Policy—(Same as Economics 166.)
   5 units (Pearson)

224. Explorations in the New Development Economics.
   5 units (Yotopoulos)

225. Modeling Economic Development.
   5 units (Fafchamps)

267. International Agricultural Policy.
   5 units (Josling)

HISTORY

304A. Graduate Colloquium: Historiography of Colonial Spanish America.
   5 units (B ouwer)

348A. Graduate Colloquium: End of Slavery in Africa and the Americas.
   5 units (R. Roberts)

381. Graduate Colloquium: Agrarian Structure and Agrarian Change in Europe and Latin America.
   5 units (Haber)

479. Graduate Seminar: Economic History of Latin America.
   5 units (Haber)

INTERNATIONAL RELATIONS

196. Environmental Issues in International Relations.
   4-5 units (Naylor)

LINGUISTICS

5. Biology and the Evolution of Language—(Same as Anthropology 5, Human Biology 113.)
   4-5 units (Fox)

90. Linguistic Field Methods—(Same as Anthropology 71.)
   5 units (Fox)

150. Introduction to Sociolinguistics.
   4-6 units (Guy)

162 English Transplanted, English Transformed: Pidgins and Creoles—(Same as Anthropology 177.)
   4 units (Rickford)

PHILOSOPHY

77. Ethics in International Relations: World Destitution.
   4 units

POLITICAL SCIENCE

113A. Politics and Development in Latin America.
   5 units (Packenham)

   5 units (Packenham)

   5 units (Fagen)

126K. Seminar: The United States and Central America.
   5 units (Karl)

140A,B,C. Ethics of Development in a Global Environment—(Same as Engineering 297A,B,C.)
   1 or 4 units (Lusignan)

   5 units (Fagen)

316. Seminar: Democratization in Latin America.
   5 units (Karl) not given 1991-92

323. Seminar: Theories of Development.
   5 units (Packenham)

SPANISH AND PORTUGUESE

109. Portuguese for Speakers of Spanish.
   3 units (Van den Dool)

130. Brazilian Cultural Perspectives.
   3 units (Van den Dool)

131B. Hispanic-American Cultural Perspectives.
   3-5 units (Sandoval)

132B. Mexican and Chicano Cultural Perspectives.
   3-5 units (Sandoval)
140. Introduction to Methods of Literary Analysis.  
3-5 units (Lopes)

3-5 units (Corral, Staff)

208. Theory of Literature and Society in Latin America.  
3-5 units (Ruffinelli)

240,241. Brazilian Literature I, II.  
3-5 units (Lopes)

3-5 units (Corral)

248. The Caribbean-Americas: An Introduction to Their Literature, Thought, and Cultural Worlds—(Same as African and Afro-American Studies 248, English 262G.)  
3-5 units (Wynter)

255. Methodology of Reading Poetry: Poesía de Amor.  
3-5 units (Ruffinelli)

3-5 units (Ruffinelli)

290. Brazilian Cinema.  
3-5 units (Lopes)

5 units (Wynter)

342. Writing and Re-Writing: Colonial Literature in Contemporary Narrative.  
3-5 units (Corral)

LINGUISTICS

Emeriti: (Professors) Clara N. Bush, Charles A. Ferguson, Joseph H. Greenberg, Dorothy A. Huntington  
Chair: William R. Leben  
Vice Chair: Ivan A. Sag  
Professors: Joan Bresnan, Eve V. Clark, Shirley Brice Heath (on leave Autumn), Martin Kay, Paul Kiparsky (on leave), William R. Leben, Stanley Peters (on leave), John R. Rickford, Ivan A. Sag, Elizabeth C. Traugott (on leave), Thomas A. Wasow (on leave)  
Associate Professor: William J. Poser  
Assistant Professors: Gregory R. Guy (Autumn), Peter Sells  
Courtesy Professor: John Baugh  
Senior Lecturers: Khalil Barhoum, Philip L. Hubbard, Beverley J. McChesney  
Acting Assistant Professor: Alessandro Zucchi

Consulting Professors: Ronald M. Kaplan, Lauri Karttunen  
Consulting Associate Professors: Jared Bernstein, Philip Cohen, Penelope Eckert, Per-Kristian Halvorsen, Geoffrey Nunberg, Annie Zaenen  
Visiting Emeritus Professor: Dwight Bolinger  
Visiting Professors: Joshua Fishman (Winter), Arnold Zwicky (Winter)  
Visiting Assistant Professor: Andrew Garrett  
Affiliated Faculty: Herbert H. Clark, James A. Fox, Mary L. Pratt, Orrin W. Robinson, III, Richard D. Schupbach  
Mellon Fellow: Thomas Veatch

English for Foreign Students  
Director: Beverley J. McChesney  
Associate Director: Philip L. Hubbard

Special Language Program  
Senior Lecturer in Arabic: Khalil Barhoum  
Lecturer in Hebrew: Mina Ben-Meir Sikuler  
Lecturer in Swahili: Ndinzi Masagara

Linguistics concerns itself with the fundamental questions of what language is and how it is related to the other human faculties. In answering these questions, linguists consider language as a cultural, social, and psychological phenomenon and seek to determine what is unique in languages, what is universal, how language is acquired, and how it changes. Linguistics is, therefore, one of the cognitive sciences; it provides a link between the humanities and the social sciences, as well as education, and hearing and speech sciences.

The department offers courses at undergraduate and graduate levels in the areas central to linguistic theory and analysis. Many of them deal with the analysis of structural patterns in the different components that make up language, including sounds (phonetics and phonology), meanings (semantics), words (morphology), and sentences (syntax). Other courses integrate the analysis of linguistic structure with phenomena that directly concern other disciplines. These include courses in language acquisition, sociolinguistics, computational linguistics, and the philosophy of language.

A variety of open forums are provided for the discussion of linguistic issues, including colloquia and regularly scheduled workshops in phonology, syntax, sociolinguistics, child language, and historical linguistics. Faculty and visiting scholars in the Cognitive Science Group and the Center for the Study of Language and Information, whose members are linguists, philosophers, psychologists, and computer scientists, participate extensively in the activities of the department.
UNDERGRADUATE PROGRAMS
BACHELOR OF ARTS

The undergraduate major stresses the study of language both as a fundamental human faculty and as a changing social institution. At the core of the program is a set of departmental courses on the nature of human language; in addition, the major draws on courses offered by other departments and programs.

The Linguistics major cuts across the humanities, social sciences, and physical sciences and provides a solid general education as a background for advanced studies in such disciplines as Anthropology, Communication, Computer Science, Education (Language Arts and Language Teaching), Hearing and Speech Sciences, Languages, Law, Linguistics, 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 including 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 information is available from the Department of Linguistics (Bldg. 100).

   a) **Linguistic Structure:** this involves the investigation of the internal properties of the human linguistic system. Traditional core areas are phonology, morphology, syntax, and semantics, in which linguists attempt to develop and justify theories of organization and content of the linguistic system. Advanced undergraduates may take introductory graduate 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 domain 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 linguistics, psychology, artificial intelligence, anthropology, and philosophy.

c) **The Linguistics of a Particular Language or Language Family:** this specialization, which provides a suitable preparation for foreign language teaching, translating, or graduate study, may be arranged in any language or language family offered at Stanford. Specific requirements are determined by an undergraduate adviser in consultation with the appropriate language department.

d) **Sociolinguistics:** this is the study of language as a social and cultural phenomenon. It explores the role of languages in marking, as well as reflecting, differences in social class, ethnicity, nation, sex, and religion; the relationship between language and the professions (education, law, medicine); the role of linguistic variation and multilingualism in social identity and national development, and languages in contact, pidgins and creoles, conversational analysis, variability and change in language, particularly as jointly constrained by internal and external factors.

e) **Linguistics and Literature:** this focuses on analysis of discourse, literary vs. non-literary language, oral vs. written literature, and literacy. It provides suitable preparation for advanced study in literary theory, law, and other fields where textual analysis is important.

f) **Individually Designed Area:** a specialization different from any of the areas above can be arranged in consultation with an undergraduate studies adviser.

2. **Language:** majors must have competence in a modern foreign language. This is usually demonstrated by completing a course at the second-year level, but the requirement may be met by special examination, presentation of superior foreign language placement scores, or certification in writing from an appropriate department. The requirement may be modified in certain areas of specialization, in consultation with the Undergraduate Studies Committee.

3. **Honors Program:** students majoring in linguistics who plan to apply for graduate studies in linguistics or related fields should seek departmental honors. An application to pursue honors work should be presented well before the end of the junior year; approval is given only to students who have maintained a letter grade indicator (LGI) of "B+" or better in the courses required for the major.

Honors students take a total of 60 units. These must include the core courses, and an area of specialization as in (1), and an honors essay based on research conducted with a member of the Linguistics faculty (normally fulfilled by 98, Honors Research, 2 units, in Autumn Quarter, 4 units,
in Winter Quarter). The essay must be submitted in final, acceptable form no later than six weeks before the date of intended graduation.

GRADUATE PROGRAMS

MASTER OF ARTS

The University's basic requirements for the master's degree are discussed in the "Degrees" section in this bulletin. The following are additional departmental requirements. Candidates should review departmental "Guidelines for 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 of 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 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 core course requirement guarantees that each student covers a sufficient set of sub-areas within the field. Note: courses required for the program are currently under review and a revised curriculum will be available Autumn Quarter 1991.

   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 second qualifying paper is the end of the first quarter of the third year, but the department recommends that, if at all possible, the student complete the second qualifying paper by the end 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 in Autumn Quarter, 2 units in Spring Quarter), and approval by a committee of at least three faculty members selected by the student and the faculty.

4. **Teaching**: at least two quarters serving as teaching assistant in a linguistics course.

5. **Colloquia**: two oral presentations exclusive of the oral presentation of the dissertation proposal (see 6b 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.

6. **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 numbering indicate a special area, as follows:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>00-04</td>
<td>General</td>
</tr>
<tr>
<td>05-19</td>
<td>Phonetics, Phonology, and Morphology</td>
</tr>
<tr>
<td>20-39</td>
<td>Syntax, Semantics, and Pragmatics, Mathematical and Computational Linguistics</td>
</tr>
<tr>
<td>40-49</td>
<td>Language Acquisition and Psycholinguistics</td>
</tr>
<tr>
<td>50-59</td>
<td>Sociolinguistics</td>
</tr>
<tr>
<td>60-69</td>
<td>Language Change, Language, and Culture</td>
</tr>
</tbody>
</table>

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 (Sells)

4. Language and Culture—(Same as Anthropology 4.) Language as a part of culture. Individual and community repertoires of languages, dialects, jargons, registers, and nonverbal communication, and their rules of use. Structure of discourse, including conversation, narrative, and poetry. Language as a martial art: style, strategy, and politics in manipulating the rules of use. Linguistic relativity, encodability, and cultural origins of vocabulary and grammar.

4-5 units, Win (Heath)

5. Biology and Evolution of Language—(Same as Anthropology 5, Human Biology 113.) Language as an evolutionary adaptation of humans. Comparison of communicative behavior in humans and animals, and the inference of evolutionary stages. Structure, linguistic functions, and evolution of the vocal tract, ear, and brain, with associated disorders (stuttering, dyslexia, autism, schizophrenia) and therapies. 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, given 1992-93

16. Writing and Literacy—(Same as Anthropology 18.) 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, Aut (Fox, McDermott)


4 units, given 1992-93

51. Language and Ethnicity—When and how does language become associated with ethnic attitudes, behaviors, and identity? How does this association influence and reflect modernization,
nationalism, language planning, language shift, and the reversal of language shift? Detailed study of Basque, Catalan, Frisian and Irish in Europe; Spanish, Navajo and Yiddish in the U.S.; Hebrew in Israel; selected immigrant and aboriginal languages in Australia and Maori in New Zealand; and the elaboration of a general theory of language and ethnicity.

4 units, Win (Fishman)

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.

4 units, Aut (Garrett)

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.

4 units, given 1992-93

71B. Linguistics and Literature— (Same as English 101.) Introduction to literary analysis through applications of concepts from the science of language. Emphasis on discourse analysis and the phonological, syntactic, semantic, and pragmatic structures of English. The use of regional and social dialects in literature. DR:7(2)

5 units, not given 1991-92

73. African American English—Survey of the English vernacular spoken by black 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 West Africa. The expressive uses of Black English (in soundin', and rappin'), and its educational implications.

4 units, given 1992-93

75. Introduction to the Germanic Languages— (Same as German Studies 19A/119.) 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, Spr (Robinson)

80. Linguistic Field Methods— (Same as Anthropology 71.) Practical training in collection and analysis of linguistic data from native speakers. Research goals, ethics, working in the community, technical equipment, and analytical strategies. Emphasis on use of computers in collection and analysis, and attention to preparation of materials useful to the subject community. Prerequisite: introductory course in linguistics.

5 units, not given 1991-92

85. Introduction to Methods of Teaching English as a Foreign 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.

3 units, Win (McChesney)

86. Practicum in TEFL—Workshop for volunteer teachers currently active in area TEFL programs or planning to teach English abroad. Includes demonstration teaching, discussion of teaching problems, and evaluation of classes observed. Prerequisite: 85 or equivalent.

2-3 units, Spr (McChesney)

97. Research in Linguistics—Introduction to research goals and methods in linguistics and related disciplines. Assigned readings and presentations by different faculty members.

4 units, not given 1991-92

98A, B. Honors Research.

2 units, Aut (Staff)

4 units, Win (Staff)

99. Independent Study.

1 or more units, any quarter (Staff)

by arrangement

101/201. Writing Systems—Survey of different types of writing systems, emphasizing their linguistic properties, history, and mental processing. Topics: history of different writing systems, history of the discovery of ancient documents and their decipherment, psychology of reading, neurological deficits affecting reading and writing, and relative merits of different writing systems. Appropriate for undergraduate and graduate students, with little background in Linguistics; necessary background incorporated as needed.

4 units, not given 1991-92

102. The History of the English Language— (Same as English 102.) Evolution of the English language as a medium of literary expression. DR:9(4)

5 units, Spr (Stork)

110. Introduction to Phonetics and Phonology—Focuses on training in phonological analysis, including ability to look for relevant data, propose and substantiate solutions for problems...
in data, evaluate alternative solutions, and construct and evaluate phonological arguments based on the sound system of English. Also, essentials of information on articulatory phonetics and phonological theory for the practice of phonological investigation.

4 units, Spr (Veatch)

120. Introduction to Syntax—Analyses of various grammatical constructions, primarily English, and their consequences for a general theory of language. Practical experience in forming and testing linguistic hypotheses, reading, and constructing rules.

4 units, Aut (Sag)

130. Introduction to Semantics and Pragmatics—Linguistic meaning and its role in communication. Broad view of issues and problems that face linguistic, psychological, and philosophical efforts to analyze meaning in natural language. Topics: speech acts that can be performed with language; distinction between literal meaning of an utterance and what is communicated; the notion of propositional content; meaning of words, sentences, and discourses; study of presupposition, entailment, and conversational implicature; how to describe the meaning associated with the infinite number of sentences belonging to a language. Prerequisite: 120 or consent of instructor.

4 units, Win (Zucchi)

131. Lexical Semantics and Cognitive Structure—Examines organizing principles in the lexicon that link word meanings within and across semantic domains; the connections between word meaning and conceptual structure, and the place of syntactic/semantic dimensions such as transitivity.

3 units, Spr (E. Clark)

135. Basic Concepts in Mathematical Logic—(Same as Philosophy 159.) Concepts and techniques used in mathematical logic: sets, functions, structures, formalization, proof, mathematical induction, enumerability, and effectiveness. DR:4(6)

3 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 consequences: Löwenheim-Skolem Theorem and Compactness Theorem. Prerequisite: Philosophy 159 or consent of instructor. DR:4(6)

4 units, Win (Mints)

139/239. Introduction to Computational Linguistics—(Same as Symbolic Systems 150.) Introduction to the computational aspects of basic linguistic processes in morphology, syntax and semantics, and their integration in applications such as machine translation and man-machine interfaces. Grades based on computer programs implementing key algorithms for parsing, generation, etc. done as homework exercises. Prerequisite: introductory course in prolog programming.

4 units, Aut (Kay)

145. Language and Thought—(Same as Psychology 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 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 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 cultures. Speech events and the role of conversation, narratives, and performance modes in different contexts. Focuses on ethnographic methods for the study of verbal and non-verbal communication.

4 units, Spr (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 (Guy)

153. Inter- and Intra-Ethnic Variation in Urban Vernacular English—(Same as Urban Studies 165.) 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, Aut (Rickford)

154. Language and Gender—(Same as Anthropology 171.) Synthesis of literature on the relations between gender and speech style, distin-
guishing linguistic, sociolinguistic, and feminist issues. Topics: language, socialization, oral and written language, language and class membership.

4 units, not given 1991-92

157/257. The Study of Language Variation—
Theoretical and methodological issues in the study of language variation. Locating variation in the grammar; categorical vs. variable properties of language, incorporating dynamic dimensions in linguistic theory. Quantitative methods in linguistics, including probabilities and statistics. Variable rule analysis, implicational scaling, significance.

4-5 units, Aut (Guy)

162. English Transplanted, English Transformed: Pidgins and Creoles—(Same as Anthropology 177.) The formation of simplified contact languages and their subsequent elaboration. Emphasis on 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 9(4*)

4 units, Win (Rickford)

165. Genetic Affiliation and Classification of Languages—What we know about how languages are related to each other and how we know it. Survey of generally accepted linguistic relationships and discussion of more controversial proposals. The nature of evidence for genetic affiliation. Methods for subgrouping of languages known to be related (shared innovations, lexicostatistics, shared retentions, intelligibility clustering). The relationship between models of language change and methods for demonstrating genetic affiliation and classification. Prerequisite: 60 or consent of the instructor.

4 units, Spr (Poser)

173. African-American English in Educational Context—(Same as Education 270X.) Enrollment limited to graduate students. Examines linguistic and cultural conflicts that confront the majority of African-American students. Interdisciplinary research 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. Linguistic Analysis of German—(Same as German Studies 212/312.) Introduction to linguistic theory and analysis, emphasizing modern German.

3-5 units, Win (Robinson)

176. Introduction to German Dialects—(Same as German Studies 118/218.) The major dialects of German-speaking Europe through texts, tapes, lectures, and presentations by native speakers; introduction to dialect geography. DR:9(4)

3 units, not given 1991-92

188. Teaching Asian Languages—(Same as Asian Languages/Chinese 288, Japanese 288, Korean 288.) Workshop studying the theoretical and practical problems involved in teaching Asian languages as a second language.

1 unit, Spr (Staff) 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 English, but principles underlying methods and techniques discussed are applicable to teaching any language.

4-5 units, Aut (Hubbard)

200. Foundations of Linguistic Theory—Theories that have shaped 20th-century linguistics; recurrent themes and descriptive practice.

4 units, given 1992-93

205A. Phonetics—Builds skill in the production and perception of speech sounds, developing an accurate kinesthetic appreciation of the speech mechanism. Skills are used in transcription and preliminary analysis of spoken language.

4 units, Win (Poser)

205B. Phonetics—Introduction to the technical side of phonetics and phonology, including acoustics of speech production, acoustic correlates of speech sounds, aspects of speech perception, the phonetics/phonology interface, and the status of phonetic explanation in phonology. Lab exercises. Prerequisite: 110 or 205A.

4 units, Win (Poser)


4 units, Win (Leben)


4 units, given 1992-93
LINGUISTICS  509

207B. Morphosyntax—Role of morphology in grammar: how word structure serves syntax in the expression of meaning. Universal properties and typology of morphological categories; proposals towards their principled explanation in a restrictive theory of language.
   4 units, not given 1991-92

   4 units, Win (Poser)

220A. Cross-linguistic Syntax—Types of critical phenomena found in diverse syntactic systems and their implications for syntactic theory. Special emphasis is placed on cross-linguistic diversity, typological variation, and their relation to general theoretical issues.
   4 units, Aut, (Bresnan)

220B. Syntactic Theory—Overview of current syntactic issues and theory, with emphasis on work based on Government-Binding theory. Prerequisite: one class in syntax.
   4 units, Win (Sells)

221A/B. Phrase Structure and Categorial 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 categorial analyses, e.g., Bach, Steedman, and Dowty. A systematic presentation of theory of Head-Driven Phrase Structure Grammar. In special cases, 221A may be taken separately by arrangement with the instructor. Prerequisite: 220A,B or consent of instructor.
   4 units, not given 1991-92

   4 units, not given 1991-92

224. Seminar on Relative Clauses—In-depth study of the major types of relative clauses found cross-linguistically, emphasizing unifying theoretical accounts. Topics: relative clause types (internally-headed, corerelative, etc.) related properties such as island constraints, parasitic gaps, resumptive pronouns, and types of relative pronouns.
   4 units, Spr (Sag, Sells)

226. Formal Architecture of LFG—The interplay between formal devices and linguistic phenomena in LFG. Introduction to the general architecture of LFG as a system of constraints within the quantifier-free theory of equality of the universally-quantified theory of relations. Logical and computational techniques for solving such constraint systems. Additional topics: functional uncertainty, wh-movement and anaphoric binding; contextual unification and the parceling of information between c-structure and f-structure, functional precedence, word order, and zero pronominals, projections and representation of semantic information. Prerequisite: introductory syntax course.
   4 units, Win (Dalrymple, Kaplan, Maxwell, Zaenen)

228A. Topics in Syntactic Theory: Ambiguity Resolution—Computational methods for resolving ambiguity in meaning, reference, and syntactic structure including methods based on abductive inference. Programming component.
   4 units, Aut (Hobbs, Kay)

228B. Topics in Syntactic Theory: The Structure of English Noun Phrases—The way NPs are organized in English, focusing on a wide range of facts, developing the descriptive apparatus needed for English, and following out implications for syntactic theory. Students investigate phenomena treated only in passing, related or parallel phenomena in other areas of English structure, or parallel phenomena in any other language.
   4 units, Win (Zwicky)

228C. Topics in Syntactic Theory: Argument Structure—Critical analysis of the recent literature on argument structure. Investigations of verb classes, nominalizations, passive, unaccusativity, reflexives, complex predicates.
   4 units, Spr (Bresnan)

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 (Sag)

230B. Semantics and Pragmatics—In-depth introduction to key areas in current research in semantics and pragmatics. Prerequisite: 230A.
   4 units, Spr (Zucchi)
231. Topics in Semantics and Pragmatics.
4 units, Spr (Zucchi)

233. Issues in the Semantics of Tense and Aspect—Seminar on current issues in this area: the interpretation of the progressive and the perfect, the interpretation of temporal and aspectual adverbs, sequence of tenses, and tense and aspect in discourse.
4 units, Aut (Zucchi)

235. Anaphora and Dynamic Theories of Meaning—Readings determined by student interest.
2 units, Aut (Zucchi)

236. Topics in Computational Linguistics—Hands-on practicum aimed at developing tools for some area of application such as machine translation. Collaborative effort involving all participants, giving opportunities to concentrate on theoretical or implementational issues including, e.g., grammar implementations, lexicon, parsing, generation, inference and knowledge representation. Prerequisite: background in computational linguistics.
3 units, Win (Kay, Sag)

3-4 units, Aut (Winograd)

239. Introduction to Computational Linguistics—(Same as Symbolic Systems 150.) See 139.
4 units, Aut (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: Morphology—(Same as Psychology 241.) Focus is on verbs; overregularization, stem choices, suppletion, inflectional patterns, tense, aspect, person, number, and agreement systems in acquisition.
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)

248. Seminar on Developmental Psycholinguistics: Speaker Perspective and Lexical Choice.
4 units, Spr (E. Clark)

250. Sociolinguistic Theory and Analysis—Kinds of problems with which sociolinguists deal and the theories, models, and methods of analysis which they have developed. Emphasis on what general linguistics might gain from the sociolinguistic approach to problems of linguistic theory and description, and linguistic change. Prerequisite: graduate standing in Linguistics or consent of instructor.
4 units, Spr (Rickford)

252. The Analysis of Interactive Discourse—Roles and methods of interactive language use: "joint" production of turns, negotiation of reference, and range of types (e.g., conversation, sermons, stories). Connections to Gricean principles, speech act theory, and relations between pragmatic phenomena and interactive language.
4 units, not given 1991-92

253. Language Planning and Public Policy—Overview of language planning theories and implementation strategies and their relationship to other public policies. Cross-national and historical dimensions of issues in language policy-making providing comparative perspective for in-depth examinations of language situations within the U.S. Particular attention devoted to status planning for the reversal of language shift. Emphasis on status planning for the reversal of language shift.
4 units, Win (Fishman)

255. Linguistic Anthropology—(Same as Anthropology 277.) Seminar on language in its cultural context. Topics similar to those in Anthropology 4, plus 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. Topics are motivated by the readings.
5 units, not given 1991-92

256. Topics in Linguistic Anthropology—(Same as Anthropology 278.) Discourse analysis, verbal art, and conversation in cultural and grammatical perspective.
5 units, Spr (Fox)

257. The Study of Language Variation—See 157.
4-5 units, Aut (Guy)

258. Educational Applications of Sociolinguistics—(Same as Education 341X.) Introduction to various studies of language in society and their educational relevance. Theoretical perspectives: quantitative sociolinguistics, alternative approaches to studies of discourse and conversa-
tion, examinations of literacy and language attitudes in multilingual and multicultural contexts, and ethnographic foundations of linguistic inquiry. Content technical in nature, but emphasizes educational application. Relevant aspects of public (language) policies considered.

3 units, Win (Baugh)

259A. Topics in Sociolinguistics: Sociophonetics—How people really talk, the sounds they actually produce in unreflecting, natural speech, and the patterns and structures in their sound systems, questions at the heart of phonetics, phonology, and sociolinguistics. Tape-recorded vernacular speech and its sound patterns, emphasizing vowels in various English dialects. Provides experience with methods of sociolinguistic field work, phonetic transcription, and phonological analysis, covering English surface phonology, sound change and variation, and some acoustic phonetics. Term project on description of the sound system of a dialect. Prerequisites: some graduate work in phonetics and/or phonology, or consent of instructor.

4 units, Aut (Veatch)

259B. Topics in Sociolinguistics: The Speech Community—Examines the central theoretical role in investigating the speech community, including the empirical study of variation, the sociology of language and the philosophical discussions of linguistic norms and conventions. Concepts of the speech community explicitly or implicitly invoked in each of these traditions. Is notion amenable to a single coherent theoretical formulation?

3 units, Spr (Eckert, Nunberg)

264. Historical Phonology and Morphology—Problem-solving introduction to historical linguistics, stressing its empirical foundations and some theoretical approaches. Goal: exposure to a wide range of historical data from several language families, and the acquisition and practice of analytic methods. Linguistic change; comparative and internal reconstruction; principles of subgrouping and dialect geography; the nature of sound change; Neogrammarian theory and structuralist and generative challenges; grammaticalization and morphologicalization; and internal vs. external models of change.

4 units, Aut (Garrett)


4 units, not given 1991-92

266. Topics in Historical Linguistics: Morphosyntactic Typology and Diachrony—Development of diachronic explanations for widespread features of typologically common morphosyntactic phenomena, in order to understand their evolution in general terms and to restrict synchronic grammars. Sample topics: ergative case-marking, preposition incorporation, possessor raising, verbal valence-changing processes, and noun incorporation.

4 units, Spr (Garrett)

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 (Cho) not given 1991-92


4 units, Win (Garrett)

274. Comparative Slavic Grammar—(Same as Slavic Languages 214.) Important features of Proto-Slavic reconstructed on the basis of comparisons of different Slavic languages (emphasizing Russian, Old Russian, and Old Church Slavonic), Baltic and other Indo-European languages (English, other Germanic languages, Latin and Romance languages, Greek). Main features of Slavic phonology (phonemic system, syllable structure), accentology, morphology, syntax, and the schemes of Slavic texts. Recommended: knowledge of at least one Slavic language and other Indo-European languages (besides English).

4 units, Aut (Ivanov) by arrangement

276. History of the German Language—(Same as German 203.) Introduction to phonological and syntactic development of modern German from the Germanic parent language. Analysis of selected texts and the consultation of linguistic works on the subject.

3 units, not given 1991-92

277. Structure of Japanese—Survey of the phonetics, phonology, and morphology of Modern Standard Japanese, emphasizing topics of current theoretical interest, including: prosodic morphology, phrasal rules, and phonetic rules, and on the overall organization of the grammar. Prerequisite: 206 or equivalent, or consent of the instructor. Recommended: knowledge of Japanese.

3 units, Spr (Poser)

4 units, Aut (Sells) by arrangement

279. Seminar: Clause Subordination in Early High German—(Same as German 222S.) Investigation of subordinate structures in Old High German, based on a study of the Old High German Isidor translation. Secondary sources consulted.

3-5 units, Spr (Robinson)

286. Sociolinguistic Field Methods—Analysis of structure of language using less familiar data gathered during interaction with a native speaker.

4 units Spr (Rickford)

289. Linguistics and the Teaching of English as a Foreign/Second Language—(Same as Education 262.) See 189.

4-5 units, Aut (Hubbard)

291. The Structure of Modern Chinese—(Same as Asian Languages/Chinese 291.) Introduction to the structure of Modern Mandarin Chinese. Emphasis on syntax and semantics; the relationship between the tone sandhi rules and syntactic structure discussed. Prerequisite: good knowledge of Chinese or consent of instructor.

4 units, Win (Sun) by arrangement

395A,B. Research Workshop—For second-year students in the doctoral program. Student presentations of research toward qualifying papers.

4 units, Win (Sun) by arrangement

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 1991-92

72. Linguistic Approaches to Point of View in Fiction.
107. Introduction to Morphology.
160. Languages in Contact.
177. Structure of Japanese.
208. Issues in Phonological Theory II
212. Metrics.
218. Topics in Phonetics.
229A,B. Mathematical Linguistics.
251. Sociolinguistics and Pidgin/Creole Studies.
254. Literacy: Social and Historical Perspectives.
255. Linguistic Anthropology.
260. Language Change.
267. Colloquium: Theories of Narrative and Genre.
275. Germanic Syntax.

LANGUAGE PROGRAMS

The Special Languages Program offers a number of foreign languages not otherwise taught at Stanford. Based on current funding and requests, the courses planned for 1991-92 are listed below. Additional languages may still be offered upon request provided funding is available. Requests must be made by the end of Autumn Quarter registration period at the Special Language Program office. For further information, 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, 3-quarter sequence.

AFRICAN LANGUAGES

(600-619)

602A,B,C. Beginning Hausa—Successful completion of 602C may fulfill the foreign language requirement.

602A. 4 units, Aut (Staff)
602B. 4 units, Win (Staff)
602C. 4 units, Spr (Staff)

606A,B,C. Beginning Swahili—Successful completion of 606C may fulfill the foreign language requirement.

606A. 4 units, Aut (Masagara)
606B. 4 units, Win (Masagara)
606C. 4 units, Spr (Masagara)
LINGUISTICS 513

607A. 4 units, Aut (Masagara)
607B. 4 units, Win (Masagara)
607C. 4 units, Spr (Masagara)

608A,B,C. Advanced Swahili.
608A. 4 units, Aut (Masagara)
608B. 4 units, Win (Masagara)
608C. 4 units, Spr (Masagara)

609A,B,C. Beginning Yoruba.
609A. 3 units, Aut (Staff)
609B. 3 units, Win (Staff)
609C. 3 units, Spr (Staff)

610A,B,C. Beginning Yoruba.
610A. 3 units, Aut (Staff)
610B. 3 units, Win (Staff)
610C. 3 units, Spr (Staff)

614A,B,C. Beginning Shona.
614A. 3 units, Aut (Staff)
614B. 3 units, Win (Staff)
614C. 3 units, Spr (Staff)

616A,B,C. Beginning Bambara.
616A. 3 units, Aut (Staff)
616B. 3 units, Win (Staff)
616C. 3 units, Spr (Staff)

618A,B,C. Beginning Zulu.
618A. 3 units, Aut (Staff)
618B. 3 units, Win (Staff)
618C. 3 units, Spr (Staff)

619A,B,C. Intermediate Zulu.
619A. 3 units, Aut (Staff)
619B. 3 units, Win (Staff)
619C. 3 units, Spr (Staff)

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)

626A,B,C. Beginning Yiddish.
626A. 4-5 units, Aut (Berman)
626B. 4-5 units, Win (Berman)
626C. 4-5 units, Spr (Berman)

627A,B,C. Intermediate Yiddish.
627A. 4 units, Aut (Berman)
627B. 4 units, Win (Berman)
627C. 4 units, Spr (Berman)

628A,B,C. Beginning Hebrew.
628A. 4-5 units, Aut (Ben-Meir Sikuler)
628B. 4-5 units, Win (Ben-Meir Sikuler)
628C. 4-5 units, Spr (Ben-Meir Sikuler)

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)

641A,B,C. Intermediate Dutch.
641A. 3 units, Aut (Staff)
641B. 3 units, Win (Staff)
641C. 3 units, Spr (Staff)

645C. Intermediate Tagalog.
3 units, Aut (Victoire)

651C. Intermediate Vietnamese.
3 units, Aut (Ha)

652A,B,C. Beginning Hindi.
652A. 3 units, Aut (Singh)
652B. 3 units, Win (Singh)
652C. 3 units, Spr (Singh)

656A,B- Beginning Indonesian.
656A. 3 units, Win (Burke)
656B. 3 units, Spr (Burke)

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)

676A,B,C. Beginning Thai.
676A. 3 units, Aut (Staff)
676B. 3 units, Win (Staff)
676C. 3 units, Spr (Staff)

677A,B,C. Intermediate Thai.
677A. 3 units, Aut (Staff)
677B. 3 units, Win (Staff)
677C. 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. 3 units, Aut (Haas)
679B. 3 units, Win (Haas)
679C. 3 units, Spr (Haas)
These courses represent the offerings in English as a foreign language in Autumn, Winter, and Spring Quarters. Enrollment in one or more courses may be required of, or recommended to, current graduate students from foreign countries after they have taken the English screening examination. To enroll, students must come to the EPS office in Building 380, room 381A, the first day of each quarter.

During the Summer Session, courses in spoken and written English are offered for undergraduates. Six-week courses in spoken English and academic orientation for foreign graduate students are 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. Spoken Usage—Structured practice in spoken English. Emphasis on current use in a variety of daily situations. Review and practice of grammatical patterns as needed.
3 units, Aut (Staff) by arrangement

691A. Discussion—Participation in seminar-style discussions as discussant and leader. Emphasis on fluency and intelligibility; 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 complex spoken and written language in academic and professional contexts, including recognition of underlying meaning, nuance, and inference. 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.
3 units, Aut, Win, Spr (Staff) by arrangement

698A. Writing Academic English—Prepares graduate students for writing academic papers; emphasis on fluency, documentation, and appropriateness for specific tasks. May be repeated for credit. 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

699. Tutorial in Academic Writing—For students actively engaged in writing dissertations, whose problems with English are clearly the result of non-native use of the language, and who demonstrate potential for rapid improvement with individualized instruction. Focus is on student’s work in progress. Emphasis on self-correction and achievement of independent control. Must enroll for credit. Prerequisite: 698B, recommendation of major adviser, and consent of instructor.
1 unit (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.
LITERATURE IN TRANSLATION

ASIAN LANGUAGES

GENERAL
113. Zhuang Zhi.
132. Chinese Fiction and Drama in Translation.
133. Modern Chinese Literature in Translation.
142. Person, Number, Gender.
169. Who's Speaking? The Position of the Speaking Subject in Western and Chinese Poetry.

CLASSICS
65. Greek Philosophy.
115. Greek Attitudes, Values, Beliefs.
169. Ancient Greek Ethics.

FRENCH AND ITALIAN

FRENCH
105. The Writings of Albert Camus.
114. The Modern French Novel.
138. Female Saints.
139C. The Grail in Modern Culture.
191. The Short Story in France.
259B/359B. How Realistic was European Literary "Realism"?
279D. Structuralism and Deconstruction: Complexity and Self-Reference in the Humanities and the Social Sciences.
288A. Limits of Economic Rationality I: The Nature of the Social Bond.
289D/389D. Deconstruction Contextualized.

ITALIAN
197/397. Reading Course on the History of the Italian Language.
248. Machiavelli.
259B. How "Realistic" was European Literary Realism?
269A/369A. Pirandello, Satre, and Beckett.

GERMAN STUDIES
19A. Introduction to the Germanic Languages.
31A,32A,33A. German Culture and Civilization I, II, III.
79A. Masterpieces of Modern German Literature in Translation.
165A. The Later Thomas Mann.
190A. Savage Places.
284A/384A. Joyce, Proust, Mann I.

HUMANITIES SPECIAL PROGRAMS
301. The Greek Period.
302. The Roman Period.
303. The European Middle Ages.
304. The Early Modern Period.
305. From Enlightenment to Modernism: the 18th and 19th Centuries.
306. The 20th Century.

SLAVIC LANGUAGES AND LITERATURES
142/242. From Suprematism to Constructivism in Russian Avant Garde Theater.
146/246. Survey of Russian Literature in English Translation II: The Age of Realism.
151. Fyodor Dostoevsky.

SPANISH AND PORTUGUESE

SPANISH
216. Don Quijote I.
217. Don Quijote II.
248. The Caribbean Americas: An Introduction to Their Literature, Thought, and Cultural Worlds.

MATHEMATICAL AND COMPUTATIONAL SCIENCE

Committee in Charge: (Co-chairs) Bradley Efron (Statistics), David O. Siegmund (Statistics); Robert W. Floyd (Computer Science), John G. Herriot (Computer Science), Joseph B. Keller (Mathematics), Robert Osserman (Mathematics), Eric S. Roberts (Computer Science), Mary V. Sunseri (Mathematics), Arthur F. Veinott, Jr. (Operations Research)

Ex-officio Members: Takeshi Amemiya (Economics), Thomas M. Cover (Electrical Engineering and Statistics), John T. Gill III (Electrical Engineering), J. Michael Harrison (Graduate School of Business), David R. Rogosa (Education)

This interdepartmental, interschool undergraduate program is designed as a major for students interested in the mathematical and computational sciences, or in the use of mathematical ideas and analysis in problems in the social or management sciences. It provides a core of mathematics basic to all of the mathematical sciences and an introduction to the concepts and techniques of automatic computation, optimal decision-making, probabilistic modeling, and statistical inference. It also provides an opportunity for elective work in any of the mathematical science disciplines at Stanford.

The program utilizes the faculty and courses of the Departments of Computer Science, Mathematics, Operations Research, and Statistics. It prepares students for graduate study or employment in the mathematical and computational sciences or in those areas of applied mathematics which center around the use of high-speed computers and are concerned with the problems of the social and management sciences.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

The requirement for the bachelor’s degree, beyond the University’s basic requirements, is an approved course program of 76 to 80 units, distributed as follows:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics (33-34 units)</td>
<td></td>
</tr>
<tr>
<td>1. Math. 41, 42, 43, Calculus and Analytic Geometry or Math. 19, 20, 21, 43</td>
<td>15</td>
</tr>
<tr>
<td>Math. 44, Calculus</td>
<td>3</td>
</tr>
<tr>
<td>Math. 103, Matrix Theory and Its Applications or Math 113, Linear Algebra and Matrix Theory</td>
<td>3</td>
</tr>
<tr>
<td>Math. 104, Continuation of 103 or Math. 114, Continuation of 113</td>
<td>3</td>
</tr>
<tr>
<td>Math. 109, Modern Algebra and its Applications or Math. 120, Modern Algebra</td>
<td>3</td>
</tr>
<tr>
<td>Math. 130, Ordinary Differential Equations</td>
<td>3</td>
</tr>
</tbody>
</table>

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 CS 137, Fundamentals of Numerical Computation CS 154, Introduction to Automata and Complexity Theory 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 (or OR 340, Linear Programming) 4
OR 243, Integer and Nonlinear Programming 3
OR 251, Probabilistic Models in Operations Research 3

Statistics (10 units)

2. Stat. 200, Introduction to Statistical Inference 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
Op. Res. 150, Statistical Issues in Manufacturing (Enroll in Engineering 110) 3
Stat. 201B, Data Analysis II 3
Stat. 217, Introduction to Stochastic Processes 3
Elect. Engr. 261, The Fourier Transform and Its Applications 3

For Computer Science (CS), suggested electives include those courses not taken under Part 3 of the above Computer Science list and the following:
MATHEMATICS 517

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 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 engineering, industrial engineering, etc., that might be relevant to a mathematical sciences major, depending on the particular interest of the student. Majors must file with their advisers a plan for completing degree requirements at least three quarters before graduation. All courses used to fulfill major requirements must be taken for a letter grade with the exception of courses offered Satisfactory/No Credit only. A course used to fulfill the requirements of one section of the program may not be applied toward the fulfillment of the requirements of another section. The student must have a letter grade indicator (LGI) of “C” or better in all course work used to fulfill the major requirement.

HONORS PROGRAM

The honors program is designed to encourage a more intensive study of mathematical sciences than the Bachelor of Science program. In addition to meeting all requirements for the B.S. in Mathematical and Computational Science, the student must:
1. Maintain, in mathematical sciences courses, an average LGI of at least 3.4.
2. Complete at least 15 units in mathematical sciences in addition to the requirements for the major listed above. These courses should form a sustained effort in one area and constitute a program approved by the committee in charge of the Mathematical and Computational Science Program.
3. Include in the above 15 units at least one of: (a) an approved higher-level graduate course, (b) participation in a small group seminar, or (c) at least 3 units of directed reading.

Prospective honors students should consult with their advisers by the last quarter of the junior year to prepare a program of study for approval by the committee in charge.

COURSES

100. Mathematics of Sports—(Same as Mathematics 100.) 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 (Cover, Keller) not given 1991-92

MATHEMATICS

Emeriti: (Professors) Harold M. Bacon, Kai Lai Chung, David Gilbarg, Georg Kreisel, Ralph Phillips, Hans Samelson, Menahem Schiffer, Mary Sunseri

Chair: Solomon Feferman


Associate Professors: Daniel Bump, Brad Osgood, Brian White

Assistant Professors: F. Jay Bourland, Amir Dembo, Masaaki Furusawa, Viktor Ginzburg, Piotr Grzegorczyk, Zheng Chao Han, Rafe Mazzeo, Katarzyna Pietruska-Paluba, Johan Råde, Zeev Rudnick, Richard Sommer

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.

(*The new algebra requirement for mathematics majors will apply to students declaring a Mathematics major Autumn Quarter 1991 and thereafter.)

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.

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, and one course in probability or set theory (123 or 160A or 162).
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:

<table>
<thead>
<tr>
<th>Autumn</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman year:</td>
<td>43H</td>
<td>44H</td>
</tr>
<tr>
<td>Sophomore year:</td>
<td>120</td>
<td>134A</td>
</tr>
<tr>
<td></td>
<td>171</td>
<td>173</td>
</tr>
<tr>
<td>Junior year:</td>
<td>143</td>
<td>4 electives</td>
</tr>
<tr>
<td></td>
<td>206A</td>
<td>from the 140s and 150s</td>
</tr>
<tr>
<td>Senior year:</td>
<td>205A</td>
<td>205B</td>
</tr>
<tr>
<td></td>
<td>Senior Thesis</td>
<td></td>
</tr>
</tbody>
</table>

Students with questions about the honors program should see Professors R. Cohen, B. Osgood, or H. 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. (Not offered 1991-92.)

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 Graduate Affairs Committee of the Department of Mathematics and submit an acceptable dissertation. The course program should display substantial breadth in mathematics outside the student's field of application 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.

For further information concerning degree programs, fellowships, and assistantships, inquire of the academic secretary of the department.

**Ph.D. MINOR**

The student should complete both of the following:

1. Math. 106, 131, 132
2. Math. 113, 114, 120 or 152

These courses may have been completed during undergraduate study, and their equivalents from other universities are acceptable.

In addition, the student should complete 18 units of 200-level courses in mathematics. These must be taken at Stanford and approved by the Department of Mathematics’ Ph.D. minor adviser.

* A third coherent sequence designed by the student, subject to the approval of the graduate committee may be considered as a substitute for one or two.

**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.

Precalculus Mathematics (3) is offered for those who need or desire a better preparation in these subjects before entering one of the calculus sequences.

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.

3. **Precalculus Mathematics**—Establishes the background needed to begin calculus: functions and graphs; linear and quadratic equations; inequalities; logarithms; binomial theorem; trigonometric functions, identities, and equations; solutions to triangles.

4 units, Aut (Staff) MTWTThF 8

19. **Calculus and Analytic Geometry**—Complete introduction to concept, techniques, and applications of differentiation and a brief introduction to concept, techniques, and applications of integration. The sequence (19, 20, 21) is taught in individual sections and covers the same subjects as the sequence (41, 42) described below. Prerequisites: see 41. DR:4(6)

3 units, Aut (Staff) MW 8, 9, 10, 11, 1:15
TTh 1:15-2:30
Win (Staff) MW 9, 10, 11
Spr (Staff) MTWTTh 10

20. **Calculus and Analytic Geometry**—Continuation of 19. Prerequisite: 19. DR:4(6)

3 units, Win (Staff) MW 8, 9, 10, 11, 1:15
TTh 1:15-2:30
Spr (Staff) MW 9, 10, 11

21. **Calculus and Analytic Geometry**—Continuation of 20. Prerequisite: 20. DR:4(6)

4 units, Aut (Staff) MW 9, 1-15
Spr (Staff) MW 8, 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 and Analytic Geometry**—Introduction to differential and integral calculus. Topics: limits, derivatives of polynomials, algebraic and trigonometric functions, curve sketching, mean value theorem, maxima and minima, indefinite and definite integrals, geometric and physical interpretations, and applications. Prerequisite: algebra and trigonometry. DR:4(6)

5 units, Aut (Osgood) MTWTThF 11, 1:15

42. **Calculus and Analytic Geometry**—Continuation of 41. Logarithms, exponential functions, hyperbolic functions, techniques of integration, analytic geometry; conic sections, polar coordinates, introduction to vectors. Prerequisite: 41 or equivalent. DR:4(6)

5 units, Aut (Pietruska-Paluba, Staff)
MTWTThF 10, 11, 1:15

Win (R. Cohen) MTWTThF 11, 1:15

43. **Calculus and Analytic Geometry**—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 (Livna, Rade, Staff)
MTWTThF 10, 11, 1:15, 2:15
Win (Furusawa, Pietruska-Paluba, Finn)
MTWTThF 10, 11, 1:15, 2:15
Spr (Bourland) MTWTThF 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 the 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 (Simon) MTWTh 2:15-3:15
Win (Schoen) MTWTh 2:15-3:15
Spr (Han) 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 (Sommer, Grzegorczyk)
MWF 10; TTh 11-12:15
Win (Rüde, Ginzburg, Staff)
MWF 10, 1:15; TTh 11-12:15
Spr (Finn, Norbutovsky) MWF 1:15; TTh 11-12:15

53. The Nature of Mathematics—(Enroll in VTSS 53.) 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, Spr (Brumfiel)

UNDERGRADUATE AND GRADUATE

Unless explicitly stated, there are no prerequisites for the courses listed below. Where a prerequisite is stated it may be waived by the instructor.

100. Mathematics of Sports—(Same as Mathematical and Computational Science 100.) The use of mathematics, statistics, and probability in the analysis of athletic performance, sports records, strategy, etc. Topics: mathematical analysis of the 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: 43. Corequisite: Statistics 116.

not given 1991-92

103. Matrix Theory and its Applications—Linear algebra and matrices, emphasizing computational and algorithmic aspects and the scientific problems in which matrix theory is applied. Solution of linear equations. Linear spaces and matrices. Orthogonal projection and least squares. Introduction to eigenvalues and eigenvectors. DR:4(6)

3 units, Aut (Rudnick, Han, Staff)
MWF 10, 1:15; TTh 11-12:15
Win (Brumfiel, Zucker, Staff)
MWF 10, 1:15; TTh 11-12:15
Spr (Furusawa, Nabutovsky, Staff)
MWF 10, 1:15; TTh 11-12:15
Sum (Staff) MTWTh 11


3 units, Win (Grzegorczyk) MWF 10
Spr (Osserman) 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 (Levine) MWF 10
Spr (Grzegorczyk) MWF 10
Sum (Staff) MTWTh 9

109. Modern Algebra and its Applications—Same as 120, but emphasis on applications of modern algebra including symmetry groups, crystallographic groups, and error-correcting codes. Prerequisite: 103, 113, or equivalent.

3 units, Aut (Sommer) MWF 2:15

113. Linear Algebra and Matrix Theory—Algebraic properties of matrices and their interpretation in geometric terms. Relationship between the algebraic and geometric points of view and matters fundamental to the study and solution of linear equations. Topics: linear equations, vector spaces, linear dependence, bases and coordinate systems; linear transformations and matrices; similarity; eigenvectors and eigenvalues; diagonal and Jordan forms. DR:4(6)

3 units, Aut (Kerckhoff) MWF 10
Win (Milgram) MWF 10

114. Linear Algebra and Matrix Theory—(Continuation of 113.) Deeper study of 113 topics plus additional topics from invariant subspaces, canonical forms of matrices; minimal polynomials and elementary divisors; vector spaces over arbitrary fields; inner products; Hermitian and unitary matrices; multilinear algebra.

3 units, Win (Kerckhoff) MWF 10
Spr (Carlsson) MWF 10

3 units, Aut (Han) MWF 1:15

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 (Rudnick) 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 (Rudnick) MWF 2:15

123. Theory of Probability—Introduction to the theory of probability and its applications. Basic concepts of probability, random variables, and their distribution functions are treated in the modern manner. Detailed classical limit theorems for sequences of independent random variables. Prerequisite: 44.

not given 1991-92

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 1991-92

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.

3 units (Karlin, Feldman) not given 1991-92

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 (Dembo) MWF 9;
TTh 1:15-2:30
Win (Ying, Han) MWF 1:15;
TTh 1:15-2:30
Spr (Rüde, Ginzburg, Staff)
MWF 10, 1:15; TTh 1:15-2:30
Sum (Staff) MWF 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 (Levine, Brendel) MWF 10,
TTh 1:15-2:30
Spr (Chow) MWF 1:15


3 units, Spr (Levine) MWF 10

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) TTh 11-12:15

135. Perturbation Methods in Mathematics and Physics—Introduction of the analysis intent on securing quantitative results for problems which lack exact solutions, but are correlated with others that admit complete resolution. Applications to eigen-function/eigenvalue problems in irregularly shaped domains, diffusion/wave problems in nonhomogeneous settings and non-linear differential equations. Prerequisite: 131 or equivalent.

not given 1991-92

141. Higher Geometries—Study of various geometries, including projective, affine, and non-Euclidean geometry. Prerequisite: 113.

not given 1991-92


3 units, Aut (Liu) MWF 3:15
144. Topics in Geometry.  
not given 1991-92

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. Prerequisite: 120, 121.  
not given 1991-92

147. Differential Topology—Smooth manifolds, transversality, Sard's theorem, embeddings, degree of a map, Borsuk-Ulsem theorem, Hopf degree theorem, Jordan Curve Theorem. Prerequisites: 115 or 171, 173.  
3 units, Spr (Kerckhoff) MWF 2:15

not given 1991-92

149. Topics in Topology.  
not given 1991-92

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 (Furusawa) TTh 1:15-2:30

155. Geometrical Groups—The rotation and unitary groups emphasizing two, three, and four dimensions. Quarterions. The Lorentz group and SL(2,C). Prerequisites: 113, 120, or consent of instructor.  
not given 1991-92

156. Group Representations.  
3 units, Spr (R. Cohen) TTh 1:15-2:30

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. DR:4(6)  
4 units, Win (Mints)

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 plus section

4 units, Aut, Spr (Suppes)

162. 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 (Sommer) MWF 2:15

165. Geometrical Groups—The rotation and unitary groups emphasizing two, three, and four dimensions. Quarterions. The Lorentz group and SL(2,C). Prerequisites: 113, 171.  
3 units, Win (Royden) MWF 1:15

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 (Simion) TTh 11-12:15

3 units, Win (Royden) MWF 1:15

175. Elementary Functional Analysis—Linear operators on Hilbert space. Spectral theory of compact operators; applications to integral equations. Elements of Banach space theory. Prerequisite: 171.  
3 units, Spr (Grzegorczyk) MWF 2:15

181. Topics in the History of Mathematics: From Antiquity to the 17th Century—(Enroll in History 138D, History of Science 140, Philosophy 140.)  
not given 1991-92

182A.B. Topics in the History of Mathematics.  
182A. From the 17th to the 19th century. Rapid development of powerful new concepts and methods in analysis and their direct connection with the physical sciences, i.e., mechanics. Illustrations from works of famous mathematicians from Descartes to Abel.  
3 units, not given 1991-92
182B. The 19th to the early 20th century. Extension and expansion of analysis and its applications. Rigorization and generality; rise of algebra and abstract mathematics. Illustrations from work of famous mathematicians from Fourier to Lebesgue.

3 units, not given 1991-92

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 1991-92

196. Undergraduate Colloquium—Readings/discussions of topics in mathematics, its history and philosophy. Emphasis on influence of models on science and western civilization. Topics determined by interests and backgrounds of class members. Term paper required.

not given 1991-92

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

PRIMARILY FOR GRADUATE STUDENTS

200. Graduate Problem Seminar.
3 units, Win (Katznelson) TTh 9-10:15


205A. 3 units, Aut (Royden) MWF 10
Spr (Osserman) TTh 1:15-2:30
205B. 3 units, Win (Royden) MWF 10
205C. 3 units, Spr (Katznelson) TTh 9-10:50

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 (Osgood) 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 11-2:15
210B. 3 units, Win (Brumfiel) TTh 11-12:15
210C. 3 units, Spr (Brumfiel) TTh 11-2:15


217A. 3 units, Win (Schoen) MW 11-12:15
217B. 3 units, Spr (Schoen) MW 11-12:15


220A. 3 units, Aut (Bourland) TTh 9:30-10:45
220B. 3 units, Win (Goodman) TTh 9:30-10:45
220C. 3 units, Spr (Keller) 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 1991-92

222. Topics in the Calculus of Variations—Global direct methods for multidimensional problems emphasizing geometrical questions, capillarity theory, stability of fluid configurations. Topics chosen according to interests of participants. Prerequisite: foundations of analysis or equivalent. Recommended: some background in measure theory and classical calculus of variations.

3 units, Win (Finn)


not given 1991-92

224. Integral Equations—Singular types and methods for their solution; alternative integral equation reformulation of boundary value problems, dual equations, and affiliated variational principles.

not given 1991-92
225. Electromagnetic Phenomenon—Field equations in macro- and microscopic forms; energy, momentum, angular momentum measures and their interrelation with charge/current sources. Variational principles and conservation laws. Solutions of the field equation for moving and extended sources. Radiation of electromagnetic energy from periodic and nonperiodic sources. A microscopic basis for classical field theory.

226. Mathematical Models in Population Biology—(Same as 126.)

228A,B. 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 \( \mathbb{Z} \) measure preserving transformation, \( \mathbb{R} \) (flow), 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. Prerequisites: 205A or equivalent.


231. Topics in Stochastic Processes—Topics in combinatorial stochastic models are emphasized including random walks on groups, graphs, trees, etc.; processes of order statistics, fluctuation theory for partial sums of independent identically distributed random variables. Multidimensional Poisson processes, stochastic population processes, applications to biological structure, population dynamics in space and time, reliability regimes, and to various communication and engineering systems.

232. Diffusions and Related Stochastic Analysis—Univariate and multivariate Brownian motion theory, boundary classification for regular diffusion models with killing, stochastic differential equations, and stochastic integrals. Discussion of examples and applications in the physical, biological, medical, and social sciences.

233. Stochastic Equations and Waves in Random Media—Differential equations with random coefficients arise in wave propagation in random media vibrations of systems with random imperfections, the theory of amorphous solids, etc. Such equations are developed for various cases, and methods of solution presented. Prerequisites: some knowledge of differential equations and the elements of probability theory.


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.

236A,B. Mathematical Population Genetics—Classical evolutionary models of one- and multi-gene traits subject to natural selection, migration, and mutational forces. Effects of nonrandom mating. Modeling of various stochastic mechanisms of recombination processes affecting gene frequency distributions. Applications to models on behavioral genetics, effects of population and demographic structure density and frequency dependence, multi-factorial inheritence phenomenon. Mathematical techniques include stability analysis of equilibria for certain nonlinear transformation, algebraic concepts of Kronecker and Schur products, group symmetries and invariants, aspects of real and probabilistic analysis.


242. Difference Equations—Theoretical account of linear functional equations which have a difference or recursive character; applications to special (Gamma) functions and to physically motivated problems. Comparisons with analogous aspects of differential equations.

244A. Riemann Surfaces—Compact Riemann surfaces; topological classifications, Hurwitz' formula. Riemann-Roch formula, uniformization
526 SCHOOL OF HUMANITIES AND SCIENCES

Abel’s theorem, Jacobian varieties. Also, some elements of harmonic analysis are developed with applications. Methods generally applicable to algebraic curves highlighted.


3 units, Aut, Win (Eliashberg) TTh 9-10:15

_246. Quantum Invariants_—Quantum invariants of links and 3-manifolds. Recent work on Jones polynomials and 2-dimensional conformal field theory. Emphasis on statistical mechanical models which produce topological invariants of manifolds, knots, and links.

3 units, Win (Turaev)

_248A,B. Analytic Number Theory_—The theory of modular forms.

3 units, Aut, Win (Bump, Rudnick)


_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.

_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.

_257. Symplectic Geometry_—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.


_264. Infinite Dimensional Lie Groups_.

_267. Harmonic Analysis_—Topics from the “\( L^2 \)” theory of harmonic analysis—the singular integral theory of Calderon and Zygmund and its
extensions, interpolation of operators, multiplier transformations, and smoothness properties of functions: sets of uniqueness for trigonometric series, spectral syntheses, thin sets, spectral theory of convolution operators, and applications. Prerequisite: knowledge of the elements of Fourier analysis.

270. Perturbation and Asymptotic Methods with Applications—Exposition of perturbation and asymptotic methods. Topics: regular perturbation theory, singular perturbation theory, initial and boundary layers, the method of multiple scales, ray theory, two-time methods. Applications: problems from fluid and solid mechanics, wave propagation, etc. Prerequisite: some familiarity with ordinary and partial differential equations.

272. Topics in Partial Differential Equations.

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.

275. Wave Motion and Their Sources—Wave features in various contexts (acoustic, elastic, hydrodynamic, electromagnetic), emphasizing source prototypes and an account of specific mathematical techniques developed to further the analysis. Prerequisites: standard courses on functions of a complex variable and partial differential equations.

277A,B. Mathematical Theory of Relativity—Ricci calculus; variational principles and covariance properties; differential geometry of spacetime; Cauchy's problem for the differential equations of gravitation and electromagnetism; relativistic hydrodynamics; unified field theories.

281A,B. The Geometry of Moduli Spaces and Applications—Topics: the geometry of Toeplitz matrices and Toeplitz varieties, "fat graphs," connections between symmetric groups, loop spaces and cyclic homology, with applications to moduli spaces of holomorphic vector bundles and instantons, the Atiyah-Jones conjecture, the geometry of moduli spaces of Riemann surfaces.

283A. 3 units. Win (Milgram)
283B. 3 units. Spr (Hurtubise)

284A,B. Topics in Geometric Topology—Topics in classical knot theory and the theory of three manifolds: Alexander and Conway polynomials, surgery theory, Kirby's theorem, Jones' polynomial, Casson's invariant, and generalizations. Also, representation spaces of 3-manifold groups, hyperbolic geometry, recent invariants of Witten, Turaev, and others.

285A,B. 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.

286A. Topics in Differential Geometry.

287A,B. Topics in Algebra and Number Theory—Introduction to algebraic geometry.


289A. Topics in Analysis—Basic introduction to Ergodic Theory.

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.

291 A. Recursion Theory—Theory of recursive functions and recursively enumerable sets. Turing machines and alternative approaches. Diophantine definability. Definability in formal systems. Gödel's incompleteness theorems. Recursively unsolvable problems in mathematics and logic. Introduction to recursive ordinals and hi-
erarchies. Prerequisites: 160A, B and 162, or equivalent.

not given 1991-92

292A. 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, Win (Sommer) MWF 2:15

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 1991-92

294. Topics in Logic—Varies each year. Examples: abstract model theory and generalized quantifiers; recursion in higher types, generalized recursion theory; categorical logic; constructive functional interpretations, foundations of constructive and semi-constructive mathematics; application to theoretical computer science. Prerequisites: appropriate background from one of 290A, B, through 293A, B, or equivalent.
3 units, Spr (Feferman) TTh 1:15-2:30

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. Also, an articulation of a Formalist View of Mathematics. Prerequisite: 205 or consent of instructor.

not given 1991-92

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

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

by arrangement

389. Seminar in Mathematical Biology.
by arrangement

by arrangement

MEDIEVAL STUDIES

Committee in Charge: George H. Brown (Chair), Hester Gelber, Gavin Langmuir, Seth Lerer, William Mahrt, Mary Wack

Affiliated Faculty: Theodore M. Andersson (German Studies), George H. Brown (English), Phillipe Buc (History), Brigitte Cazelles (French and Italian), John Freccero (French and Italian), Hester Gelber (Religious Studies), Gavin I. Langmuir (History), Seth Lerer (English), Suzanne Lewis (Art), William Mahrt (Music), Jeffrey Schnapp (French and Italian), Nancy Stork (English), W. Wesley Trimpi (English), Mary Wack (English)

The Medieval Studies Program is administered through Humanities Special Programs. Although there is no formal undergraduate degree program, students may propose individually designed majors in Medieval Studies. Such majors must be proposed to and approved by the Dean of Undergraduate Studies’ Advisory Committee on Individually Designed Majors. Guidelines may be found under the “Program for Individually Designed Majors” section 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. 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. Philosophy, Religious Studies, Humanities.
   (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, Spanish, or Italian.

**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)

*5 units, Win (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**


**CLASSICS**

103. History of the Roman Empire.
206. Undergraduate Colloquium: Magna Carta.


306. Graduate Colloquium: The Language of Politics in the Western Middle Ages.

307. Graduate Core Colloquium in Medieval History.

308. Graduate Colloquium: The Religious Crisis of the 11th and 12th Centuries.

408. Graduate Seminar in Medieval History.

HUMANITIES

303. The Western Traditions: The European Middle Ages.

ITALIAN

227. Italian Literature I: The Middle Ages and the Renaissance—DR:7(2)


RELIGIOUS STUDIES


168. Divine Justice in Medieval Thought and Literature.


SLAVIC LANGUAGES AND LITERATURES

143/243. Early Russian Art and Architecture, 1050-1725—DR:7(2)

211. Introduction to Old Church Slavic.

212. Old Russian and Old Church Slavonic Texts.


SPANISH AND PORTUGUESE

150. Spanish Literature I—DR:7(2)

MODERN THOUGHT AND LITERATURE

Faculty: Joel Beinin (History), John Bender (English), Henry Breitrose (Communication), Terry Castle (English), Wanda Corn (Art), Sandra Drake (English), Charles Drekmeyer (Political Science), Jay Fliegelman (English), Eckhart Förster (Philosophy), Estrella Freedman (History), Regenia Gagnier (English), Peter Galison (Philosophy), Barbara Gelpi (English), René Girard (French), Akhil Gupta (Anthropology), David Halliburton (English), Van Harvey (Religious Studies), Shirley Heath (English and Linguistics), Herbert Lindenberger (English and Comparative Literature), Diane Middlebrook (English), Thomas C. Moser (English), Kurt Mueller-Vollmer (German Studies), David Palumbo-Liu (Comparative Literature), Marjorie Perloff (English), Mary Louise Pratt (Spanish and Portuguese), Paul A. Robinson (History), Renato Rosaldo (Anthropology), Lucio Ruotolo (English), Ramon Saïdçav (English), Jeffrey Schnapp (French and Italian), Dan Selden (Classics), James Sheehan (History), Peter Stansky (History), Hans Weiler (German Studies), Robert Weissberg (Law), Sylvia Wynter (Afro-American Studies), Sylvia Yanigasako (Anthropology)

The Program in Modern Thought and Literature admits students for the Ph.D. and sponsors an undergraduate major through the Humanities honors program.

UNDERGRADUATE PROGRAMS

HONORS PROGRAM

This undergraduate program is designed for students with a strong commitment to the interdisciplinary study of modern literature (since the 17th 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. Completion of the Cultures, Ideas, and Values requirement (15 units, freshman year) with a letter grade indicator (LGI) of at least "B" and an "A-" or better in at least one quarter of the sequence.
2. Humanities 90 (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. The scope of these courses must be comparable to that of German Studies 241, 242, 243, or History 136, 136A, 136B.
6. One course in the history of modern science or technology.
7. One course in modern art or music.
8. One course addressing modernization from a historical or social scientific perspective.
9. Completion of at least two years of college-level study of a modern foreign language or demonstration of equivalent proficiency.
10. Honors essay on a literary topic treated in an interdisciplinary manner (2 units, Spring Quarter, junior year; 5 units, Autumn Quarter; 5 units, Winter Quarter, senior year). An LGI of at least “B” is required on the essay for graduation with honors in Humanities.

COTERMINAL PROGRAM
Each year, one or two undergraduate students who are exceptionally well-prepared in literature and at least one foreign language 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.

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 of the reasons why the student could not pursue the studies he or she desires in some other way (e.g., the “Major in English With Interdisciplinary Emphasis”).
4. A plan of study listing, quarter by quarter, each course by name, units, and instructor which will be taken in order to fulfill the requirements for the degree.
5. A writing sample of critical or analytical prose.
6. Two letters of recommendation for 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 will be 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 and writing in the humanities and humanistic social sciences. It assumes serious interest in one or more areas of modern thought: anthropology, history, linguistics, philosophy, political and social thought, psychology, religious studies. Students are expected to acquire an extensive knowledge of a single literature, normally English and 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 and advanced courses in interdisciplinary and related fields such as those listed above.

MASTER OF ARTS
Only candidates for the Ph.D. are admitted; but students in the Ph.D. program who satisfy the committee of their progress, and who complete satisfactorily 45 units of work, may apply for an A.M. in Modern Thought and Literature.

DOCTOR OF PHILOSOPHY
A candidate for the Ph.D. degree in Modern Thought and Literature must complete three years (nine quarters) of full-time work, or the equivalent, in graduate study beyond the A.B degree. He or she is expected to complete at least 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:
1. An introductory seminar, Modern Thought and Literature 361 (5 units).
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), and thesis registration (399, 802) may not be counted among these 30 units. 396, 397, and 399 may not be counted among the
90 units of graduate work required for the degree.

3. Forty units of advanced work in a coherent and individually arranged interdisciplinary program, including at least one additional seminar. The program, to be worked out with the student's adviser, may include courses and readings in various areas of modern thought and culture, and individual creative work.

4. Procedures for Candidacy:
   a) 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 essay based on a term paper written during the first year. The colloquium, to be attended by two members of the Committee-in-Charge including the chair, must be scheduled at least two weeks before the end of Spring Quarter. The paper, to be read by at least two members of the Committee-in-Charge, including the chair, must be submitted by the same date.
   b) Qualifying Examination: at the beginning of the second year, students must demonstrate knowledge of major writers and movements in their chosen literature from 1750 to the present. Normally, students spend much of their first summer preparing for this demonstration. Students may choose between two ways of demonstrating this knowledge: a one-hour oral examination conducted by two faculty members plus the chair, covering materials not already studied in courses; or a collection of brief critical commentaries on materials not covered in courses, to be read by two faculty members plus the chair. The examination and/or commentaries are based on reading lists drawn up by the student in consultation with the adviser and approved by the Committee-in-Charge. Normally a student's list is based on the advisory lists provided by the program, which can be revised to include works drawn from the student's special field of interest.

5. Teaching is an essential part of the program. Candidates must do four quarters of supervised half-time teaching. During the first year, a candidate is expected to act as a reader for two courses or a section leader for one course, in the second year to teach two quarters of Freshman English, and in the third or fourth years to assist a faculty member as a section leader in a high-enrollment course.

As preparation for teaching, students must take English 396, a 2-unit course on the obligations and opportunities of graduate study, and 397A, a 5-unit course on teaching composition.

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 consultation 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, 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 may be drawn from the literature of specialization, from the area of non-literary studies, or from a combination of the two.

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 Humanities program, see "Humanities Special Programs" section in this bulletin.
COURSES

Courses crosslisted below are relevant to the interdisciplinary component of the program. For literature courses, students should consult the listings of the Departments of English, German Studies, Spanish and Portuguese, French and Italian, Asian Languages, and Slavic Languages. For other offerings, including courses at the undergraduate level, students should consult listings in the Departments of Anthropology, Art, Communication, Drama, Feminist Studies, History, Linguistics, Philosophy, Political Science, and Religious Studies. Consent of instructor is often required.

51D. Introduction to Political Philosophy—(Enroll in Political Science 51D, Philosophy 30, Public Policy 103A.)
5 units, Aut (Satz)

101. Science, Technology, and Contemporary Society—(Enroll in VTSS 101.)
4-5 units, Aut (McGinn)

103A. Seminar: International Feminism—Theory and Practice—(Enroll in Feminist Studies 103A/203A.)
5 units, Aut (Chang)

110. Representations of India in Western Philosophical Texts—(Enroll in Comparative Literature 110.)
5 units, Spr (Dhillon)

141. History of Film—(Enroll in Communication 141/241.)
4 units, Win (Breitrose)

151. The Transformation of American Thought and Culture, 1865 to the Present—(Enroll in American Studies 151, History 163A.)
5 units, Win (Gillam)

153. Utopian Political Thought—(Enroll in Political Science 153.)
5 units, Spr (Hansot)

5 units, Spr (Bernstein, Bland, Dornbusch, Drekmeier, Moses, Noddings, Ross)

160A. Dance History and Philosophy—(Enroll in Dance 160A, Drama 127A.)
3-4 units, Win (Ross)

160B. Dance and Live Art in the 20th Century—(Enroll in Dance 160B, Drama 127B.)
3-4 units, Spr (Ross)

160D. Cinema and Literature—(Enroll in English 160D.)
5 units, Win (Marsh)

161. Theaters and Staging: 18th Century to the Present—(Enroll in Drama 161.)
4 units, Aut (Eddelman)

161S. Seminar: Democratic Theory—(Enroll in Political Science 161S.)
5 units, Spr (Sniderman)

162A. Study of Chicanas—(Enroll in English 162A, Chicano Studies 161, Feminist Studies 165, Spanish 286.)
5 units, Win (Candelario)

163. Seminar: Contemporary Issues in Feminist Thought—(Enroll in Political Science 163, Feminist Studies 102C/202C.)
5 units, Aut (Hansot)

164. Seminar: Social Theory and Political Values—Authority and Freedom in Weber, Durkheim, and Freud—(Enroll in Political Science 164.)
5 units, Win (Drekmeier)

165. Dance Heritage: History and Styles—(Enroll in Dance 165.)
3 units, Aut, Win (Ross, Staff)

165A. Seminar: An Introduction to Marx and Socialist Thought—(Enroll in Political Science 165.)
5 units, Spr (Tunick)

165C. Introduction to Literary Theory—(Enroll in English 165C.)
5 units, Win (Saldañar)

168. American Indian Mythology, Legend, and Lore—(Enroll in English 168.)
5 units, Win (Fields)

173. Women and Feminism in Eastern Europe—(Enroll in Feminist Studies 173.)
5 units, Win (Crnkovic)

190A. Savage Places—(Enroll in German Studies 190A.)
3-5 units, Win (Gillespie)

197. Modernism and the Humanities—(Enroll in Humanities 197.)
5 units, Aut (Ruotolo)
Win (Dupré)

198. Modern Culture and the Humanities—(Enroll in Humanities 198.)
5 units, Aut (Selden)

200. The American Character—(Enroll in American Studies 200, History 250, 260A.)
5 units, Aut (Gillam)
Spr (Rakove)

213. Family Dynamics in Literature—(Same as Psychiatry 213, Comparative Literature 213.)
Seminar uses psychological tools to analyze a
2-3 units, Win (Van Natta)

217. Technology and Cultural Theory—(Enroll in VTSS 217.) Open to graduate students and upper-division undergraduates. Theoretical perspectives on technology developed by the Frankfurt School (Horkheimer and Adorno, Marcuse, Benjamin), existentialism and phenomenology (Husserl and Heidegger), theorists of modernism and post-modernism (Lyotard, Castoriadis, Habermas); current debates over technology within the arts and architecture.
4 units, Spr (Katz)

230C. 20th-Century Russian Literary Theory from Symbolism and Formalism to Semiotics—(Enroll in Slavic Languages 230C.)
4 units, Aut (Ivanov)

239. Undergraduate Colloquium: Gender, Class, and Social Transformation in Modern Europe—(Enroll in History 239.)
5 units, Aut (Canning)

240. Geistesgeschichte to the Enlightenment Threshold—(Enroll in German Studies 240.)
3-5 units, Aut (Gillespie)

241. Deutsche Geistesgeschichte I—(Enroll in German Studies 241.)
3-5 units, Aut (Trabant)

242. Deutsche Geistesgeschichte II—(Enroll in German 242.)
3-5 units, Win (Staff)

243. Deutsche Geistesgeschichte III—(Enroll in German 243.)
3-5 units, Spr (Mueller-Vollmer)

247. Gender and Social Theory—(Enroll in Anthropology 248, Feminist Studies 148A.)
5 units, Win (Delaney)

3-5 units, Aut (Wynter)

3-5 units, Win (Wynter)

249F. The Aesthetic Absolute: German Literature and Philosophy around 1800—(Enroll in German Studies 249F, Philosophy 126.)
3-5 units, Win (Mueller-Vollmer, Förster)

250. Basic Texts in Modern Political Theory—(Enroll in Political Science 250.)
5 units, Win (Drekmeier)

251. Issues in Cultural Studies—(Enroll in Anthropology 251.)
5 units, Win (Rosaldo)

252. Major Dramatic Texts III: Early Realistic to the Present—(Enroll in Drama 152/252.)
4 units, Win (Lyons)

254. Essentials of Political Theory—(Enroll in Political Science 254.)
5 units, Aut (Drekmeier)

258. Ideology and Cultural Nationalism—(Enroll in Anthropology 258.)
5 units, Spr (Befu)

259. Transnationalism in a Post-Modern World—(Enroll in Anthropology 259.)
5 units, Win (Klimt)

259A. Limits of Economic Rationality I: The Nature of the Social Bond—(Enroll in Political Science 259A, Economics 100B, French 288A.)
2-3 units, Spr (Dupuy)

259B. How “Realistic” Was European Literary Realism?—(Enroll in French 259B/359B, Spanish 295, German 293/393.)
3-5 units, Win (Gumbrecht)

3-5 units, Aut (Gumbrecht, Lenoir)

265. Habermas—(Enroll in German 265.)
3-5 units, Spr (Berman)

266. Society, Education, and Dance—(Enroll in Dance 268, Education 218.)
3-5 units, Aut (Cashion, Ross)

279D. Structuralism and Deconstruction: Complexity and Self-Reference in the Humanities and the Social Sciences—(Enroll in French 279D.)
2-3 units, Win (Dupuy)

281. Novels into Film—(Enroll in Italian 281.)
4 units, Win (Springer)

289. Brazilian Cinema—(Enroll in Portuguese 290.)
5 units, Aut (Lopes)

289D. Deconstruction Contextualized—(Enroll in French 289D/389D, Comparative Literature 369, English 369, German 345.)
3-5 units, Aut (Gumbrecht)

290. History of Anthropological Theory: The 19th Century—(Enroll in Anthropology 290.)
5 units, Aut (Starrett)

291. History of Anthropology: The 20th Century—(Enroll in Anthropology 291.)
5 units, Win (J. Collier)
   5 units, Spr (Wynter)
294. Latin American Cinema: Myths, Realities, and Style—(Enroll in Spanish 294.)
   5 units, Spr (Ruffinelli)
300. Toward a Definition of Postmodernism—(Enroll in Drama 300.)
   5 units, Aut (Lyons)
302. Colloquium: Culture and Technology—(Enroll English 302.)
   5 units, Win (Halliburton)
302A. Graduate Colloquium: Introduction to Problems of Historical Interpretation and Explanation—(Enroll in History 302A.)
   5 units, Spr (Emmons)
   5 units, Spr (Middlebrook, Strober)
309F. Ethnopoetics—(Enroll in English 309F, Chicano Studies 362.)
   5 units, Aut (Candelaria)
309J. Colloquium: Chicano Cultural Studies, Gender, and Ethnicity—The Relevance of Theory—(Enroll in Comparative Literature 309J, English 309J, Spanish 386.)
   5 units, Win (Saldívar)
310. Research Seminar in Musicology: Adorno's Music Criticism—(Enroll in Music 310.)
   4 units, Win (Dreyfus)
346. Graduate Colloquium: Black Hair as Culture and History—(Enroll in History 346.)
   5 units, Spr (Jackson)
354T. Seminar: Technology and Narratives of Identity—(Enroll in Drama 354T.)
   5 units, Spr (Rayner)
360C. Seminar: Neoclassicism, Aesthetics, and Modern Criticism—(Enroll in English 360C.)
   5 units, Spr (Trimpi)
361. The Modern Tradition: Criticism and Colonialism—(Same as Comparative Literature 309, English 361, 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, Aut (Pratt) M 12:15-3:05
365A. Graduate Colloquium: Sexuality in American History—(Enroll in History 365A.)
   5 units, Spr (Freedman)
366. Seminar: American Enlightenment—(Enroll in English 366.)
   5 units, Spr (Fliegelman)
376. Proseminar: Italian Intellectual History—(Enroll in Italian 376.)
   4 units, Win (Harrison)
383. Seminar: Foucault and Contemporary Critique—(Enroll in Comparative Literature 383, English 383.)
   5 units, Spr (Parker)
385B. Seminar: Theory and Practice of the Avant-Garde—(Enroll in English 385B.)
   3-5 units, Win (Perloff)
389. Rereading Gramsci—(Enroll in Italian 389.)
   4 units, Spr (Picone)
395. Ad Hoc Graduate Seminars—Graduate students (at least 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. Letter grade or Satisfactory/No Credit basis.
   any quarter, by arrangement
396. Introduction to Graduate Study—(Enroll in English 396.)
   2 units, Aut (Halliburton, Watters)
397A. Rhetoric and Teaching Composition—(Enroll in English 397A.)
   5 units, Aut (Watters)
397B. Teachers Workshop I—(Enroll in English 397B.)
   5 units, Win (Watters) 12-1
397C. Teachers Workshop II—(Enroll in English 397C.)
   5 units, Spr (Watters)
398. Research Courses—The 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 course.
   any quarter, by arrangement
EMERITI: (Professors) William L. Crosten, Wolfgang E. Kuhn, Herbert B. Nanney, Leonard G. Ratner, Sandor Salgo, Harold C. Schmidt, Earl Schubert (by courtesy, School of Medicine); (Professors, Performance) Marie Gibson, Andor Toth; (Lecturers) Adolph Baller, Frances Blaisdell, Earle Blew, Edward C. Colby

Chair: Karol Berger

Professors: Karol Berger, John Chowning, Albert Cohen, George Houle, William H. Ramsey, Leland C. Smith

Associate Professors: Laurence Dreyfus, William P. Mahrt (on leave Winter, Spring)

Assistant Professors: Thomas Grey, Kimberly Marshall (on leave Autumn, Winter), Jody Rockmaker

Professor (Research): Max V. Matthews

Associate Professors (Research): Christopher Chafe, Bernard Mont-Reynaud, Julius O. Smith

Professor (Performance): Arthur P. Barnes (Director of Bands)

Associate Professor (Performance): George Barth

Senior Lecturers: Judith Bettina (Voice), Margaret Fabrizio (Early Keyboard), Susan Freier* (Violin), Stephen Harrison* (Violoncello), Gennady Kleyman (Violin, Viola), Phillip Levy* (Violin), Naomi Sparrow (Piano), Gregory A. Wait (Voice), Bernard Zaslav* (Viola)

Lecturers: Robert Bates (Associate University Organist), Fredrick Berry (Jazz Band), Robert Black (Director of Orchestras), Joan Brainard (Piano), Marjorie Chauvel (Harp), Anthony J. Cirone (Percussion), Robert Claire (Baroque Flute), Floyd O. Cooley (Tuba), John Dornenburg (Viola da Gamba), Gregory Dufford (Clarinet), Charles A. Ferguson (Guitar), Claire Giovannetti (Voice), James Goldsworthy (Piano), Alexandra W. Hawley (Flute), Joyce Johnson-Hamilton (Trumpet), Jay Kados (Audio Recording), William Klingelhoffer (French Horn), Christopher Lanz (Theory), Janet Maestre (Flute), Anthony P. Martin (Baroque Violin), James Matheson (Oboe), Melinda McGee (Production), Herbert Myers (Early Winds), James O. Nadel (Jazz), Karen Nagy (Bibliography), Rufus Olivier (Bassoon), Grover Sales (Jazz), Harold Stein ( Saxophone), Stephen Tramontozzi (Contrabass), Frederick R. Weldy (Piano)

Visiting Professor, Emeritus: John R. Pierce
Mellon Fellow: Pamela M. Potter

* Member of Stanford String Quartet (Ensemble-in-Residence)

The Department of Music's aims are to promote the understanding and enjoyment of music in the University at large and to provide specialized training for those who plan careers in music as composers, performers, teachers, or research scholars.

The department is housed in Braun Music Center, Dinkelspiel Auditorium, and The Knoll, including two theaters for concert and operatic productions, two rehearsal halls, and a small chamber hall. In addition to pianos, organs, harpsichords, and a variety of early stringed and wind instruments, students may use rare instruments from the Harry R. Lange Historical Collection.

The music library contains a comprehensive collection of complete editions, scores, books, and records. Supplementing this is the Stanford Memorial Library of Music, an invaluable collection of musical manuscripts and first editions.

The Doreen B. Townsend Center for Computer Research in Music and Acoustics (CCRMA) provides one of the top-rated facilities for digital sound research in the world. It includes a large computer room with control room and studio, an all-digital recording studio, a MIDI-based small systems studio, and work areas with terminals, personal computers, synthesizers, and speakers. Offices and workspaces connect with a workstation network; and a gateway connects to the campus-at-large and to national and international networks. CCRMA software consists of a vast set of programs and system tools for editing, viewing, synthesizing, and analyzing sound. For a detailed and up-to-date description of the hardware and software available, contact the CCRMA office.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The undergraduate major in music is built around a series of foundation courses in theory, musicianship, and music history, in addition to performance and proficiency requirements outlined below. Prospective majors are urged to consult one of the major advisers in the department as early as possible in order to plan a program which allows sufficient time for major course work, practice, and University requirements outside the major. Early planning is especially important for students contemplating overseas study during their undergraduate years, and for those with particular musical talents and interests.

1. Students are required to include the following foundation courses in their programs:
   a) Theory: 21, 22, 23, 24A, B, C.
   b) History: 40, 41, and three from the series 140-145.
   c) Analysis: 121 and two from 122A, B, C.
2. Additionally, music majors must fulfill the following two performance requirements:
   a) Individual studies in performance: five quarters.
   b) Ensemble: five quarters of work in one or more of the department's organizations or chambers groups. 161C (Sports Activity Band) and 167 (University Singers) do not satisfy this requirement.

3. Majors are required to pass a Piano Proficiency examination by playing one prepared piece comparable at least in difficulty to Bartok's Mikrokosmos, Book IV and by sight-reading two works from contrasting periods at the same level of difficulty. Students must take this examination as soon as possible after declaring the major and no later than the end of Spring Quarter in the same year.

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
OF 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>
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<th>S</th>
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<tbody>
<tr>
<td>Freshman English</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Music 21-23*, 24A,B,C</td>
<td>4</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Individual Instruction and/or Ensemble</td>
<td>1-4</td>
<td>1-4</td>
<td>1-4</td>
</tr>
<tr>
<td>Cultures, Ideas, and Values</td>
<td>3-5</td>
<td>3-5</td>
<td>3-5</td>
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<tr>
<td>Choice of Foreign Language, Distribution Requirement, or Freshman Seminar</td>
<td>3-5</td>
<td>3-5</td>
<td>3-5</td>
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SECOND YEAR

<table>
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<tr>
<th>Courses</th>
<th>A</th>
<th>W</th>
<th>S</th>
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<tbody>
<tr>
<td>Music 40, 41, and 121</td>
<td>8</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Individual Instruction and/or Ensemble</td>
<td>1-4</td>
<td>1-4</td>
<td>1-4</td>
</tr>
<tr>
<td>Distribution Requirement</td>
<td>3-5</td>
<td>3-5</td>
<td>3-5</td>
</tr>
<tr>
<td>Elective (or Music 23 if not taken previously)</td>
<td>3-5</td>
<td>(3)</td>
<td>(3)</td>
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THIRD AND FOURTH YEARS

<table>
<thead>
<tr>
<th>Courses</th>
<th>A</th>
<th>W</th>
<th>S</th>
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<tbody>
<tr>
<td>Three from Music 140-145 and two from 122A, B, or C</td>
<td>4-8</td>
<td>4-8</td>
<td>4-8(4)</td>
</tr>
<tr>
<td>Elective</td>
<td>(4)</td>
<td>(4)</td>
<td></td>
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</table>

* 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.

MUSIC, SCIENCE, AND TECHNOLOGY

The A.B. in Music, Science, and Technology is designed for those students with a strong interest in the acoustic and psychoacoustic foundations of music and the musical ramifications of a rapidly evolving computer technology. The program is highly multi-disciplinary and entails a substantial research project under faculty guidance. 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, 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. Music, Science, and Technology majors 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 will evaluate 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), in-
including the advanced music sections, and a departmental entrance test in theory and musicianship. In addition, applicants are asked to submit evidence of accomplishment: a composition, research paper, or performance in the proposed field of concentration.

Departmental Examinations—(1) A placement examination tests 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 is given at the beginning of study in the department.

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 (including conducting). 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>
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<tbody>
<tr>
<td>200. Music Bibliography</td>
<td>4</td>
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<tr>
<td>Three quarters of work in the student's area of concentration</td>
<td>9</td>
</tr>
<tr>
<td>Three quarters of ensemble performance</td>
<td>3</td>
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<tr>
<td>223. Composition</td>
<td>4</td>
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<tr>
<td>or 240. Music History: Philosophy and Methods</td>
<td>4</td>
</tr>
<tr>
<td>or 267. Introduction to Performance Practice</td>
<td>4</td>
</tr>
<tr>
<td>299. Master of Arts Project</td>
<td>4</td>
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</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—An examination for admission to candidacy is given in the sixth quarter of full-time residence. Written sections of the test examine knowledge of history and repertory, and an oral examination tests ability to respond verbally to a wide range of questions in the field.

Teaching—All students in the Ph.D. or D.M.A. degree programs, regardless of sources of financial support, are required to do three quarters of supervised teaching at half time and one at quarter 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 courses:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>200. Music Bibliography</td>
<td>4</td>
</tr>
<tr>
<td>240. Music History: Philosophy and Methods</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

The Doctor of Musical Arts (D.M.A.) degree may be pursued in two concentrations: composition or performance practice (including conducting). Each concentration is given breadth through collateral studies in other branches of music and in relevant studies outside music as seems desirable. A minimum of 72 units of credit is required for the degree.

Examinations—A written examination in the candidate's special area of concentration is given no later than the third quarter after passing the qualifying examination. A public lecture-demonstration is given during the last quarter of residence. It should be about one hour in length,
treating some aspect of the final project or composition.

**Performance Practice**—Candidates make extensive study of historical styles of performance, technique, and repertory. In addition to formal course work and such independent study as may be done, the program in performance practice includes a number of performances supported by research papers. This requirement totals 16 units of academic credit and may be satisfied by one of the following course arrangements, to be selected in consultation with an academic adviser:

Four term projects, each of 4 units, investigating and performing compositions in different styles of music, or music from different historical eras.

Three term projects, each for 4 units, and a full recital for 4 units.

Two projects of greater scope, each for 6 units, and one term project for 4 units.

Two projects of greater scope, each for 6 units, and a full recital for 4 units.

The final project in performance practice is chosen from among different possibilities open to the candidate, including (1) preparing a performing score of a work, with commentary; (2) writing an extended critical or historical essay on a problem of performance practice; and (3) translating and commenting on a notable treatise on performance practice.

**Composition**—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**

**Performance Practice:**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>267. Introduction to Performance Practices</td>
<td>4</td>
</tr>
</tbody>
</table>

Two courses in the 269 series:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>269A. Performance Practice of Medieval Music</td>
<td>4</td>
</tr>
<tr>
<td>269B. Performance Practice of Renaissance Music</td>
<td>4</td>
</tr>
<tr>
<td>269C. Performance Practice of Baroque Music</td>
<td>4</td>
</tr>
<tr>
<td>269D. Performance Practice of Classic Music</td>
<td>4</td>
</tr>
<tr>
<td>269E. Performance Practice of 19th-Century Music</td>
<td>4</td>
</tr>
<tr>
<td>269F. Performance Practice of 20th-Century Music</td>
<td>4</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>399. D.M.A. Projects in Composition</td>
<td>16</td>
</tr>
</tbody>
</table>

Additional courses are required for performance practice candidates chosen in consultation with the adviser from the following:


221. History of Music Theory 8
224, 225. Solfège and Score Reading 8
230, 231. Orchestral and Choral Conducting 4
268. Thorough-Bass Realization 1
300. History of Notation 12

**Composition:**

323. D.M.A. Projects in Composition 16
399. D.M.A. Final Project 8

**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
312. Aesthetics and Criticism of Music | 8
341. Ph.D. Dissertation | 12

**MUSICOLGY**

267 or one course in the 269 series | 4
300. History of Notation | 12
310. Research Seminars in Music | 12
310. Research Seminars in Musicology | 16

**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
420. Applications of the Fast Fourier Transform | 4
421. Physical Modeling of Musical Acoustics | 4
or equivalent work in another Stanford department (e.g., Psychology, Computer Science, or Electrical Engineering), to be decided in consultation with the adviser.

**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, Spr (Marshall)

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 (Grey)

2B. The Concerto.
   3 units (Barnes)

2C. Opera.
   3 units (Mahrt)

3C. Medieval Music.
   3 units (Mahrt)

   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. DR:7(2)
   3 units (Houle)

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. DR:7(2)
   3 units, Win (Grey)

4D. The Operas of Mozart—DR:7(2)
   3 units (Berger)

4E. The Music of Debussy and Ravel.
   3 units, Spr (Cohen)

4F. The Music of Stravinsky.
   3 units, Win (Potter)

4G. The Music of Wagner—DR:7(2)
   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)

18. Jazz History.
   3 units, Win (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 (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 (Staff)
   Win (Blaecty

22. Elements of Music II—Extension of melody, counterpoint and harmony, introduction of simple forms, chorale harmonizations. Prerequisite: 21; pass minimum proficiency test in piano, or one quarter prior and concurrent enrollment in 12; or consent of instructor.
   3 units, Win (Barnes)
   Spr (Bates)

23. Elements of Music III—Chromatic harmony, complex forms. Prerequisite: 22; pass minimum proficiency test in piano, or two quarters prior and concurrent enrollment in 12; or consent of instructor.
   3 units, Aut (Barnes)
   Spr (Grey)

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 (Staff)

24B. Ear Training II.
1 unit, Win (Staff)

24C. Ear Training III.
1 unit, 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 (Berger)

41. Music History since 1750.
4 units, Spr (Dreyfus)

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.

121A. 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.

121B. Harmonic Materials of the 19th Century—Analysis of 19th-century music, with compositional exercises based upon 19th-century models. Prerequisites: 121 and successful completion of the Ear Training Proficiency examination.

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 or consent of instructor, and successful completion of the Ear Training Proficiency examination.

122B. Harmonic Materials of the 19th Century—Analysis of 19th-century music, with compositional exercises based upon 19th-century models. Prerequisites: 121 or consent of instructor, and successful completion of the Ear Training Proficiency examination.

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. Prerequisite: 23 or consent of instructor, and successful completion of the Ear Training Proficiency examination.

123. Undergraduate Seminar in Composition—Individual projects in creative work. May be repeated for credit. Prerequisite: consent of instructor.

3 units, Aut, Win, Spr (Rockmaker, Smith)

127. Orchestration—Prerequisite: 23.
3 units, Aut (Barnes)


220A. Fundamentals of Computer-Generated Sound—Introduction to computer-sound generation, composition, acoustics, and computer programming. Prerequisite: experience in musical composition or consent of instructor.

4 units, Aut (Chowning)

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 (Chowning)

220C. Research—Research projects in composition, psychoacoustics, or signal processing. Prerequisite: 220B.

4 units, Aut, Win, Spr (Staff)

220D. Music Typography on the Computer.
4 units (Smith)

223. Seminar in Composition—May be repeated for credit.

4 units, Aut, Win, Spr (Smith)

224, 225. Solfège and Score Reading.

224. 4 units, Spr (Barnes)

225. 4 units (Barnes)

HISTORY AND LITERATURE

50. Readings in Music and Music History—(Enroll in German Studies 52E.) For students with a knowledge of German (one year or equivalent) who want to acquire German reading proficiency in music.

3-4 units (Staff)

140, 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.

not given 1991-92

141. Studies in Renaissance Music—Prerequisite: 40.

4 units, Win (Houle)

142. Studies in Baroque Music—Prerequisite: 40.

not given 1991-92
143. Studies in Classic Music—Prerequisite: 41.
144. Studies in Romantic Music—Prerequisite: 41.
145. Studies in Modern Music—Prerequisite: 41.
not given 1991-92
4 units, Spr (Dreyfus)
150A. History of Musical Instruments.
4 units (Myers)
150C. History of Musical Aesthetics—Aesthetic theories from antiquity (Plato, Aristotle, Plotinus) through Augustine, Aquinas, Boethius, Renaissance humanists, Descartes, and the Enlightenment to Romanticism. Music style and criticism in response or relation to aesthetic theory.
4 units (Houle)
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.
4 units, Win (Matthews, Pierce, Shepard)
153. Organ Literature and Performance Practice—To be taken concurrently with 172B/272B. A specific period of repertoire is treated each quarter. Students present one paper on organ performance practice pertaining to that period.
1 unit, Aut, Win (Bates)
Spr (Marshall)
154. Introduction to Computer Music—Survey of recent works and computer-based techniques.
4 units, Spr (Chafe, Staff)
155. Keyboard Literature and Performance Practice—Required for majors with a concentration in piano performance and graduate students in piano performance practice. To be taken concurrently with 172A/272A. A six-quarter sequence covering keyboard literature for the pianist (J. S. Bach to the present.)
1 unit, Aut, Win, Spr (Barth)
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)
251. Choral Repertory (1500-1750).
4 units (Ramsey)
252. Choral Repertory (1750-Present).
4 units (Ramsey)

PERFORMANCE GROUP INSTRUCTION
Special fee of $75 per quarter (subject to revision) for 12A,B,C, 65A,B, 72, 74, 75, 76, 77.
12A,B,C. Introductory Piano—(A=level 1; B=level 2; C=level 3) Preference to music majors. Special fee for non-majors: $75.
1 unit, Aut, Win, Spr (Brainard, Goldsworthy)
65A. Voice Class I—Large group beginning voice for the non-major. Special fee: $75.
1 unit, Aut, Win, Spr (Giovannetti)
65B. Voice Class II—Large group instruction for non-majors with previous vocal training. Special fee: $75.
1 unit, Aut, Win, Spr (Giovannetti)
65C. Voice Class—For music majors, and non-majors who are members of departmental performing organizations.
1 unit, Aut, Win, Spr (Wait)
72,73,74,75,76,77. Small Group Instruction.
1 unit, Aut, Win, Spr (Staff)
72A. Piano Class—For intermediate students.
72B. Organ Class—For beginning organ students who have keyboard skills.
73. Voice Class.
(Wait)
74A. Stringed Instruments Classes.
(Harrison, Kleyman)
74D. Harp Class.
(Chauvel)
75A. Wind Instruments Classes.
(Hawley, Staff)
75B. Renaissance Wind Instruments Class.
(Myers)
76. Brass Instruments Classes.
(Staff)
77. Percussion Class.
(Cirone)
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.

3 units, Aut, Win, Spr

172A/272A. Piano.
   (Baller, Barth, Sparrow, Goldsworthy, Weldy)
172B/272B. Organ.
   Aut, Win (Bates)
   Spr (Marshall)
172C/272C. Harpsichord.
   (Fabrizio)
172E/272E. Early Piano.
   (Barth, Fabrizio)

   (Bettina, Wait)

174/274. Stringed Instruments.
174A/274A. Violin.
   (Freier, Kleyman, Levy)
174B/274B. Viola.
   (Kleyman, Zaslav)
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. Renaissance Wind Instruments.
   (Myers)
175F/275F. Saxophone.
   (Stein)
175G/275G. Baroque Flute.
   (Claire)

176A/276A. French Horn.
   (Klingelhofer)
176B/276B. Trumpet.
   (Hamilton-Johnson)
176C/276C. Trombone.
   (Kenley)
176D/276D. Tuba.
   (Cooley)

177/277. Percussion.
   (Cirone)

PERFORMANCE PRACTICES

130. Orchestral Conducting—Prerequisite: 127.
   3 units, alternate years, given 1992-93

131. Choral Conducting.
   131A. 3 units, Win (Ramsey)
   131B. 3 units, Spr (Ramsey)

180. Diction for Singers.
   180A. Italian.
      1 unit (Staff)
   180D. English.
      1 unit (Staff)

181. Performance of Vocal Literature.
   1 unit, Aut, Win, Spr (Bettina)

183. Performance of String Literature.
   183A. 1 unit, Win (Zaslav)
   183B. 1 unit, Spr (Zaslav)

230. Advanced Orchestral Conducting.
   4 units, Win, Spr (Black)

231. Advanced Choral Conducting.
   4 units, Aut (Ramsey)

   4 units, Aut (Houle)

268. Thorough-Bass Realization.
   1 unit, Aut, Win, Spr (Fabrizio)

269. Studies in Performance Practices—Performance techniques, theoretical principles, aesthetics, and musical resources of various historical periods. Lectures, seminar reports, individual research, and performance. Prerequisite: 267.
   269A. Medieval.
      4 units (Mahrt)
   269B. Renaissance.
      4 units, Win (Houle, Mahrt, Meyers)
   269C. Baroque.
      4 units (Dreyfus)
   269D. Classic.
      4 units, Spr (Barth)
   269E. Romantic.
      4 units (Barth)
269F. Modern.
4 units, Spr (Black)

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.

1 unit, Aut, Win, Spr (Cirone)

158. Contemporary Performance Ensemble.
1 unit, Aut, Win, Spr (Rockmaker)

T 4:15-6:05

159. Early Music Ensembles.
159A. Early Music Singers.
1 unit, Aut (Mahrt)
Win, Spr (Staff)

159B. Renaissance Wind Band.
1 unit, Aut, Win, Spr (Myers)

159C. Baroque Orchestra—A chamber orchestra performing on instruments closely approximating those of the 17th and 18th centuries and employing articulations and bowings from historical sources.
1 unit, Aut, Win, Spr (Dornenburg, Myers)

160. University Orchestra.
1 unit, Aut, Win, Spr (Black) MTh 7:15 p.m.

161. University Bands.
161B. Jazz Band.
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 (Ramsey)
M 7:30-10 p.m. and 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 (Ramsey, Wait)
T 4:15-5:30, Th 7-8:30 p.m. and Su 10-12

165. Stanford Chamber Chorale—Small vocal ensemble specializing in performance music of all periods for the chamber chorus.
1 unit, Aut, Win, Spr (Ramsey) MWF 12

166. Chamber Orchestra—Open to advanced players who have had orchestral experience.
1 unit, Aut, Win, Spr (Black) TThF 12-1:50

1 unit, Aut, Win, Spr (Ramsey)
T 7:15-8:45 p.m. and Th 4:15-5:45

168A. University Symphonic Band.
1 unit, Aut, Win, Spr (Barnes)
W 7:30-9:30 p.m.

170. Piano Accompanying.
170A. Piano Accompanying.
1-2 units, Aut, Win, Spr (Baller, Barth, Sparrow, Weldy)

170B. The Literature and Practice of Accompanying.
1 unit, Aut, Win, Spr (Baller, Barth, Sparrow, 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 (Harrison, 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: high-school level algebra and physics.
3 units, Win (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. Prerequisites: 192A.
3 units, Spr (Kadis)

192C. Session Recording—Independent engineering of recording sessions. Prerequisites: 192A and B.
1 unit, Aut, Win, Spr (Kadis)

271. Performance Special—For students who take part in performances organized in 269 while not enrolled in that class.
1 unit, Aut, Win, Spr (Staff)

GRADUATE RESEARCH AND SPECIAL STUDIES

200. Music Bibliography—Use of bibliographical materials in music research; introduction to methods of research.
4 units, Aut (Nagy)
221. History of Music Theory—Principal theories, theorists, and treatises of Western music, from ancient times to the present.

221A. Ancient Through Renaissance.
4 units, Aut (Cohen)

221B. Baroque Through Modern.
4 units, Win (Cohen)

240. Music History: Philosophy and Methods—Introduction to study of music history through intensive reading and discussion of representative primary and secondary works, and selected sources.
4 units, Win (Barth)

241. Seminar in Analysis for Performance.
4 units (Houle, Mahrt)

1-3 units (Staff)

299. Master of Arts Project.
4 units, any quarter (Staff)

300A,B,C. History of Notation.
4 units (Mahrt) alternate years, given 1992-93

alternate years, given 1992-93

301A. Modal Analysis.
4 units (Houle)

301B. Tonal Analysis.
4 units (Grey)

301C. Post-Tonal Analysis.
4 units (Smith)

302. Research in Musicology.
Aut, Win, Spr (Staff) by arrangement

310. Research Seminar in Musicology.
4 units, Aut (Mahrt)
Win (Dreyfus)
Spr (Burger, Potter)

312. Aesthetics and Criticism of Music—Intensive reading of selected major primary texts.
alternate years, given 1992-93

312A. 3 units (Berger)

312B. 4 units (Berger)

319. Research Seminar on Computational Models of Sound Perception.
1-3 units, Aut, Win, Spr (Mont-Reynaud)

320. The Discrete Fourier Transform (DFT)—Fundamentals of spectrum analysis for discrete-time signals. Topics: complex numbers, signal representation, orthogonal projection of signals, the DFT, and Fourier theorems relating to time-shift, convolution, correlation, aliasing, signal power, odd and even symmetries, and bandlimited interpolation. Prerequisites: proficiency in high-school level algebra and trigonometry.
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 (Smith)

330. D.M.A. Term Projects in Conducting.
4 units, Aut, Win, Spr (Ramsey, Black)

any quarter (Staff) by arrangement

369. D.M.A. Term Projects in Performance.
369A. Early Music to 1800.
4 units, Aut, Win, Spr (Staff)

369B. Music From 1800 to Present.
4 units, Aut, Win, Spr (Staff)

369C. D.M.A. Recital.
4 units, Aut, Win, Spr (Staff)

399. D.M.A. Final Project.
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, tracking sinusoidal peaks across FFT frames, and modeling time-varying spectra as sinusoids plus filtered white noise using the FFT for analysis and resynthesis. Prerequisites: proficiency with Fourier theory on the level of 320 and digital signal processing theory on the level of Electrical Engineering 104.
2-4 units, Win (J. Smith)

421. Physical Modeling of Musical Acoustics—Computational models of musical instruments in the wind and string families based on physically accurate mathematical models. Models are designed to capture only the "audible physics" of musical instruments using computationally efficient algorithms and signal processing techniques. Topics: one-dimensional wave equation, traveling waves, wave impedance, signal energy and momentum, lumping of losses and dispersion, simulation of one-dimensional waveguides such as vibrating strings and woodwind bores, allpass techniques for tuning and stiffness simulation, scattering theory, lattice/ladder digital filter theory, and complete models of winds and strings using delay lines, scattering junctions, low-order digital filters, and nonlinear junctions implementing oscillation sources such as bow-string and reed-bore couplings. Techniques are outlined for calibrating model parameters to recordings of live instruments. Prerequisites: calculus, ordinary differential equations, and dy-
namics on the level of Physics 51 or Engineering 12.

2-4 units, Spr (J. Smith)

OVERSEAS STUDIES PROGRAM

Stanford Center for Technology and Innovation-Kyoto
Director: Robert Orr

Stanford Program in Berlin
Director: Karen Kramer
Assistant Director: Hannelore Noack
Faculty: Maria Biege, Carol Delaney, Dubrava Friesel-Kopecki, Volker Gransow, Cord Jakobiet, James Johnston, Louis Kaplan, Hans-Peter Kreuger, Franz Neckenig, Susanne Rohr, Jürgen Schutte, Carl Weber, Jochen Wohlfeil

Stanford Program in Florence
Director: Giuseppe Mammarella
Faculty: Nicola Bellini, Patrizio Bianchi, Martin Carnoy, Roberto D’Alimonte, Cecilia Filippi, Guido Fink, Mia Garre, Patrizia Guarnieri, Robert Harrison, Lorrin Koran, Patrizia Pizzorno, Maria Todorow

Stanford Program in Kraków
Faculty Director: Stanley Wojcicki
Faculty: Kazimierz Baran, Waldemar Martyniuk, Wladyslaw Miodunka, Halina Niec, Emil Orzechowski, Jacek Szmata, Jacek Wasilewski, Andrzej Wojtyna

Stanford Program in Oxford
Director: Geoffrey Tyack
Faculty: Nicholas Crafts, David Dabydeen, John Darwin, William Durham, Robert Elmore, Luis Fajardo, Michael Gearin-Tosh, Ruth Mateer, J. B. McLaughlin, Ziba Moshaver, David Miles, Trevor Rowley, Gerald Bowen Thomas, Jonathan Wordsworth

Stanford Program in Paris
Resident Director: Estelle Halevi
Faculty: Bernard Faure, Monique Fouet, Nancy Green, Denis Lacorine, Rejean Legault, Renaud de Maricourt, Nonna Mayer, Jean Padioleau, Philippe Roger, James Winchell

Program in Salamanca
Director: Isabel Criado
Faculty: Maria Dolores de la Calle, Morena Concha

Overseas Studies believes academic study abroad should be a normal part of every student’s educational options. There are study centers in Berlin, Florence, Kraków, Kyoto, Paris, and Oxford 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, science, engineering, and technology courses as well as internship programs are available in Berlin and Kyoto. The Berlin, Florence, Kyoto, and Paris 2** programs require two quarters of the appropriate language instruction. The Oxford and Kraków programs have no foreign language prerequisites. Students may enroll for one, two, or three quarters. All courses are taught by local and Stanford faculty.

Special programs are offered at Paris 1* and Salamanca for students fluent in French or Spanish; students attend some classes in the local universities. Other opportunities through consortium programs exist in Rome and Kyoto. Students stay registered at Stanford and pay the usual tuition, and room and board 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; some students live in the Stanford Center, others with families, and others with local students in apartments or in local university dormitories. Courses offered abroad carry regular University credit; some also receive credit toward departmental majors. In most courses, instruction is in English.

Overseas Studies has a full-time staff to assist students in planning all aspects of a program abroad. The office is on the first floor of Sweet Hall. Telephone: (415) 723-3558. The information below, while accurate at the time of printing, is subject to change.

* The Paris 1 program is for students with two years of French taking courses at Paris universities.
** The Paris 2 program consists of Stanford-initiated courses at the Stanford center in Paris.

COURSES

BERLIN

4. West German Literature between the Reality of Ruins and the Student Movement, 1945-68—The relationship between the suppression of Germany’s fascist past and the various schools of post-war German literature. DR:7(2)

4 units, Spr (Schutte)

7X. Investigating Culture: An Introduction to Anthropology—(Same as Anthropology 7X.) Introduction to the way anthropologists approach the study of culture. Using their own common environment, Berlin, students explore the culturally specific ways humans orient themselves: in space and time, by means of language, with the body, the structures of everyday life, and in terms of the symbols and frameworks provided by pub-
lic myth and ritual. Attention to issues of gender, class, and ethnicity. DR:9†(5)
5 units, Spr (Delaney)

30. Engineering Thermodynamics—(Same as Engineering 30.) Key laws and concepts: energy conservation and production of entropy. Applications to engines, power production and other energy systems stressed. DR:6(8)
3 units, Aut (Johnston)

33. Introductory Fluids Engineering—(Same as Mechanical Engineering 33.) For Mechanical Engineering majors only. Elements of fluid mechanics applied to engineering problems. Majors must register for lab for 1 unit upon return to campus. Interested students must see Professor Johnston at Stanford.
3 units, Aut (Johnston)

101A. German Theater: East and West—(Same as Drama 101A.) Weekly theater trips, a tour of back-stage facilities, attendance at a rehearsal, and discussions with actors, directors, or other theater professionals. Syllabus is based on the productions attended in any given quarter. Texts of plays (50% in English translation) are supplemented by theoretical writings of respective playwrights and background reading in theater history and theory. DR:7(2)
4 units, Aut (Johnston)

116X. A United Germany and a Europe in Transition—(Same as Political Science 116X; also listed as International Relations Cluster A.) Fundamental changes in Germany from the perspective of longer political trends in postwar history, in Europe and between the two German states. The interrelationship between German and European super-power politics.
4-5 units, Spr (Basler)

117V. Industrial Revolution and Its Impact on Art, Architecture, and Theory—(Same as VTSS 117T, Art 173Y.) The interlinking of architecture and painting with technological and scientific development. In a period of industrial revolution, the dominance of positivist thinking and empirical methods promotes in the cultural and artistic realm a response of euphoric acceptance or emphatic rejection. Art work as a social, cultural, and spiritual "symbol" is a response to scientific and technological development, yet claims timeless validity. Topics: frictions between Idealism and Realism, photography and painting, Historicism and Functionalism, Expressionism and Dadaism, Futurism and New Sobriety, Functionalism and Nazi Classicism. The technological and scientific development motivates aesthetic redefinition. DR:7(2)
5 units, Aut (Neckenig)

120X. New Ways of Seeing—(Same as Art 120X.) Art objects in the Berlin cityscape, museums, and galleries as historical symbols. The cultural and ideological movements of the various epochs through an analysis of form and content, ground plan and façade, artistic details, aesthetic effects, and symbolic meanings. DR:7(2)
4 units, Win (Neckenig)

122X. Berlin: Turkey's Third Largest City—(Same as Anthropology 122X.) Explores the issues involved in multiculturalism by focusing on the large Turkish population living in Berlin. Topics: personal and social reasons that motivate people to migrate, patterns of migration, aspirations and fears of migrants, expectations of the host country, the meaning of borders, legal and citizenship issues, and development in the arts. DR:9(5)
5 units, Spr (Delaney)

124X. German Art since 1945 in the International Context—(Same as Art 124X.) Focus is on trends after 1945, including: traditional school, assimilation of international standards of art, art in E. Germany and post-modern art.
4 units, Spr (Neckenig)

135X. East-West Relations in Europe—(Same as Political Science 135X; also listed as International Relations Cluster A.) The historical developments and major issue areas of East-West relations and the differences between the two systems. Economic, cultural, and political issues. DR:9(5)
5 units, Win (Jakobeit)

153X. From Socialism to Capitalism in East Germany: A Political Economy Approach—(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. Inter-disciplinary approach, including economic, political, and social issues. DR:9(5)
4-5 units, Aut (Krueger)

158. Brecht: Poet, Playwright, Director—(Same as Drama 158.) Brecht's poetic work, and his theory and practice as a playwright and director from WWI to the 1950s. The social and political developments which shaped Europe during this period, especially during the years when Berlin was the showcase of the two competing social and political systems. Visits to museums, theater performances, and discussions with theater artists and authors.
4-5 units, Win (Weber)
166. The Theater's Response to History—(Same as Drama 166.) How the theater, and other artistic media, articulate themselves in relation to the socio-political environment. Focuses on contemporary plays and other productions in Berlin theaters which reflect historical conditions and current political trends in Germany and Central and Eastern Europe. Overview of recent historical/political events and a historical assessment of art in general. Attendance at theater performances and/or rehearsals required; meetings with authors and theater artists.

4-5 units, Win (Weber)

179B. Split Images: Postwar German Film Culture—(Same as German Studies 179B.) The emergence in the postwar period of two new German film and television cultures. Strategies for cross-cultural reception. Students attend the Berlin Film Festival. DR:7(2)

4 units, Win (Kramer)

227V. Introduction to German History: Politics and Culture from the Middle Ages to the Unification of Germany, 900-1870—(Same as History 227V; also listed as International Relations Cluster A.) Berlin and Prussia in an “exemplarisch” selective way. The transformation of social forms and their cultural expressions in the context of political development. History as an interdisciplinary project, drawing on artistic, literary, and theoretical documents and artifacts. DR:9(5)

4 units, Aut (Neckenig)

228V. A Century of Media Technology in Germany: 1840-1940—(Same as History 228V, VTSS 115T.) How media technologies emerged and transformed Germany from the mid-19th to the mid-20th century. Focus is on different types of media or communications technology (e.g., photography, telephone) and their different functions and implantations in the socio-cultural sphere.

4-5 units, Aut (Kaplan)

GERMAN LANGUAGE PROGRAM

70. Intensive German—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.

6 units, Aut, Win, Spr (Staff)

80. Intermediate German—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)

88. Intermediate Conversation.

2 units, Aut, Win, Spr (Staff)

90. Advanced German—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)

93. Contemporary Berlin: Public Media—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)

FLORENCE

106F. Comparative Analysis of Educational Production: Italy and the U.S.—(Same as Education 106F, Sociology 156X.) Analyzes how schools work as organizations and knowledge producers and the differences between this form of organization in the U.S. and Italy.

5 units, Win (Carnoy)

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 the 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, Win (Mammarella)

107W. Comparing the Approach of the United States and Italian Mental Health Systems to Major Mental Illness—(Same as Sociology 107W, Human Biology 162H.) Compares the U.S. and Italian approaches to mental health care and the successes and failures in caring for the chronically mentally ill in both societies. Overview of the medical definitions and findings regarding schizophrenia and affective disorders and the critiques by sociologists and radical psychiatrists of the concept of mental illness. The structure of the U.S. mental health care delivery system.

5 units, Aut (Koran)

111A. Tuscan Art from Giotto to Leonardo—(Same as Art 111A.) Chronological analysis of the stylistic development of Tuscan art from the 13th to 15th centuries, including Giotto, Donatello, Botticelli, and Leonardo. DR:7(2)

4 units, Aut (Todorow)
111B. The High Renaissance and Mannerism in Florence, Rome, and Venice—(Same as Art 111B.) The stylistic trends, iconography, and social history of Italian art, concentrating on Michelangelo and Raphael, but including Bronzino, Vasari, Titian, Tintoretto, and Caravaggio. Emphasis on classical influences on the artists studied. DR:7(2)
4 units, Spr (Todorow)

114X. Technology, Economic Development, and Knowledge Formation—(Same as Economics 114X, Political Science 115X, VTSS 114T; also listed as International Relations Cluster A.) The role of new information technology in the economic development of industrialized countries, focusing on Italy. The special role of university education in technological innovation and diffusion. Economics majors must take for a letter grade. DR:9(5)
5 units, Win (Carnoy)

121X. U.S. and Western Europe after WWII—(Same as Political Science 121X, History 135V; also listed as International Relations Cluster A.) Economic, political, military, and cultural relations between the U.S. and NATO countries, especially U.S. policy toward Europe as it relates to East-West issues and European unification. DR:9(5)
4 units, Spr (Mammarella)

125X. Contemporary West European Politics—(Same as Political Science 125X; also listed as International Relations Cluster A.) Combines a thematic approach with the analysis of a number of W. European political systems. Material grouped by topic to allow for comparison. Particular aspects are related to single political systems. The political, socio-economic, and cultural conditions explaining the rise of democratic regimes in W. Europe and their different pattern of development, constitutional models, parties and party systems, electoral trends and electoral systems, and the development of the "welfare" state. The European Economic Community and its future. DR:9(5)
4 units, Spr (Mammarella)

126X. Italian Political System—(Same as Political Science 126X.) In-depth analysis (in English) of Italian political institutions, actors, and processes. Political parties, the connection between the stability of the political system and its performance. Prospects for change with reference to the evolution of the Italian Communist Party. Part II in the following quarter, in Italian, at the University of Florence. DR:9(5)
4 units, Aut (D’Alimonte)

128. Cinema and Literature in Italy—(Same as Communications 128, Italian 276F.) Brief introductory summary of some critical attempts to define “adaptation” and the novel/film relationship in narratological terms. Discussion of specific texts, possibly including the script as the basic intermediate moment between the literary and cinematic work. DR:7(2)
4 units, Spr (Fink)

134V. History of the European Community—(Same as History 134V; also listed as International Relations Cluster A.) Ideological and political history of European integration starting from the period between the two wars, and covering the political platforms of the European Resistance Movements and the development of postwar politics. DR:9(5)
5 units, Aut (Mammarella)

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, Spr (Bianchi, Bellini)

171Z. The Theory and the Practice of Religiosity in Chaucer and Boccaccio—(Same as English 171Z, French and Italian 225F, Religious Studies 269W.) Seminar systematically explores the religious element in Chaucer’s Canterbury Tales and Boccaccio’s Decameron via a close reading of selected tales and novellas. 4 units, Aut (Pizzorno)

4 units, Win (Guarnieri)

1911. Medicine, Psychiatry, and Art in Renaissance Florence—(Same as History of Science 1911.) The interrelationships between the intellectual and artistic contributions of Florentine Renaissance and the contemporary practice, concerns, and development of medicine and surgery in Florence. Topics: the historical, economic, political, intellectual and artistic context and developments of the Italian Renaissance; the interrelationships between medicine, illnesses, artists, and artwork in that period. 5 units, Aut (Koran)
218X. European Integration and 1992—(Same as Political Science 218X; also listed as International Relations Clusters A and C.) The historical development of the European Communities from the Schuman plan to the Single European Act and the “1992 project.” Topics: institutions and policy-making, policies and budgets, the completion of the internal market, and the path toward the economic and monetary union. Use of integration to analytically answer questions of the dynamics and possible alternative outcomes of the integration process. DR:9(5) 4-5 units, Win D’Alimonte)

272F. The Italy of Italo Calvino—(Same as Italian 272F.) Calvino’s development as a writer, analyzing the increasing complexity of his experiments with narrative structure and literary language, and the enduring component of fantasy in all his narrative works. Emphasis on the image, culture, and social aspects of contemporary Italy present in his works.

340F. Boccaccio’s Decameron—(Same as Italian 340F.) Virtues of character and characters of virtue in Boccaccio’s masterpiece. Boccaccio’s hero, male or female, embodies a new morality of character which is no longer based on piety but rather on human resourcefulness. The genealogy of this new hero. His or her dominant virtues, e.g., imagination, wit, ingenuity, and beauty. The representation of the city of Florence and the 14th-century Tuscan landscape, the art of storytelling and Boccaccio’s transformation of medieval literary conventions. Also, Boccaccio’s Filostrato, which is the basis of Chaucer’s Troilus and Cressida.

ITALIAN LANGUAGE PROGRAM

3F. First-Year Italian, Third Quarter—(Enroll in Italian 3F.) 5 units, Aut, Win, Spr (Staff)

50F. Second-Year Italian, First Quarter—(Enroll in Italian 50F.) 5 units, Aut, Win, Spr (Staff)

54F. Second-Year Italian, Second Quarter—(Enroll in Italian 54F.) 5 units, Aut, Win, Spr (Staff)

112F. Third Year Italian Course Work. 3 units, Aut, Win, Spr (Staff)

198F. Individual Advanced Work and Directed Reading—(Enroll in Italian 198F.) Requires advance approval from the Department of French and Italian. 3 units, Aut, Win, Spr (Staff)

KRAKÓW

1. Director’s Seminar on Contemporary Poland.
   2 units, Spr (Wojciecki)

3. Poland and Eastern Europe in East-West Relations.
   units to be announced, Spr (Czubinski)

4. East Meets West: Polish Film from the Polish Perspective—Stanford and Polish students meet in forum for discussion of issues of mutual concern.
   2 units, Spr (Nice)

120V. History of Eastern Europe—(Same as History 120V; also listed as International Relations Cluster A.) Comparative history of Eastern Europe from the Middle Ages to the end of WWII. The rise of a new serfdom east of the Elbe in the 15th and 16th centuries, the relatively liberal patterns of the Polish-Lithuanian Commonwealth with its habeas corpus for gentry, etc. Enlightenment, liberalism, and nationalism in Poland during the 19th century, the interwar period in the 20th century, and the drift of E. European states from parliamentary democracies to authoritarian governments. Detailed diplomatic history of 1939-1945, emphasizing the Tehran 1943 and Yalta 1945 conferences. DR:9(5) 4 units, Spr (Baran)

123X. Efficiency of Capitalist and Socialist Economies and the Polish Crisis—(Same as Economics 123X; also listed as International Relations Cluster C.) Explores the relative efficiency of the capitalist and socialist economies in coping with new challenges. The Polish economic crisis as an extreme example of interaction between domestic and external factors, and the main causes and effect of the crisis at macro- and micro-levels. DR:9(5) 5 units, Spr (Wojtyna)

134W. Polish Society in Transition—(Same as Sociology 134W.) The various social forces in Poland (military, church, labor unions, peasants, the party, etc.) and the place of each in the current upheaval.
   4 units, Spr (Szmatka)

156X. The Transition of Communism in Eastern Europe—(Same as Political Science 156X.) The processes that are changing the circumstances of Czechoslovakia, Hungary, Germany, Bulgaria, and Romania. Political science/international relations focus.
   4 units, Spr (Wasilewski)

165C: Poland: A Nation and Its Culture—Studies in the Cultural Historical and Political Dimensions of Polish Literature—(Same as Slavic Languages 165C.) Discusses some of the interest-
ing and difficult "Polish Questions" and presents the richness and variety of Polish literature.

4 units, Spr (Staff)

SLAVIC LANGUAGE PROGRAM

5. Beginning Polish.
   5 units, Spr (Staff)

   5 units, Spr (Staff)

7. Advanced Polish.
   5 units, Spr (Staff)

199. Independent Study in Russian—By arrangement with instructor. Students seeking Slavic Studies credit should keep copies of all work and present them to the Department of Slavic Languages upon return to Stanford.
   2 units, Spr (Miodunka)

KYOTO

This section describes the Stanford Center for Technology and Innovation Program for Spring 1991. The structure should be similar for Spring 1992.

50. Lecture Series on Business in Japan—Weekly lectures by American and Japanese executives, journalists, and scholars involved in business and research and the development sides of the U.S.-Japan competition.
   2 units, Spr (Staff)

124X/224X. Economic Institutions of Modern Japan—(Same as Economics 124X/224X.) Background on the economic development of Japan since 1945 from a mass production toward an innovation dependent system. Organization of the modern Japanese firm, including human resource policies, the structure of research and development, internal technology transfer, interfirm associations and international growth.
   5 units, Spr (Abe, Imai)

215X. The Political Organization of Economic Life in Japan—(Same as Political Science 215X; also listed as International Relations Cluster C.) Overview of institutions and case studies of the political organization of economic activity in modern Japan. Domestic and international issues are considered. DR:9(5)
   5 units, Spr (Orr)

JAPANESE LANGUAGE PROGRAM

3K. First Year Modern Japanese—(Enroll in Asian Languages/Japanese 3K.)
   5 units, Spr (Staff)

9K. Japanese for Professionals—(Enroll in Asian Languages/Japanese 9K.)
   5 units, Spr (Staff)

23K. Second Year Modern Japanese—(Enroll in Asian Languages/Japanese 23K.)
   5 units, Spr (Staff)

100K. Advanced Japanese—(Enroll in Asian Languages/Japanese 100K.)
   5 units, Spr (Staff)

OXFORD

4. The Population Question: Exploring Links Between Population Growth and Social Problems with Special Reference to the U.K.—Investigates the relationship between the vital rates of human populations (fertility, mortality, migration and growth) and the socioecological problems of poverty, hunger, and environmental degradation. The history of the population question through major theoretical positions beginning with Malthus. The models pitted against each other in the context of the specific social history of England and of Ireland.
   units to be announced, Spr (Durham)

5. Darwinism and Social Thought—The evolution of Darwinism from 1859 to the present emphasizing the influence of evolutionary theory on Western social thought. Darwin’s life and work, through Origin of the Species and Darwin’s autobiography. Topics debated today in Europe and the U.S.: the sociobiology controversy and the ongoing punctuation debate.
   units to be announced, Spr (Durham)

6. Infectious Diseases and Western Civilization in the 19th and 20th Centuries—Study of five important infectious diseases: malaria, tuberculosis, small-pox, rabies, and AIDS. The main historical, epidemiological, pathological and clinical aspects of these infections. Students investigate the impact of these diseases on the Western civilization since 1800, with emphasis on the British contribution to our understanding, treatment, and prevention of these diseases.
   2 units, Aut (Fajardo)

10. The Imperial Theme in English Literature—Texts: Shakespeare’s Othello; Conrad’s Heart of Darkness; Rhys’ Voyage in the Dark; Dabydeen’s The Intended; and poetry by Grace Nicholls; Amryl Johnson and other black British poets. Films shown and discussed: Kureshi’s My Beautiful Laundrette and Dabydeen’s Age of Darkness.
   4 units, Win (Dabydeen)

22. Social Policy in Britain since 1945—Focus is on the political, sociological, managerial, and ethical issues of social policy in Britain. Overview of the health services, the provision for personal social services, and the social security system as
a case study illustrating the changes in structure and ideology which have taken place since 1945.

units to be announced, Win (Elmore)

35X. International Politics since 1945—(Same as Political Science 35X; also listed as International Relations Cluster A.) Analysis of the origins of the Cold War. Topics: the U.S. and the U.S.S.R. as the two competing powers in the Cold War, the decline of European colonialism and the rise of the newly independent nation-states, and the analysis of East-West relations after the 1950s. DR:9(5)

5 units, Win (Moshaver)

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, Win (Moshaver)

81. Values, Ethics, and Law—(Same as Philosophy 81.) Analysis of standards and values of conduct in the light of traditional ethics; the widening dimensions of human self-interpretaion in light of modern scientific, political, and legal developments; the problems of planning for the future. Conceptual and historical approach. DR:8(3)

4 units, Win (McLaughlin)


4 units, Aut (Fajardo)

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 WWII. 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 the 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 the 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 and architecture produced in a period of confused taste, experimentation, and uneven achievement. Field trips to buildings and paintings discussed. DR:7(2)

3 units, Aut (Tyack)

140V. English Social History from 1800 to the 1980s—(Same as 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.

5 units, Win (Tyack)

141V. European Imperialism and the Third World, 1870-1970—(Same as History 141V, Political Science 148X.) European imperialism from its zenith in the late 19th century to the era of decolonization after WWII. The effects of western imperialism in different parts of the "Third World." The legacy of imperialism and decolonization to the modern world.

5 units, Spr (Dawwin)

147X. 1992: Europe, the U.S., and the World—(Same as Political Science 147X; also listed as International Relations Clusters A and C.) The European Community makes 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, Aut (Thomas)

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 the key texts are read closely.

5 units, Spr (Wordsworth)

158M. Modern Drama and its Roots—(Same as Drama 158M, English 148Z.) 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.

4 units, Aut (Mateer)

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; investigation of 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)

5 units, Win (Crafts)

Courses 173X through 173Z are taught jointly for Stanford students and second-year St. Catherine’s undergraduates and are open only to students majoring in Drama, English, and related subjects.

173X. Shakespeare: The Comedies—(Same as English 173X.) First part of a study of the complete dramatic oeuvre of Shakespeare. Focus is on the sources of the plays, their historical context, their dramatic content and their use of language.

5 units, Aut (Gearin-Tosh)

173Y. Shakespeare: The Tragedies—(Same as English 173Y.) 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.) 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)

176X. History of British Architecture—(Same as Art 176X.) Chronology of the development of English architecture from the early Middle Ages to the 20th century. Analysis is stylistic and functional, and buildings are related to their historical background. Topics: the variety of materials used; the influence of foreign ideas on English architecture; the rise of the professional architect during the 17th century; and the emergence of new types of building with changing historical circumstances during the 18th and 19th centuries. Study of grand buildings like the Oxford Colleges, and ordinary homes of the people. DR:7(2)

4 units, Spr (Tyack)

185Z. Dickens and Autobiography—(Same as English 185Z.) Charles Dickens, in writing his novels, was also writing his life. Study of three stages in the Dickens’ “self” David Copperfield, Great Expectations, and Edwin Drood. Emphasis on “reading” a Victorian novel, the illustrations, and autobiography as a critical issue.

5 units, Spr (Mateer)

240V. History and Archaeology of the British Landscape—(Same as History 240V.) Relationship between man and his habitat in Britain from the Iron Age to 1500. The geography of the British Isles and the nature of archaeological evidence. Links between archeology and history. Changes in religion and ritual, in man’s attitude toward death, and in the nature of social and political organization through the archaeological record. DR:9(5)

4 units, Aut (Miles, Rowley)

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, Win (Mateer)

PARIS

3. European Institutions—Survey of the institutions of the European Community and the program to create a single market, and the efforts made to achieve greater cooperation of the fields of social rights, monetary integration, and political union. The relations of the Community with the U.S., Japan, and the Third World.

4-5 units, Aut (de Maricourt)

4. 20th-Century French and European Economy—The economy of France and its economic relations with other countries, using international models for comparison.

5 units, Win (Fouet)

7. Sociology of Business Life—Study of business activities in a sociological way rather than through a micro-economic/finance framework. Topics: developing concepts and methods for analyzing markets and firms as institutions regulated by social relations; how a sociological ap-
proach can increase our knowledge of concrete business activities such as the phenomena of trust in the banking sector, and analyzing the various types of business activities through a comparative approach.

units to be announced, Win (Padioleau)

36X. International Relations: Europe and the U.S.—(Same as Political Science 36X; also listed as International Relations Cluster A.) Examines European-American relations since the beginning of WWII. The role of France, the "reluctant ally," the Gaulist legacy, and a number of crisis situations chosen to reveal significant differences between American world-views, systems of decision, and modes of conflict resolution.

4-5 units, Aut (Lacorne)

11IX. Contemporary French Politics—(Same as Political Science 11IX.) The institutions of the Fifth Republic, the main political forces and their evolution, stressing the "alternance" of 1981, the decline of the Communist Party, the rise of the National Front and of the Green. Electoral behavior and the attitudes and values linked to voting choice.

4-5 units, Aut (Mayer)

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, Ingres, Delacroix, Courbet, Daumier, Manet, Degas, and others. DR:7(2)

4 units, Win (Halevi)

169P. Writing Fiction and History in 18th-Century France—(Same as French 169P.) Explores the original link between what we now describe as "fiction" and "non-fiction" through a close reading of some major fictional and historical works and a survey of the methodological and ideological debates waged around these problems.

4-5 units, Win (Roger)

178U. The Architecture of Paris: Buildings and Urban Forms (1750-1990)—(Same as Urban Studies 178U.) The unique architecture of Paris from the Enlightenment to the 20th century. Focuses on the examination of specific buildings and/or urban sites, and identifying their architectural traits and urban character. Architectural periods and styles 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.

4-5 units, Aut (Legault)

179P. Paris and Modernity: Realism, Surrealism, Phantasmagoria—(Same as French 179P.) Proposes a poetics of the city since the Revolution. The origins of a modern consciousness of the urban experience and succeeding metamorphoses of Parisian mentalités. DR:7(2)

4 units, Win (Winchell)

187P. Humanities Seminar—(Same as French 187P.) Introduction to seminal texts in various areas of the French humanities. Individual oral presentations, followed by general discussion allows students to explore new areas of potential interest while pursuing reflection about their own concentration area in the humanities.

3 units, Win (Faure)

188P. The Ideologies of French Everyday Life—(Same as French 188P.) Explores some of the sociological, cultural, and ideological aspects of everyday life in a French city. Issues: sociological notions such as habitus and "distinction," Marxist and Situationist critiques of modernity, the role of the media in the representation of reality, and their subversion by popular spatial and discursive strategies. DR:8(3) or DR:9(5)

4 units, Aut (Faure)

189P. Urbanism a la Parisienne: Utopias and Realities—(Same as French 189P, Urban Studies 116U.) Students discover a past, present, or future policy or project for urban development in Paris and detail its methodology, goals, resources, political agenda, aesthetic theory and eventual success or failure based on critical criteria related to all of the above. DR:7(2) or DR:9(5)

4 units, Aut (Winchell)

230V. Social History of Modern France—(Same as History 230V.) The social underpinnings of the transformation of modern France. Economic and social change studies with regard to long-term historical trends and from the perspective of the social actors themselves. Themes: the changing structure of the labor force, women's role in the economy and society, the demographic question, immigration since the turn of the century, and colonialism and the social impact of decolonization. DR:9(5)

4-5 units, Win (Green)

SALAMANCA

101A. Socio-Political Bases of Spanish Cultural Evolution—The Middle Age: oral romance proto-culture, and Christian-European patrimony, the crisis of the Low Middle Age, the Court world of the 15th century and the Renaissance, The Golden Age: Erasmus and Neo-platonism, Mysticism, and patriotism. The Baroque culmination of all literary genres. Neo-classicism under French influence. Literature and reality in the 19th century: Romanticism and Realism.

5 units, Aut (Criado)
PHILOSOPHY 555


5 units, Win (Criado)


4 units, Aut (de la Calle)


4 units, Win (de la Calle)

SPANISH LANGUAGE PROGRAM

103A. Advanced Grammar and Composition. 3 units, Aut (Moreno)

103B. Advanced Grammar and Composition. 3 units, Win (Moreno)
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, for a total of 10 units.
   b) The core: 24 additional units as follows:
      1) Logic: 57, or 159, or 160A.
      2) Philosophy of Science: any course in history of science or philosophy of science offered by the Department of Philosophy.
      3) Moral and Political Philosophy: one from 170-173.
      4) Metaphysics and Epistemology: one from 180-188.
      5) History: two history courses numbered 100 or above.
   c) One undergraduate philosophy seminar from the 194 series.
   d) Electives: courses numbered 10 or above, at least 13 units of which must be in courses numbered above 99 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.

SPECIAL PROGRAM IN HISTORY AND PHILOSOPHY OF SCIENCE

Undergraduates may major in History and Philosophy of Science under the Department of Philosophy. Each participating student is assigned an adviser who approves the course of study. 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.

1. General requirements:
   a) Three science courses in a coherent field (e.g., physics, chemistry, biology) (12 units).
   b) One history course, e.g., modern European history, modern American history (3 units).

2. The following core courses must be completed with a letter grade indicator (LGI) of "B-" or better by the end of the junior year.
   a) Philosophy 57 or 159.
   b) Philosophy 80.
   c) Philosophy 60.

3. Two history of philosophy courses.

4. Three philosophy of science courses. Choices of courses must be approved in writing by the program adviser.

5. At least six courses in the major must be completed at Stanford with an LGI of "B" (not including "B-" ) or better. 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.

Applicants 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 can be taken Satisfactory/No Credit. At least three courses in each must be completed with an LGI of “B” (not including “B-”) or better.

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 over 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, 102, or 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 literate and a preliterate, tradition) and including at least one seminar.

   General Major Requirements—An additional five 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.

Applicants to graduate programs in the Department of Philosophy can be obtained from the Graduate Admissions Support Section of the Registrar's Office. Applicants must take the Graduate Record Examination in 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. A special program may require knowledge of a foreign language. At least 36 units must be completed with an LGI of "B-" or better at Stanford. Students are reminded of the University requirements for advanced degrees, and particularly of the fact that for the A.M., students must complete three full quarters as measured by tuition payment.

**GENERAL PROGRAM**

The General Program requires a minimum of 36 units in Philosophy courses numbered above 99. Courses taken to satisfy the "undergraduate core" may not be counted in the 36 units. The requirement has three parts:

1. **Undergraduate Core:** students must have when they enter, or complete early in their program, the following undergraduate courses. (Students entering from other institutions should establish equivalent requirements with a master's adviser upon arrival or earlier):
   a) Logic 57, 159, or 160A.
   b) Philosophy of science: any course in history of science or philosophy of science offered by the Department of Philosophy.
   c) Moral and political philosophy: one from 170-173.
   d) Metaphysics and epistemology: one of 180-188.
   e) History: Two 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 and epistemology.
   e) History.

Each master's candidate must take at least two courses numbered above 200. One may be a graduate core seminar (264, 270, 280, 281), but no student is admitted to a core seminar before completing undergraduate requirements in the area of the seminar and securing the approval of the instructor.

3. **Specialization:** students must take at least three courses numbered over 105 in one of the five areas.
SPECIAL PROGRAM IN THE HISTORY AND/OR PHILOSOPHY OF SCIENCE

Only students with substantial preparation in philosophy or in the history of science in one of the natural or social sciences are admitted. Entering students whose primary preparation has been in science may be required to satisfy all or part of the undergraduate core requirement as described in the General Program. Students whose preparation has not been in science may be required to take additional science courses.

COURSE REQUIREMENTS

1. At least four courses in the Department of Philosophy in the history or philosophy of science. At least two of these must be graduate-level courses, or graduate sections of undergraduate courses, and at least one of the four must be in the philosophy of science and one in the history of science.

2. In most cases, one upper division or graduate course outside the Department of Philosophy in the natural or social sciences or in history.

3. Remaining courses are to be chosen in consultation with and approved by an adviser.

SPECIAL PROGRAM IN 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, 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) Six of the seven items listed below:
      1) Four-quarter "core" graduate courses and seminars, in philosophy of language (281); philosophy of mind, metaphysics, and epistemology (280); value theory (270); and philosophy of science (264). These are given every other year. To enroll, the student must be a Ph.D. student in Philosophy or have special permission of the instructor.
      b) First-order logic (Philosophy 160A) or the equivalent.
      c) Breadth requirement: a course in Eastern or Continental philosophy, or some other course establishing breadth.
   b) First-order logic (Philosophy 160A) or the equivalent.
   c) Breadth requirement: a course in Eastern or Continental philosophy, or some other course establishing breadth.

2. Teaching assistance: six quarters of teaching assistant 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). Approval for candidacy indicates that in the department's judgment the student is prepared to proceed to the dissertation stage. 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, a Ph.D. student should successfully complete at least one graduate-level course/seminar in philosophy each quarter.

5. 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.

Students with special interests in philosophy of science, requiring detailed knowledge of science and perhaps history of science, can design an individual program of study in close consultation with an advisory committee from the faculty. Such students are expected to satisfy proficiency requirements (2) and (3) above.

### 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 must 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.
   c) Two additional courses numbered over 199 must be taken in one of these (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 Philosophy.

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) 280, the philosophy core seminar in metaphysics and epistemology.
   b) 281, the philosophy core seminar in philosophy of language.

c) One course in the history of modern philosophy.

d) Two quarters of graduate logic courses from among 390A, 391A, 392A, 393A.

e) 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.

3. Three linguistics and computational linguistics courses:
   a) Graduate courses on natural language that focus on two of the following areas: phonetics and phonology, syntax, semantics, or pragmatics.
   b) One graduate course in computational linguistics, typically Linguistics 227.

4. At least two additional graduate seminars, at a more advanced level, in the general area of the program, independent of department. These would typically be in the area of the student's proposed dissertation project.

The requirements for the third year are the same as for other third-year graduate students in philosophy: a dissertation proposal and creation of a dissertation committee. The latter must include at least one member of the Department of Philosophy and one member of the Symbolic Systems Program outside the Department of Philosophy.

The requirement for the fourth year is the same as for the other graduate students in philosophy: a department oral on an initial draft of part of the dissertation, and a University oral exam when the dissertation is essentially complete.

GRADUATE FELLOWSHIPS AND ASSISTANTSHIPS

A limited amount of fellowship support is available for Ph.D. students in philosophy. Students request aid by checking the appropriate box on the application form.

The Department of Philosophy does not offer separate teaching assistantships as part of its support program. Each Ph.D. student is considered a member of the Philosophy fellows program. All fellows, whatever their sources of financial support, are required to do six quarters of teaching assistance at 25 percent time. Details of this program may be obtained from the department. If teaching a section, the student may register for 239, Teaching Methods in Philosophy.
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 Cultures, Ideas, and Values Program. Any one of 5A, B, C may count as the introductory philosophy course requirement for the major.

5A. 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 effects the organization of society and individual lives. Subtheme: how these understandings shape and are shaped by conceptions of gender, race, and social class.

5A, B, C. Philosophy and Human Existence, Classical Foundations—Orientation to philosophic 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.

5A units, Aut (Staff) MW 10 plus two 90-minute sections

5B. 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, Galileo, Newton, Hobbes, Locke, Rousseau, de Pizan, Wollstonecraft, Mill, Douglass, Jacobs, and Native American narratives. DR:1; three-quarter sequence.

5B units, Win (Staff) MW 10 plus two 90-minute sections

5C. 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.

5C units, Spr (Staff) MW 10 plus two 90-minute sections

10. Knowledge, Self, and the World: Introduction to Philosophy—The basic concepts, methods, and problems of Western philosophy. The extent of human knowledge, the nature of the mind, and the concept of the self. DR:8(3)

5 units, Spr (Miller) MWF 11 plus section


5 units, Win (Clark) MWF 11 plus section

30. Introduction to Political Philosophy—(Same as Political Science 51D, Public Policy 103A.) Concepts of equality, justice, tolerance, liberty, utility, and rights approached through major works in political philosophy. Each work presents a distinct and systematic conception of human nature and the social and economic conditions of a just association which expresses that nature. Readings: Hobbes, Locke, Mill, Marx, Rawls, and Nozick. DR:8(3)

5 units, Aut (Satz) MWF 11 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 1:15

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:8(3*)

4 units, Win (Ivanhoe) MW 10 section by arrangement
56. Reasoning and Argumentation—Introduction to various reasoning techniques, e.g., first-order predicate logic, diagrammatic reasoning, mathematical proof techniques, and probabilistic reasoning. Identifying and assessing arguments, analytical problem solving, common errors in reasoning.

4 units, Aut, Win, Spr (Burke, Etchemendy) MWF 9

57/157. Introduction to Logic.

57/157. Section 1. Computer-based; no lectures. Axioms and rules of inference for sentential and first-order predicate logic. Elementary applications to a variety of domains. Individual choice of topics for a variety of domains. Individual choice of topics for a grade beyond "satisfactory." Students progress at own pace. First class is organizational meeting only, held at 12:45 on first class day of quarter. DR:4(6)

5 units, Aut, Spr (Suppes)

57/157. Section 2. Lecture. 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, Spr (Staff) MTWThF 2:15

60. The Growth of Scientific Knowledge—(Same as History of Science 60.) Positivism, Popper, and the old "received view" of scientific theories. Kuhn and the radical turn. Recent attempts to reconstruct moderate empiricist and realist positions: Salmon, Van Fraassen, Hacking, Laudan, and others. The relation between history and philosophy of science. Case study in the "synthesis" of Darwinism and genetics which produced modern evolutionary theory. DR:8(3)

5 units, Win (Godfrey-Smith) TTh 11-12:15

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 1991-92

62. History of Biological Thought—(Same as History of Science 62, History 116A, VTSS 127.) Central issues in biological thought since Darwin: teleological vs. mechanistic explanations, vitality, reductionism, the units and levels of biological organization, the origins of life, development, inheritance, and evolution.

4 units, Aut (Smocovitis) MW 2:15-3:30

75. Computers, Ethics, and Social Responsibility—(Enroll in Computer Science 201, Symbolic Systems 100, VTSS 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 a number of 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. Prerequisite: Computer Science 106B or 106X.

3-4 units, Spr (Winograd) MWF 11-12:15

77. Ethics in International Relations—Topic: World Destitution—Focuses on the phenomena of hunger and malnutrition in poor countries, including analytical and empirical material drawn from moral and political philosophy, economics, and nutrition science. Methods of quantitative assessment of the extent and distribution of well-being and basic needs in a society. Readings from contemporary sources. Prerequisite: 30 or consent of instructor.

4 units, not given 1991-92

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, Aut (Zalta) 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, personal identity, and basic issues in the philosophy of language. Writing focus course. Letter grade only. Prerequisite: one course in philosophy other than logic. DR:8(3)

5 units, Aut (Bratman) MWF 10

Spr (Zalta) MWF 1:15

85. Historical and Ethical Issues in Population Studies—(Enroll in Ethics in Society 85, History 104.) Populations are composed of majorities and minorities who compete for power, resources, and relative welfare. Intrinsic is the power to determine basic values (what it is morally right and wrong for groups and individuals) and what "the government" should or should not do about regulating human reproduction, health, death,
and migration. Topics: sexuality, contraception, abortion, the control of epidemic diseases, the regulation of private consumption (alcohol, smoking, and drugs), the right to die, general freedom to enter or leave a national population. Introduces moral history and ethical dimensions of making decisions about moral issues by focusing on how history and ethics combine to influence past and present demographic policies.

4-5 units, Aut (Johansson) MTW 9

HISTORY OF PHILOSOPHY

100-106 are surveys 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, Aut (Jenkins) MWF 1:15

4 units, Win (Gelber) MWF 11

4 units, Win (Rosmond) MWF 2:15

103. 19th-Century Philosophy—Ideas and conceptions that shaped 19th-century philosophy. Fichte, Hegel, Marx, Kierkegaard, Nietzsche.
4 units, given 1992-93

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 Yearle, and David Wong. No knowledge of Chinese required. Separate readings for those who know Classical Chinese. Prerequisite: 46 or consent of instructor.
5 units, Spr (Ivanhoe) MWF 10

117. Aristotle—(Graduate students register for 217.) Examination of Aristotle’s theories in metaphysics and ethics. Examples also from his scientific writings.
4 units, Spr (Moravcsik) MWF 2:15

118. Pyrrhonian Skepticism—(Graduate students register for 218.) Examination of ancient philosophical skepticism as described by Sextus Empiricus in his Outlines of Pyrrhonism. Emphasis to those features which make it relatively invulnerable to the types of refutation that have been brought against modern forms of skepticism.
4 units, Spr (Mates) T 1:15-3:05

118A. Ancient Greek Ethics—(Same as Classics 169.) Explores in depth the ethical philosophies of Socrates, Plato, and Aristotle, attempting to interpret them in cultural/historical contexts. Focus is on the philosophers’ rejection and/or appropriation of Greek poetry as a vehicle for ethical reflection. DR:8(3)
3-4 units, Win (Nightingale)

119. Hellenistic Philosophy—(Enroll in Classics 165.) Stoicism and Epicureanism as comprehensive systems of philosophy, attempting to base ethics on theories of nature; the skeptics’ attack of those attempts. Recommended: previous work in earlier Greek philosophy.
3 units, Spr (Wigodsky)

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, Aut (Förster) TTh 11-12:15

126. The Aesthetic Absolute: German Literature and Philosophy around 1800—(Graduate students register for 226; same as German 249F/349F.) Fichte, Novalis, Schelling, A. and F. Schlegel, Schleiermacher, Tieck, Wackenroder.
3-5 units, Win (Mueller-Vollmer, Förster)

130. Kierkegaard—(Graduate students register for 230; same as Religious Studies 274C.) Examines Soren Kierkegaard’s major works: Either/Or, Philosophical Fragments, The Concluding Unscientific Postscript, The Sickness Unto Death, Works of Love, and Purity of Heart is to Will One Thing. How do Kierkegaard’s views on human nature and freedom bear on his understanding of God and the good life? How do his views on dread and despair relate to the intellectual climate of his times? Does his authorship (pseudonymous and nonpseudonymous) present a unified cosmology, or is it an elaborate poking-fun at anything resembling metaphysics, epistemology, ethics?
5 units, Spr (Jackson) TTh 4:15-6:05

131. The Structure of Cognition: Introduction to Husserl’s Phenomenology—Its background and basic concepts. Emphasis on the concept of
intentionality, and its role in Husserl's theory, and in contemporary philosophical debates.

4 units, Aut (Miller) TTh 1:15-3:05

132. Existentialism—Systematic examination of the basic philosophical ideas of Sartre and Heidegger.

4 units, Win (Miller) TTh 1:15-3:05

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.

4 units, Spr (Förster) TTh 11-12:15

HISTORY OF SCIENCE


138A. Ancient Period—DR: 8(3); also satisfies Area 4(6) when taken in sequence with 138B or 138C.

4 units, given 1992-93

138B. Science and Technology in the Scientific Revolution—(Same as VTSS 124.) DR: 8(3); also satisfies Area 4(6) when taken in sequence with 138A.

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

138C. Newton to Einstein—DR: 8(3); also satisfies Area 4(6) when taken in sequence with 138A.

4 units, Spr (Staff) MWF 2:15

140. Topics in the History of Mathematics: From Antiquity to the 17th Century—(Same as History 138D, History 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.

3 units (Knorr) given 1992-93

145. Scientific Revolution—(Graduate students register for 245; same as History 139, History of Science 145, VTSS 125.) Social, intellectual, and institutional background of the 17th-century period that established modern science. Theories of matter and motion, Galileo, Descartes, Bacon, Boyle, and Newton. Historical controversies: Yates' thesis on hermeticism and magic, Merton on Protestantism and science, Hessen on the economic basis of scientific change. Readings from era texts and modern historical studies. Interpretations of the revolution and what is meant by science and revolution. DR: 8(3)

5 units, Win (Caliso) TTh 11-12:15

150. Origins of Life—(Same as History 133D, History 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, Spr (Lenoir) TTh 2:15-3:30

152. The Darwinian Revolution—(Same as History of Science 152, Human Biology 152, VTSS 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.

4 units (Lenoir) given 1992-93

LOGIC AND PHILOSOPHY OF SCIENCE

156. Popper, Kuhn, and Lakatos—Three controversial figures in recent philosophy of science. Popper: scientific methods as openness to refutation and rational criticism. Kuhn: science develops discontinuously via scientific revolutions. Lakatos: scientific research programs have a "hard core" which adherents try to protect by making changes in the "protective belt." Interpretations and criticisms.

4 units, Win (Phillips) T 7-10 p.m.

157. Introduction to Logic—(Same as 57.) For graduate students.

158. Axiomatic Set Theory—Zermelo-Fraenkel axioms. Operations on sets, relations, and functions. Equivalence and ordering relations. Equivalence of sets and cardinal arithmetic. Topics on ordinal numbers and axiom of choice as time permits. Computer-based; no lectures. Students progress at own pace. First meeting is...
159. Basic Concepts in Mathematical Logic—
(Same as Linguistics 135.) Concepts and techniques used in mathematical logic: sets, functions, structures, formalization, proof, mathematical induction, enumerability, and effectiveness. DR:4(6)

4 units, Aut, Spr (Suppes)

160A. First-Order Logic—Syntax and semantics of sentential and first-order logic. Introduction to basic concepts of model theory. Gödel’s Completeness Theorem and its consequences: the Löwenheim-Skolem Theorem and the Compactness Theorem. Prerequisite: 159 or consent of instructor. DR:4(6)

4 units, Win (Mints) MWF 9 plus section

160B. Computability and Logic—Different approaches to effective computation: recursive functions, register machines, and various programming styles. Proof of their equivalence, discussion of Church’s Thesis. Development of some elementary recursion theory. These techniques are used to prove Gödel’s Incompleteness Theorem for arithmetic, whose technical and philosophical repercussions are surveyed. Prerequisite: 160A.

4 units, Spr (Mints) MWF 9 plus section

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, Aut (Guttmann) MWF 2:15

165. Quantum Mechanics—Non-technical introduction to quantum mechanics in general and particularly to the philosophical discussion on the measurement problem and the correspondence principle.

4 units, Spr (Guttmann) MWF 2:15

166A. Structuralism and Deconstruction: Complexity and Self-Reference in the Humanities and Social Sciences—(Enroll in French 279D.) Undecidability, infinite deferment, structural incompleteness, bifurcation and structural stability, the text as a machine, etc. Interdisciplinary approach exploring conceptual foundations of modern critical theory. Topics: deconstruction of structuralism, the logic of mimetic desire. Readings: Lacan, Derrida, Lévi-Strauss, Girard.

2-3 units, Win (Dupuy)

167. Philosophy of Biology—Questions about explanation and theory construction in evolutionary biology. Adaptationism, functional explanation, fitness, role of simple models and idealizations, units of selection, nature of species, reductionism, sociological critiques of biological theories.

4 units, Spr (Godfrey-Smith) MWF 10

168. History and Philosophy of Physics—(Same as History of Science 168, VTSS 126.) Philosophical questions raised by historical developments in 20th-century physics. 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. What is meant by “unified” field theories in contemporary physics? Readings: scientific, historical, and philosophical texts. DR:8(3)

5 units, Spr (Galison) TTh 11-12:15

169. Intensional Logic—Logical analysis of intensional notions like modality, time, conditionals, knowledge, and action, starting from their philosophical background. Development of the basic model theory and proof theory of Modal Logic (possible worlds semantics). Transition to newer developments: partiality, dynamics, type structure.

4 units, Spr (van Benthem) MW 11-12:15

ETHICS, AESTHETICS, AND SOCIAL AND POLITICAL PHILOSOPHY

170. Reason and the Good in Ethical Theory—The Aristotelian tradition in ethics examined against major alternatives including the theories of Hume and Kant.

4 units, Aut (Clark) MWF 2:15

171. Political Philosophy—In-depth topics in political philosophy, especially the ability of contemporary liberal political thought to respond to its critics’ attacks on its psychological and methodological foundations. Also Marxist, communitarian, conservative, and anarchist critics.

4 units, Spr (Satz) MWF 1:15

172. Topics in Moral Philosophy—The concept of friendship in relation to ethics and psychology. Examples from literature.

4 units, Aut (Moravcsik) MW 1:15

174. 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, Win (Jackson) MWF 1:15

175. Seminar: Hegel’s Political Philosophy—(Enroll in Political Science 155.) Critical reading of Hegel’s Philosophy of Right, emphasizing Hegel’s concept of freedom, criticism of Kantian
morality, and distinction between state and civil society. Aim: 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 1992-93


4 units, not given 1991-92

177. Feminism and Philosophy—(Graduate students register for 277; same as Feminist Studies 102B/202B.) Feminist approaches to political philosophy and philosophy of science. Feminist critiques of the main Western political feminism; specific issues such as affirmative action, abortion, and pornography. Feminist responses to specific areas of science, especially sexual difference; critical consideration of general assumptions about scientific objectivity. Undergraduate prerequisite: Feminist Studies 101, or consent of instructor. DR:8(3)

5 units (Dupré) not given 1991-92

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 prior to the presentation. Group discussion follows.

3 units, Win (Clark, Okin) T 1:15-3:05

EPistemology, Metaphysics, and Philosophy of Language

Philosophy 80 or consent of instructor is a prerequisite for the 180 series.

181. Philosophy of Language—Basic issues in the relationship between language, mind, and world through the work of Frege, Russell, Wittgenstein, Kripke, and others. Prerequisites: 80 and some background in logic.

4 units, Win (Moravcsik) 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 (Dretske) MWF 1:15

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 (Dretske) MWF 1:15

194. Undergraduate Seminars in Philosophy—Preference given to undergraduate majors. A series of advanced undergraduate seminars. Enrollment is limited to 16 in each seminar. For those in the Philosophy honors program, seminars serve as preparation for writing an honors thesis.

194A. Naturalistic Philosophy of Science—Naturalistic approaches to questions about scientific change, focusing on David Hull's Science as a Process and his claims about the role of the structure of scientific communities in explaining dynamic aspects of science. The views of Lakatos, Laudan and Kitcher. Prerequisite: introductory course in philosophy of science or consent of instructor.

4 units, Aut (Godfrey-Smith) T 2:15-5:05

194B. Nonexistent Objects and the Semantics of Fiction—Systematic account of our commonsense reasoning about fictions. Ancient Greeks worshipped Zeus and Ponce de Leon searched for the fountain of youth, but if fictional, mythical, and dream objects don't exist, how can they figure into anyone's thoughts? Does it make sense to say of something that it doesn't exist? Works of Russell, Kripke, Searle, Lewis, and others.

4 units, Win (Zalta) T 2:15-5:05

194C. Topic to be announced.

4 units, Spr (Follesdal) Th 2:15-5:05

194D. Descartes and Hume: the Rationalist and the Empiricist—Study of the difference in their views of persons and human knowledge.

4 units, Aut (Miller) W 2:15-5:05


5 units, Win (Harvey) MW 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 Mingru xuean, a history of Ming Dynasty philosophers.
Focuses on structure and theory of organization and approach to text. Additional readings from Wang Yangming and Li Zhi. Prerequisite: reading knowledge of Classical Chinese.

5 units, Aut (Ivanhoe) MW 2:15-4:05

212. Interpreting Confucian Texts—(Same as Asian Languages 230, Religious Studies 212.) Illustrates critical importance of historical and philosophical issues to the task of interpretation. Introduction to Chinese commentarial tradition. Seminar; pace and range determined by constituents. Prerequisite: consent of instructor.

5 units, Win (Ivanhoe) MW 2:15-4:05

213. Zhuang Zi—(For graduate students; same as 113.)

216A. Plato: Laws—(Enroll in Classics 462.) Graduate seminar.

5 units, Spr (Nightingale)

217. Aristotle—(For graduate students; same as 117.)

218. Pyrrhonian Skepticism—(For graduate students; same as 118.)

219A. Lucretius—(Enroll in Classics 431.) Seminar on problems of text, composition, sources; conflict or harmony between poetry and philosophy.

5 units, Win (Wigodsky)

225A. Kant's Critique of Pure Reason—(For graduate students; same as 125A.)


4 units, Spr (Förster) Th 3:15-5:05

231A. Topics in Phenomenology—Examination of the differences between Husserlian and Heideggerian phenomenology.

3 units, Spr (Miller) Th 9-10:50

238. The Technology of Modernism and Postmodernism—(Same as History of Science 238.) Theoretical inquiry into the nature of science and technology in their relation to the wider cultural movements of modernism and postmodernism. Logical positivism and modernism on architecture and art. Modernism in mathematics (the Hilbert program) and physics (Einstein and Bohr). Creation of the computer in the 1940s, electronics and simulations. Image of technology in literature and films. Readings: the Vienna Circle, Einstein, Hilbert, von Neumann, Lyotard, Baudrillard, Gibson, and current work in science studies.

5 units, Win (Galison) T 4:15-6:05

239. Teaching Methods in Philosophy.

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

240. Individual Work for Graduates.

any quarter (Staff) by arrangement

242A. Seminar in the Philosophy of Science: Quantum Mechanics.

3 units, Aut (Suppes) M 3:15-5:05

242C. Seminar in the Philosophy of Science: Perception.

3 units, Spr (Suppes, Follesdal) W 3:15-5:05


3 units, Win (Cuttmann) T 1:15-3:05

244. Evolutionary Perspectives on Cognitive Science—Survey of the relevance of evolutionary considerations to various branches of cognitive science. Functional explanation and functionalism, relation between evolution and learning, evolutionary approaches in neuroscience and connectionism, teleological theories of mental representation, optimality models, artificial life.

3 units, Spr (Godfrey-Smith) M 3:15-5:05

245. Scientific Revolution—(For graduate students; same as 145.)

256. Seminar: Ethical Issues in Science and Technology—(Same as VTSS 212.) Topics: objectivity and neutrality of science, science and society, science and ideology, norms and values in human actions, the role of values in the social sciences, theoretical and practical rationality, the moral judgment on science and technology, a systems-theoretic approach to the issue of freedom and responsibility of science.

4 units, Aut (Agazzi) Th 3:15-5:05

264. Philosophy of Science—Core seminar in philosophy of science for first- and second-year students in the Philosophy Ph.D. program.

4 units, given 1992-93

270. Moral Philosophy—Core seminar in moral philosophy for first- and second-year students in Philosophy Ph.D. program.

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

273. Topics in the Philosophy of Economics.

4 units, Spr (Dupré, Satz) W 3:15-5:05

274. Morality and Reasons for Action—The rationality of moral conduct. Specifically, are there, necessarily, reasons for each person to behave as morality requires? Investigation of practical rationality, and the nature of moral motivation and
reasons to be moral. Readings mostly from contemporary writers.

3 units, Spr (Cohon) Th 3:15-5:05

278. Graduate Seminar in Applied Ethics—Interdisciplinary. Faculty and students present issues of public and personal morality, topics chosen with the advice of instructors. Student-prepared reading list is available to class members a week prior to their presentation. Group discussion follows.

3 units, Win (Moravcsik, Staff) Th 3:15-5:05


3 units, Spr (Moravcsik, Suppes) M 3:15-5:05

280. Metaphysics and Epistemology—Core seminar in metaphysics and epistemology for first- and second-year students in the Philosophy Ph.D. program.

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

281. Philosophy of Language—Core seminar in philosophy of language for first- and second-year students in the Philosophy Ph.D. program.

4 units, given 1992-93

282. History of Philosophy of Mind—The simplicity of the soul and the unity of consciousness in the history of western philosophy. The views and arguments of various philosophers about these and related issues. Readings focus on the 17th and 18th centuries, but include other periods.

3 units, Aut (Rozemond) Th 3:15-5:05

284. Graduate Seminar in Metaphysics.

3 units, Spr (Dupré) Th 3:15-5:05

286A,B,C. Philosophy of Language—Advanced seminars; may be taken independently. 286A and 286C are organized as reading groups.

286A. Propositional Attitudes.
1-2 units, Aut (Israel)

286B. Grice's Philosophy of Meaning.
3 units, Win (Israel)

286C. Semantics and Philosophical Logic.
1-2 units, Spr (Israel)

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, Spr (van Benthem)

326. Nonmonotonic Reasoning—(Same as Computer Science 323.) Formalisms for representing nonmonotonic 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, to logic programming, and to reasoning about action using the situation calculus. Prerequisite: a basic knowledge of logic such as 160A.

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

380A,B,C. Graduate Seminar on Mind and Action—Research seminars on topics in the philosophy of mind and action. Prerequisite: 280 or consent of instructor.

3 units, Aut, Win, Spr (Dretske, Bratman) T 3:15-5:05


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

392A. Set Theory—(Enroll in Math. 292A.) 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, Win (Sommer) MWF 2:15

394. Topics in Logic—(Enroll in Math. 294.) Varies each year. Examples: abstract model theory and generalized quantifiers; recursion in higher types, generalized recursion theory; categorical logic; constructive functional interpretations, foundations of constructive and semi-constructive mathematics; application of theoretical computer science. Prerequisites: appropriate background from one of Math. 290A,B, through 293A,B, or equivalent.

3 units, Spr (Feferman) TTh 1:15-2:30


3 units, Win (Smith) Th 10-11:30

395B. Philosophy of Cognitive Science—(Same as Symbolic Systems 296.) A foundation analysis of modern cognitive science, emphasizing the role of computation. Topics: traditional symbol manipulation (Fodor, Haugeland, Newell, Pyly-
shyn, Simon); full-scale critiques (Dreyfus, Searle, Taylor, Winograd); the role of connectionism (Cussins, Fodor, Smolensky); and anti-representationalism (Brooks, Chapman, Dretske, Rosenschein).

3 units (Smith) given 1992-93


3 units, Win (Etchemendy)

450. Thesis.

any quarter (Staff) by arrangement

PHYSICS

Emeriti: (Professors) Stanley S. Hanna, Paul H. Kirkpatrick, David M. Ritson, Arthur L. Schawlow, J. Dirk Walecka

Chair: Steven Chu

Director of Graduate Study: Robert V. Wagoner

Director of Undergraduate Study: Mason R. Yearian


Associate Professor: Peter F. Michelson (on leave Spring)

Assistant Professors: Bryan W. Lynn, Zein-Ed-dine Meziani (on leave), Roger W. Romani

Professors (Research): John A. Lipa, Todd I. Smith, John P. Turneaure

Acting Assistant Professors: Sebastian E. Kuhn, David Spooner, Stavros Theodorakis

Consulting Professors: Bernard Couillaud, Theodor W. Hänsch, Marc D. Levenson, Melvin Schwartz, Frank H. Shu

By Courtesy: Peter Galison, Peter A. Sturrock

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. A 120 MeV superconducting electron linear accelerator is currently available to provide free electron laser radiation. 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 new 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 the honors program.

Graduate students find opportunities for research in the fields of astrophysics, theoretical physics, low temperature physics, atomic physics/laser science, nuclear and atomic collision physics, intermediate energy physics, high energy physics, coherent optical radiation, and condensed matter 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 Applied Physics in the areas of astrophysics, theoretical and experimental condensed matter physics, materials research, quantum electronics, photon science, and novel imaging technology.

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 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, 105, 106, 107, 110, 111, 120, 121, 122, 130, 131, 132, 170, 171, 181, 200, 201 and Math. 41, 42, 43, 44, 130, 131, and any one additional math course numbered 100 or higher. Physics 51, 53, 54, 55, 56, and 57 can replace the Physics 60 series requirements. Students who have taken Physics 55 or its equivalent may substitute Physics 135, 167, 172, or 204 for 181. 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. The requirements of Physics 55, 56, and 57 may be waived upon approval of the Physics Undergraduate Study Committee. 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, 55, and 57) 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 would be 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. The sequence of courses during the first two years is relatively inflexible, but considerable freedom exists during the upper-class years. 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.

SEQUENCE 1

FIRST YEAR*

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>A</th>
<th>W</th>
<th>S</th>
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</thead>
<tbody>
<tr>
<td>Math. 42, 43, 44. Analytic Geometry, Calculus</td>
<td>5</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Physics 61, 63, 65. Advanced Freshman Physics</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Physics 64, 66. Advanced 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 105, 106, 107. Intermediate Physics Laboratory, Seminars | 3 | 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 135. Computational Physics | (3)‡ |
| Physics 170, 171, 172. Thermodynamics, Kinetic Theory and Introduction to Statistical Mechanics, Physics of Solids | 3 | 3 | (3)‡ |
| Physics 181. Optics | 3‡ |
| Physics 210, 211, 212. Advanced Mechanics (Particle and Continuum, Nonlinear, Statistical) | (3) | (3)‡ |
| Physics 262. Essential General Relativity | (3)‡ |

FOURTH YEAR*

| Physics 200, 201. Advanced Physics Laboratory | 3 | 3 |
| Physics 204. Senior Seminar in Theoretical Physics | (3)‡ |
| Physics 205. Honors Program | (3) | (3)‡ |
| Physics 220, 221. Classical Electrodynamics | (3) | (3)‡ |

SEQUENCE II

FIRST YEAR*

| Math. 41, 42, 43. Analytic Geometry and Calculus | 5 | 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, 57. Light and Heat, Modern Physics 4 3
Physics 56. Light and Heat Laboratory 1
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, 106, 107. Intermediate Physics Laboratory Seminars 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 (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 200, 201. 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.
‡ Students who have taken Physics 55 or its equivalent may elect to take any one of these five courses (see text).

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 a.m. to 5 p.m. and 7 p.m. to 9 p.m. and Fridays 9 a.m. to 3:15 p.m.

HONORS PROGRAM
The department offers a program leading to the degree of Bachelor of Science in Physics with Honors:
1. Students should find a physics project, either theoretical or experimental.
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 200, 201, 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 in 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: 200, 201, 210, 211, 212, 220, 221, 230, 231, 232, 290, 294, 330.

All Ph.D. candidates must also take the following math courses or have taken their equivalent previously: 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 com-
prehensive examination on undergraduate and first-year graduate physics. This exam is given annually during the summer. The examination should be taken after the first-year graduate courses (210-232) have been taken. 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. Students interested in astronomy, astrophysics, or space science should also consult the "Astronomy Course Program" section in this bulletin.

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.

The department office has more detailed information on how to obtain an advanced degree in physics and should be consulted by prospective candidates.

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. (Not offered 1991-92.)

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, 57, 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 66 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 1991-92

12. The Nature of the Universe—(Enroll in Applied Physics 15.) DR:5(7)

3 units, Win (Walker)

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 discussion by arrangement

19. An Introduction to Physics (Physics for Poets)—Presents 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, Win (Cabrera) TTh 11-12:15 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. Prerequisites: working knowledge of elementary algebra and trigonometry. Calculus is used as a language and developed as needed. DR:5(7) 3 units, Aut (Wojcicki) MWF 10 or 11 Sum (Gillespie) MTWThF 10-12 two-hour discussion by arrangement

22. Mechanics and Heat Laboratory—Concurrent or prior registration in 21 is required. Mandatory Satisfactory/No Credit grading. 1 unit, Aut (Wojcicki) 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 Sum (Gillespie) MTWThF 10-12 two-hour discussion by arrangement

24. Electricity and Optics Laboratory—Concurrent or prior registration in 23 is required. Mandatory Satisfactory/No Credit grading. 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—Concurrent or prior registration in 25 is required. Mandatory Satisfactory/No Credit grading. 1 unit, Spr (Little) by arrangement

27. Evolution of the Cosmos—(Enroll in Applied Physics 25.) DR:5(7) 3 units, Aut (Petrosian)

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 (Dimopoulos) 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 (Osheroff) lec MWF 9 or 10 discussion by arrangement

54. Electricity and Magnetism Laboratory—Concurrent or prior registration in 53 is required. Mandatory Satisfactory/No Credit grading. 1 unit, Spr (Osheroff) by arrangement

55. Light and Heat—Reflection and refraction of light, lens systems; light and electromagnetic waves; temperature, properties of matter, introduction to kinetic theory of matter. Prerequisites: 53 and Math. 23 or 43, or consent of instructor. DR:5(7) 4 units, Aut (Meyerhof) lec MWF 9 or 10 discussion by arrangement

56. Light and Heat Laboratory—Concurrent or prior registration in 55 is required. Mandatory Satisfactory/No Credit grading. 1 unit, Aut (Meyerhof) by arrangement

57. Modern Physics—Relativity, experimental basis of quantum theory, Schrödinger equation, atomic structure, nuclear structure, high energy
physics, elementary particles. Prerequisites: 55; prior or concurrent registration in Math. 130. DR:5(7)
3 units, Win (Jaros) TTh 11-12:15

58. Modern Physics Laboratory—Concurrent or prior registration in 57 is required. Mandatory Satisfactory/No Credit grading.
1 unit, Win (Jaros) 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 (Cabrera) TTh 9-10:50
63. 4 units, Win (Spooner) TTh 9-10:50
65. 4 units, Spr (Michelson) TTh 9-10:50

64. 1 unit, Win (Spooner) by arrangement
66. 1 unit, Spr (Michelson) by arrangement

105,106,107. Intermediate Physics Laboratory Seminars—Required of all Physics majors. Year-long series in experimental techniques. Two to eight weeks depending on subject matter. Must be taken in sequence. Each of the series schedules a one-hour weekly lecture, usually Friday noon. Topics: electronics, detectors and radioactive sources; optics and lasers, statistics and data handling, microwaves, low temperatures and computer interfacing. Prerequisites: 54 and 56, or 64 and 66; concurrent registration in the 120 series.
105. Laboratory Seminar I: Electronics—DR:6(8)
3 units, Aut (Spooner) by arrangement
106. Laboratory Seminar II.
3 units, not given 1991-92
107. Laboratory Seminar III.
3 units, Spr (Schwettman) by arrangement

110,111. Intermediate Mechanics—Mechanics of systems of particles and rigid bodies. Coordinate transformation and vectors; Newtonian mechanics; linear and nonlinear oscillations; Hamilton’s principle, Lagrangian and Hamiltonian dynamics; central forces, planetary motion; collisions; non-inertial reference systems; rigid body dynamics; coupled oscillations; and introductory fluid mechanics. Prerequisites: 51 or 61, and Math. 130.
110. 3 units, Win (Lathrop) MWF 9
111. 3 units, Spr (Lathrop) 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 (Kuhn) MWF 11
121. 3 units, Win (Kuhn) MWF 11
122. 3 units, Spr (Kuhn) 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: 57 or equivalent and 110, 111; concurrent or prior registration in 120, 121, 122, and Math. 130, 131.
130. 3 units, Aut (Yearian) TTh 1:15-2:30
131. 3 units, Win (Yearian) TTh 1:15-2:30
132. 3 units, Spr (Yearian) 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.
3 units, Spr (Cabrera) by arrangement
160. Introduction to Stellar and Galactic Astrophysics—(Enroll in Applied Physics 160.)
3 units, Aut (Romani)

161. Introduction to Extragalactic Astrophysics and Cosmology—(Enroll in Applied Physics 161.)
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 (Beasley) 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 of Science 168, Philosophy 168, VTSS 126.)
5 units, Spr (Galison) TTh 11-12:15

200,201. Advanced Physics Laboratory—Experiments in atomic physics, nuclear physics, solid state physics, low-temperature physics, optics, and particle physics. Students are urged to take 200 no later than Autumn Quarter of the senior year and 201 no later than Winter Quarter. Prerequisites: 105, 121, and 131.
200. 3 units, Aut (Staff) by arrangement
Win (Staff)
Spr (Spooner)
201. 3 units, Aut (Staff) by arrangement
Win (Staff)
Spr (Spooner)

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.
3 units, Spr (Susskind) by arrangement

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.) Prerequisite: some undergraduate level device and circuit exposure.
207. 3 units, Win (Fox)
208. 3 units, Spr (Fox)

3 units, Aut (Wagoner) MW 9:30-10:50

211. Fluids and Nonlinear Mechanics—Examples from fluid mechanics (instabilities, turbulence, etc.) and other fields are provided as a physical background. Analysis of simple nonlinear mathematical models. Emphasis on phase-plane analyses, attractors, and transition to chaos. Prerequisite: 210.
3 units, Win (Wagoner) MW 9:30-10:50

212. Statistical Mechanics—Kinetic theory; evolution of distribution function, transport coefficients. Principles of statistical mechanics; ensembles, statistical equilibrium. Thermodynamic functions, ideal and near-ideal gases, solids. Fluctuations, noise, and irreversible thermodynam-
ics. Phase transitions and cooperative phenomena. Prerequisites: 171 and 231.

3 units, Spr (Doniach) 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 (Susskind) MW 1:15-2:30
221. 3 units, Win (Susskind) MW 1:15-2:30


230. 3 units, Aut (Theodorakis) MWF 11
231. 3 units, Win (Theodorakis) MWF 11
232. 3 units, Spr (Theodorakis) MWF 11


3 units, Spr (Bloom)

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: 210, 211, 221.

3 units, Spr (Michelson) 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)

3 units, Spr (Harrison)

3 units, Aut (Harrison)

274. Electronic Structure—(Enroll in Applied Physics 274.)
3 units, Win (Harrison)

3 units, given 1992-93

290. Research Activities at Stanford—Review of research activities in the department and elsewhere at Stanford at a level suitable for entering graduate students. Registration required of all entering students.
0-3 units, Aut (Meyerhoj) TTh 12:15-1:05

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 Department of Physics chair required. Prerequisites: 25 units of college physics and consent of instructor.
any quarter (Staff) by arrangement
294. Teaching of Physics—Registration required of all teaching assistants in Physics. Techniques of teaching physics by means of lectures and lab. 0-3 units, Aut (Tigner)

312,313. Basic Plasma Physics I and II—(Enroll in Applied Physics 312 and 313.) 3 units (Sturrock) alternate years, given 1992-93

315. Topics in Computational Physics—(Enroll in Applied Physics 315.) 3 units, Win (Doniach)

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, Win (Chu) alternate years, not given 1992-93


324. Physics of Particle Accelerators—(Enroll in Applied Physics 324.) 3 units, Win (Wiedemann)

326. Beam Dynamics in Storage Rings—(Enroll in Applied Physics 326.) Accelerator physics. 3 units, Spr (Siemann)


351,352. Elementary Particle Physics—Phenomena of elementary particle interactions, and their theoretical interpretation. Winter: introduction to the Standard model—features of high-energy interactions of hadrons; deeply inelastic lepton-hadron scattering; structure functions; the parton model; QCD, gluons and scaling violations; jets and quark fragmentation in pp and e+e- annihilation to hadrons; radiative corrections in QED and QCD; running coupling constants; experimental measurements of the strong coupling; Monte Carlo techniques. Spring: Hadron spectroscopy in the static quark model; properties of heavy quarks and quarkonium systems. Weak interactions: muon, pion, and beta decay; weak mixing angles; the K_s-K^- system on CP violation; charged and neutral current neutrino scattering; determinations of sin^2(\theta_W); properties of W and Z bosons; gauge symmetries and the Higgs mechanism; properties of Higgs particles. Introduction to topics beyond the standard model: grand unification, proton decay, supersymmetry. Prerequisite: 330. 351. 3 units (Wojcicki) not given 1991-92 352. 3 units, Spr (Swartz) MWF 9-10

360. Stellar Physics—(Enroll in Applied Physics 360.) 3 units, Spr (Petrosian) alternate years, not given 1992-93

362. High Energy Astrophysics—(Enroll in Applied Physics 362.) 3 units (Staff) alternate years, given 1992-93

363. Solar Physics—(Enroll in Applied Physics 363.) 3 units, Aut (Sturrock) alternate years, not given 1992-93

365. Extragalactic Astrophysics and Cosmology—(Enroll in Applied Physics 365.)
3 units (Staff)
alternate years, given 1991-92

3 units, Aut (Fetter) TTh 9-10:50

3 units (Laughlin)
alternate years, given 1992-93

383. Introduction to Atomic Processes—(Enroll in Applied Physics 383.)
3 units (Harris)
alternate years, given 1992-93

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: early universe. Winter: inflation. Spring: chiral anomalies. Prerequisite: 332.
450. 3 units, Aut (Linde)
451. 3 units, Win (Linde)
452. 3 units, Spr (Kallosh)

453A,B,C. Special Topics in Elementary Particle Physics.
3 units, Aut (Kallosh)
453B. Grand Unified Theories—Gauge hierarchy problem, technicolor, supersymmetry, neutrino masses, solar neutrino problem, Baryogenesis, Baryon number violation via electroweak instants, etc.
3 units, Win (Dimopoulos)
453C. General Theory of Quantization—First and second quantization. BRST quantization. Superstring theory
3 units, Spr (Kallosh)

473A. 1 unit, Win (Huberman)
473B. 3 units, Aut (Doniach)
473C. 3 units, Aut (Beasley)
473D. 3 units, Aut (Kapitulnik)

490. Research Orientation—Familiarizes students with activities of one or more research groups, within the department or outside. Registration limited to one quarter per research group with overall limitation of two quarters. Prerequisite: consent of student’s adviser.
any quarter (Staff) by arrangement

491. Research—Open only to graduate physics major students, with consent of instructor. Work is in experimental or theoretical problems in research, as distinguished from independent study of non-research character in 190 and 293. If taken under the supervision of a faculty member outside the department, Physics Graduate Study Committee approval required.
any quarter (Staff) by arrangement

POLITICAL SCIENCE

Emeriti: (Professors) Gabriel A. Almond, Thomas S. Barclay, Heinz Eulau, Alexander L. George, Robert A. Horn, Nobutaka Ikek, Hubert R. Marshall, Robert C. North, Kurt Steiner, Jan F. Triska, Robert A. Walker, Robert Ward
Chair: John Ferejohn
Associate Professors: Luis R. Fraga, Judith L. Goldstein, Terry L. Karl, Daniel I. Okimoto (on leave), Condolezza Rice
Assistant Professors: Geoffrey Garrett (on leave), Kurt T. Gaubatz, Nina P. Halpern (on leave Autumn), Paul M. Sniderman, Hans N. Weiler
Assistant Professors: Geoffrey Garrett (on leave), Kurt T. Gaubatz, Nina P. Halpern (on leave Autumn), Scott D. Sagan (on leave Autumn), Mark Tunick
Professor (Teaching): David J. Danelski
Courtesy Professors: Steven H. Chaffee, Philip E. Converse, Jean-Pierre Dupuy, Lawrence Friedman, Roger Noll

POLITICAL SCIENCE
Senior Lecturer: Elisabeth Hansot
Visiting Professors: Jürg Gabriel, Han Sung-Joo, Elemer Hankiss, Rudolfo Stavenhagen
Affiliated Professors: David P. Baron, Michael W. Kirst, Walter Lohnes, William J. Perry
Affiliated Associate Professor: Jonathan Bendor

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 three 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 student in an introductory Political Theory course, and the Lindsay Peters, Jr., Memorial Prize for the outstanding student each year in Political Science 10.

HONORS THESIS 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 or three quarters (for a total of 10-15 units). (2) If a student has done little or no previous work on the topic, but the thesis adviser believes that the proposed 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

The department offers a terminal A.M. program for a limited number of students. 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 A.M. degree may be pursued as part of a joint degree program with one of the university's professional schools. The student 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. Courses must be numbered above 100, and a letter grade indicator (LGI) of "B-" or better must be attained in each course. 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 1991-92.)

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 fields of 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 field. Students concentrate on two of these fields by fulfilling, depending on the field, combinations of the following: written qualifying examinations, research papers, research design, course work. The requirement for the third field may be satisfied by taking either a written examination in that field or by offering a minimum of 10 units with a letter grade indicator (LGI) of "B" or better in the third field from among the formal graduate-level courses in the five divisions of the department. The third field cannot be satisfied by courses taken as a requirement for a first or second field. A third field in methodology requires two courses in addition to the 5 units necessary to fulfill the program requirement. A third field in methodology requires two courses in addition to the two core courses offered by the department.
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. Competence is required in:
   a) a foreign language; and/or
   b) a skill or skills such as statistics, mathematics for social science, computer science, interview techniques, or historiography.

   The level of competence needed for successful completion of the research is determined by the student's adviser. In some cases, it may be necessary for the student to show competence in both a language and relevant research skills.

3. If the candidate has not completed at least one year of previous undergraduate instruction, or 5 quarter units of previous graduate instruction in political theory, he or she must take 5 quarter units of graduate instruction in political theory.

4. All candidates must complete 5 units of statistical methods or its equivalent. Students who are in the field 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.

5. By the end of the third 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 fields 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 field 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 September 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.

6. When both the student and adviser feel that the student is ready, he or she takes one or two comprehensive examinations or completes one or two research papers, depending on the fields chosen. 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 late in Spring Quarter. Students should normally expect to complete these examinations and papers by the end of their second year.

7. During the sixth quarter, and upon completion of three out of four of the field requirements in his or her two major fields, 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.

8. 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.

9. A candidate for the Ph.D. in Political Science must serve as a teaching assistant (TA) in the department for three quarters. The student normally begins serving as a TA after the sixth quarter and completes service as a TA by the end of the ninth quarter.

10. 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.

11. 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.

12. The candidate must complete a dissertation satisfactory to the Dissertation Reading Committee and the University Committee on Graduate Studies.

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Ph.D. MINOR

Candidates in other departments offering a minor in Political Science select two fields 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 fields of political science, must be 200 level and above. All grades must be an LGI of "B" or better. Candidates are examined in their fields 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, Aut (Marshall)

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, Spr (Fraga)

20. Introduction to Comparative Politics—Introduction to basic concepts and theories of comparative politics (Marxist, Weberian, and Structural Functionalist) and to the major types of political systems: liberal democratic, communist, authoritarian. Countries studied: Britain, France, U. S. S. R., China, and Mexico.

5 units (Halpern) given 1992-93

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)

51D. Introduction to Political Philosophy—(Same as Philosophy 30, Public Policy 103A.) Concepts of equality, justice, tolerance, liberty, utility, and rights approached through major works in political philosophy. Each work presents a distinct and systematic conception of human nature and the social and economic conditions of a just association which expresses that nature. Readings: Hobbes, Locke, Mill, Marx, Rawls, and Nozick. DR:8(3)

5 units, Aut (Satz)

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 1992-93

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 section.
PUBLIC ADMINISTRATION AND PUBLIC POLICY
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.) Overview of the domestic policy-making process. Prerequisite: 10.
5 units, Spr (Staff)

106M. Bureaucratic Politics—Introduction to the organization, activity, and performance of public bureaucracy. Topics: presidential and congressional control, interest group influence, budgetary politics, and bureaucratic routines.
5 units, Win (Moe)

108. Organizational Leadership—(Same as Sociology 165, Business 379.) 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)

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.

112D. Readings in Political Science and International Relations in German—(Same as German Studies 52D.) 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.
3-4 units (Lohnes) given 1992-1993

112H. Politics of Korea—S. Korean politics from perspectives of: historical—the evolution of politics since 1945 involving the struggle and process of democratization in period from independence to military coup d'état in 1961, 1960s-70 where authoritarian politics accompanied rapid industrialization, and the 1950s which witnessed a democratization process in earnest; patterns and behavior—the nature of politics focusing on key elements (political parties, elections, students and dissidents, the military, "middle class," mass media, the business sector, labor, and the bureaucracy); politics as a dependent variable—the search for explanations (political culture, ideology, class structure and conflict, economic and social change, war and national division, external nexus, the "state," and legal and institutional arrangements; politics as an independent variable—the socio-economic consequences of political change (rapid industrialization, changes in class structure, ideology and values, and lifestyle.
5 units, Win (Han)

113A. Politics and Development in Latin America—Survey of the major political systems in Latin America (normally Brazil, Mexico, Cuba, and Argentina), the patterns of economic and social development associated with them, and their historical and international contexts. DR:9(5)
5 units, Spr (Pdckenham)

5 units (Okimoto) given 1992-93

114K. The Political Economy of Development—Introduction to major theories of political development, emphasizing interplay between economic and political processes, and national and international factors from Latin America, and also Africa and Asia. Cases include Brazil, China, Cuba, El Salvador, India, Taiwan, Nigeria, and Venezuela. DR:2(*) or 9(5)
5 units, Win (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, policymaking process, and state-society relations. DR:2(*) or 9(5*)
5 units, Win (Halpern)

116C. The Integration of Europe—Analysis of efforts reducing national barriers to trade and investment, promoting social exchange and geographic mobility, and creating common institutions and supra-national authorities in Europe since the 1950s. Emphasis on the European Coal and Steel Community, the European Economic Community, the European Free Trade Associa-
tion, and the recent commitment to “complete Europe’s Internal Market” by 1992. Lectures/discussion sections. Computer-assisted instruction introduces quantitative analysis of data on the unity and diversity of European countries.

5 units (Schmitter) given 1992-93

116L. The Social Foundations of Democracy—
(Same as Sociology 132.) Social, cultural, political, economic, and international factors favorable to the development and consolidation of democracy in historical and comparative perspective. Attention to worldwide development and re-emergence of democracy in the past decade. Case studies of the individual country’s experiences with democracy.

5 units, Spr (Diamond) MWF 11

117A,B. Eastern Europe in Transition—Analyzes the social, political, and economic development of E. European societies since 1945. Hungary is focus and serves as reference for the analysis of similar and contrasting developments in Poland and Czechoslovakia, the Soviet Union, and other E. European countries.

117A. 5 units, Win (Hankiss)

117B. 5 units, Spr (Hankiss)

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 U.S.S.R., and countries of the developing world.

5 units, Win (Rice)

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, problems in stimulating economic development, and cases of cooperation and conflict among African states.

5 units (Abernethy) given 1992-93

118B. Southern Africa: Race, Class and Political Change—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. Attention to domestic politics and foreign policy of South Africa. DR:2(*) or 9(5*)

5 units, Spr (Abernethy)

119A. The Soviet Union: Politics and Society since 1917—(Same as History 123A.) Major trends and events: political leadership, political process, social change and stratification, legitimacy and dissent, major conceptual frameworks used to explain the Soviet experience; alternative approaches and conflicting points of view.

DR:9(5)

5 units, Aut (Dallin)

121W. Seminar: Politics, Literature, and Film in Germany—Writers and filmmakers reveal different aspects of politics and social change, and provide new and often startling interpretations. Uses (in English translation) novels by Grass, Böll, Wolf, Lenz, Heym, and others, and contemporary German films, to analyze key political issues in the German states: the legacy of the past; the changing role of women; and challenges to secular and religious authority.

5 units (Weiler) given 1992-93

122G. Problems in Contemporary European Politics—Analysis of two issues of fundamental importance in contemporary W. European politics: political responses to economic decline and the balance of power between Left and Right-Thatcherism, Mitterrand’s socialist experiment, and the decline (?) of Scandinavian social democracy, and the politics of economic integration and the European free market of 1992—the tensions between domestic politics, the dynamics of the European Community, and broader international competition (the U. S. and E. Asia).

5 units (Garrett) given 1992-93

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, Win (Packenham)

125. Seminar: Rise of Industrial Asia—(Same as Economics 130, VTSS 152.) Interdisciplinary seminar on 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 instructors.

5 units, Aut (Lau, Lewis, Okimoto)

126F. Seminar: Politics and the Novel—Open only to juniors and seniors. Preference given to Political Science and International Relations majors. Examination of “realist” 20th-century works of fiction that deal with key political and social issues of our time. American and European novels are read with a view to understanding the conditions which produced them and their impact.

5 units, Spr (Fagen)

126K. Seminar: The United States and Central America—The crisis of development in Central America and the challenge it poses for U.S. policy towards Latin America. Emphasis on the historic roots of the crisis and the emergence of specific
policy dilemmas in the issue areas of democratization, national security, and human rights.

5 units (Karl) given 1992-93

127R. Ethnic Conflicts and Nation-States in the Contemporary World: The Ethnic Question in Comparative Perspective—(Same as Anthropology 141, Latin American Studies 180.) Overview of the major ethnic conflicts in the world: who is involved, what are the issues, how they are being handled. The reemergence of ethnic movements and the challenge to the nation-state. Principal theories accounting for ethnic conflicts and their critique. The question of individual and collective human rights, The international system (the UN and its specialized organs). Case studies from Eastern and Western Europe, Asia, Africa, Latin America, Canada, and the U. S.

5 units, Win (Stavenhagen)

128R. Agrarian Change, Marginality, and Human Rights in Latin America—(Same as Anthropology 104, Latin American Studies 128.) Introduction to agrarian change trends and urban marginality in Latin America, focusing on the characteristics of traditional peasant societies, land tenure systems, agrarian reforms and revolutions, peasant movements, agricultural modernization, rural to urban migrations, urban marginality and the informal sector, the problem of natural resources and ecological deterioration, foreign investments and state policies regarding the agricultural sector, the state and policies of urbanization. The relation of the above to the changing power structures and the human rights of peasantries, migrants, indigenous peoples and urban squatters.

5 units, Aut (Stavenhagen)

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, Religious Studies 158.) 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, Drekmeier, Moses, Noddings, Ross)

TTh 2:15-4:05 p.m. 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 (Sagan)

134B. American Foreign Economic Policy—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, VTSS 171.) Examines critical decisions made by the U. S. including development of the A-bomb and H-bomb, the crash development of the ICBM and SLBM after Sputnik, the decisions made in the wake of the energy crisis in the 70s, the space program, and current issues, e.g., high-density TV, the human genome project, and the
SDI program. How decisions to develop the A- and H-bombs were made in the U. S. S. R. and China, and comparison of the role of the U. S. and Soviet governments in their respective space programs. Focus: the process by which technical issues are synthesized into the decision process, and how they are explicated for the policymaker with no background in technology; the role of technical agencies, governmental committees, and science advisory boards and the way these groups interact to advise senior policymakers. Guest specialists lecture from business, technological, and governmental areas.

3 units, Aut (Perry) MW 4:15-5:30

136. Soviet Foreign Policy since 1917—(Same as History 122B.) 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 1992-93

138A. Security and Global Order—Introductory survey of international security relations since 1945, from the breakdown of the WWII alliance through recent political and military changes in the Soviet Union, Europe, and Asia. Lectures on development of nuclear weapons, arms competition, and efforts at arms control and disarmament in post-WWII period. Stresses political, technological, and conceptual problems of security policies and the emerging world order.

5 units, Win (Lewis, Staff) MTWThF 1:15

138B. Seminar: Security and Diplomacy.

5 units, Aut, 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 (Okimoto) given 1992-93

140A,B,C. Ethics of Development in a Global Environment (EDGE)—(Same as Engineering 297A,B,C.) Seminar with a series of speakers on current development issues emphasizing problems of the poorer nations. Autumn Quarter: basic world resources (energy, food, housing, population and environment), and the political development and dependencies of developing regions. Winter Quarter: international institutions and their roles—international banking, international business, U.S. and foreign universities, East-West political policies, and organizations of developing countries. Spring Quarter: the roles of individuals in national and international institutions dealing with the problems of developing countries. Speakers represent a range of political, professional, and national backgrounds and present candid and differing points of view. Gives students who plan to work in developing countries or in institutions dealing with developing countries a better knowledge of the challenges and issues. One unit credit for attendance of the speaker series; 3 units additional credit for optional workshops treating selected issues in more depth. (Sequential registration not required.)

1 or 4 units, Aut, Win, Spr (Lusignan) lecture W 7:30-10 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)

142G. Theories of International Relations: A European Perspective—For students with an interest in theories of international relations. Presents classical and contemporary texts focusing on perennial underlying issues of international politics. Establishes conceptual clarity and pulls together theories characterizing the field. Based on basic concepts, students try theory-building.

5 units, Aut (Gabriel)


5 units, Win (Sagan)

143K. Seminar: Democracy 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, Spr (Gaubatz)

144J. Seminar: America in Vietnam—The history and politics of American involvement in the Vietnam War. Emphasis 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, Win (Goldstein)
145L. Seminar: The Political Sociology of American Security Policy—(Same as Sociology 136.) By what internal social and political processes are the ends and means of national security policy determined? Utilizes system-, society-, and state-centered approaches (e.g., rational actor, neo-Marxist, and organizational) to explore goal-setting and the development of policy instruments in post-WWII American foreign and military policy. Issues: early Cold War strategy, U.S. intervention in Vietnam, the Gulf War, and thought and behavior of military organizations.
5 units, Spr (Eden) TTh 10-12

149. Directed Reading/Research in International Relations—Advanced individual study in international relations.
any quarter (Staff) by arrangement

POLITICAL THEORY

151A. History of Political Thought I: Ancient, Classical, and Christian Worlds—From the beginning of political speculation in preliterate societies to the Stoics; Greek thinkers are emphasized. Church/State controversies of the Medieval period.
5 units, Aut (Drekmeier)

151B. History of Political Thought II: Pre-Renaissance to Enlightenment—Focuses on the secularization of political thought and the development of liberal and republican ideas between the 14th and the 18th centuries. Readings from the works of Marsilius, Machiavelli, Luther, Calvin, Hobbes, Locke, Montesquieu, Hume and Rousseau.
5 units, Win (Okin)

152. 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: Arendt, Burke, Bentham, Dostoyevsky, Hegel, Marx, Melville, Mill, Nietzsche.
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, Gilmour, Piercy) and anti-utopias (Orwell, Le Guin, Borges). Limited enrollment. DR:8†(3)
5 units, Spr (Hansot)

154. Feminist Political Theory: Gender, Power, and Justice—Emphasis on recent feminist theories. How feminist perspective complicates and enhances political thought. Types of contemporary feminist thought and the effects of men's and women's different perspectives on moral, social, and political issues. DR:8†(3)
5 units, Win (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 1992-93

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)

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, Aut (Manley)

163. Seminar: Contemporary Issues in Feminist Thought—(Same as Feminist Studies 102C/202C.) Undergraduate seminar on 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. Prerequisite: Feminist Studies 101 or consent of instructor. DR:8t(3)
5 units, Aut (Hansot)

164. Seminar: Social Theory and Political Values—Authority and Freedom in Weber, Durkheim, and Freud—Their contributions to the understanding of political behavior, institutions, and values.
5 units, Win (Drekmeier)

165. Seminar: An Introduction to Marx and Socialist Thought—Study of Marx's key texts on capitalism, ideology, alienation, and historical development; and works of non-Marxist socialists (Fabian socialism, Owen). Why (or whether) socialism has failed in the U. S. ; and the role Marxism plays today in Latin American liberation theology. Limited enrollment.
5 units, Spr (Tunick)

169. Directed Reading/Research in Political Theory—Advanced individual study in political theory.
any quarter (Staff) by arrangement
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, and criminal procedure.

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 differential role and responsiveness of court as compared to other governing institutions. Prerequisites: 170 or 171 and junior standing, or consent of instructor.

5 units, Win (Barker) given 1992-93

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, Spr (Barker)

AMERICAN POLITICS

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, Win (Friedman) MTWTh 9

183D. The Politics of Welfare Policy—Contemporary welfare policy against the background of the politics of welfare policy development from the 16th to the 20th centuries. Why "insufficiency" is considered a problem for the community, and, therefore, a question to be addressed by public policy. The ideological roots of the problem of insufficiency and attitudes that constrain solutions to the problem. Cases from regimes as diverse as Henry VIII and President Carter.

5 units, Spr (Brody)

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, Win (Fraga)

187. The Social Sciences and Educational Analysis: 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 politics of reform emphasized.

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


3 units, Aut (Kirst) MWF 2:15

189. Voting in the American Electoral System—Focus is on the citizen; object is to make voting behavior comprehensible. What lies behind electoral participation, the turnout decision, the candidate choice, the voting decision? The effect of the legal context on behavior, the social background of the voter, partisanship, issue concerns, media effects, campaign and candidate effects. Voting behavior in primary and general elections, both Presidential and Congressional.

5 units (Brody) given 1992-93

191. Seminar: The President, the Press, the Public, and Politics—(Same as Communication 163.) Enrollment preference given to seniors. The interactions between the President, the media, and the public in contemporary American politics. Standard and new conceptions of the
sources of presidential power in policy making. Whether the evidence justifies the new conceptions of the role of President in the politics of policy making. Prerequisite: 101P or equivalent.

5 units, Win (Brody)

196A,B. 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, Win, 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

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, Win (Ferejohn)

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, Spr (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, Aut (Krehbiel)

202B. Seminar: Conflict and Cooperation—Mixed-motive situations in which individually rational behavior can produce collectively suboptimal outcomes. The paradigmatic example of this problem is the prisoner's dilemma. Analyzes various subtypes of dilemmas (two-person and n-person; with perfect and imperfect information, etc.), possibly other situations such as coordination games, chicken, etc., that exhibit the basic tension between individual and collective rationality.

5 units, Spr (Bendor)

203A. 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.

5 units, Win (Rivers)

203B. 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, Spr (Rivers)

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, Spr (Rivers)

PUBLIC ADMINISTRATION

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 (Moe)

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. International Perspectives on Organizations—(Same as Sociology 265, 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)

209. Directed Reading in Public Administration.

any quarter (Staff) by arrangement

COMPARATIVE POLITICS

212P. The Politics of Regional Cooperation and Integration—Open to advanced undergraduates and graduate students. Theory and practice of "regionalism," bilateral and multilateral efforts to resolve conflicts between countries peacefully, to increase mutual exchanges, and even to create supra-national institutions. Attention to the European Community, to the U.S.-Canadian Free Trade Area, and to recent experiences in Latin America.

5 units (Schmitter) given 1992-93

213. Graduate Seminar in Chinese Politics.

5 units, Spr (Lewis)


5 units (Okimoto) given 1992-93

215B. 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: 215A, or consent of instructor.

5 units (Okimoto) given 1992-93


5 units, Win (Rice)

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, Spr (Weiler)

221. Education and Political Change—(Same as Education 306B.) The relations between education and politics from a comparative perspective. Topics: different theoretical approaches to the study of education and politics, problems of legitimacy in educational policy, international factors in educational development, the politics of educational planning and reform, processes and conditions of political learning.

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

222. Decolonization in Asia and Africa, 1940-80—Comparison of the dynamics of decolonization and "new state" formation. Factors affecting the timing, speed, nature, and extent of violence in the decolonization process, and the character of the regime ruling the new state. Case studies: India/Pakistan, Indonesia, Indochina, Ghana, Ivory Coast, Algeria, Zambia, and Zimbabwe.

5 units, Spr (Abernethy)

223G. Seminar: Comparative Political Parties and Party Systems—Analyzes classics in the study of political parties: Downs, Duverger, Michels, Sartori, Lipset, and Rokkan. Recent developments in the literature, including Laver and Schofield on party coalitions, Przeworski and Tsebelis on party activists and party leaders, and Shepsle and Robertson on theories of party competition. The empirical focus is on advanced industrial democracies. Prerequisite: consent of instructor.

5 units (Garrett) given 1992-93

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, Spr (Packenham)

225. Seminar: Political Economy of Socialist Reform—The political economy of reform in selected socialist countries, including the U.S.S.R., China, and Eastern Europe. The political economy of the original Stalinist model; past efforts at economic reform in these countries; and the implications of recent political changes for the future of economic reform in the socialist world.

5 units, Spr (Halpern)

225A. Introduction to Comparative Political Economy—Introduces theoretical and empirical issues in comparative political economy. The merits of assessing applying rational choice-microeconomic approaches to substantive issues.
The role of the state, why people vote the way they do, the impact of parties on the economy, the "new" institutionalism and endogenizing political change; the interrelationships between governments and organized economic interests (capitalists and workers), analysis of state-socialist systems, and national choice reinterpretations of normative political philosophy.

5 units (Garrett) given 1992-93

225B. Seminar: Advanced Topics in Comparative Political Economy—For advanced graduate students. Examines contemporary scholarship on comparative political economy. The merits of microfoundational approaches to the interaction between the capitalist economy and democratic politics. Topics: impact of parties on the economy, politics of institutional change, coalitional politics, macroeconomics and microeconomics. Prerequisite: 225A or consent of instructor.

5 units (Garrett) given 1992-93

226C. Colloquium: Major Problems in Soviet Politics and Society—(Same as History 219.)

5 units, Aut (Dallin)

227H. Seminar: The Question of Freedom in Western and East European Societies—For graduate students in political science with background in philosophy, the history of ideas, cultural history, European studies, or E. European politics and sociology. The meaning and social role of freedom in various historical and social contexts. Topics: concepts of freedom in philosophy and social history, political vs. economic vs. social vs. spiritual freedom, the meaning and role of freedom in 20th-century Western and E. European societies, the "shock of freedom" in contemporary E. European societies.

5 units, Spr (Hankiss)

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 (Schmitter) given 1992-93

229. Directed Reading in Comparative Politics.

any quarter (Staff) by arrangement

INTERNATIONAL RELATIONS

236. The Soviet Union and the International System—The emergence of the Soviet Union as a superpower, and its possible decline. Domestic sources of Soviet power and policy, and the effects of international rivalry on the Soviet system. Topics: economic and technological bases of power; ideology and foreign policy; the armed forces and military doctrine; the Soviet Union in the world economy; Gorbachev's "new thinking"; Eastern Europe and Soviet security. Prerequisites: 136, History 122B, or consent of instructor.

5 units (Holloway) given 1992-93

242C. Seminar: The Neutrals in a Uniting Europe—European integration and the challenges and problems it poses for the neutral countries (Sweden, Austria, and Switzerland in particular). Neutrality's long history in Europe as part of the traditional balance of power system which is coming under increasing pressure with the advent of integration and, particularly, with the end of the Cold War. Graduate seminar familiarizes students with specific issues confronted by the European neutrals. Prerequisite: general knowledge of European politics and economics. Recommended: command of French and German.

5 units, Win (Gabriel)

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: 243 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. Research in International Relations—Graduate seminar for doctoral students working on international political economy, international security, or foreign policy research papers. Prerequisite: 243 or consent of instructors.

5 units, Aut (Goldstein)

245H. International Policy Studies: Core Seminar—Only for students taking the A.M. in International Policy Studies. The end of the Cold War and the transition to a new international system.

5 units (Holloway) given 1992-93

246. Colloquium: Nuclear Weapons and International Relations—Theories and History—(Same as History 261.) Theories of arms racing, deterrence, and 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)
Th 2:30-4:30

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, Spr (Gaubatz)

248. Seminar: The Politics of International Cooperation in Education—(Same as Education 207.) Analysis of policies and practices in international cooperation, assistance, and exchange. Emphasis on the role of international organizations (World Bank, UNESCO, OECD) and the politics of multilateral and bilateral assistance programs.

5 units, Sum (Weiler)

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.

250. Basic Texts in Modern Political Theory—Intended (not exclusively) for graduate students wishing a basic knowledge of the works of Machiavelli, Hobbes, Locke, Rousseau, and Marx. Lectures/discussions on conceptions of power, and legitimation and models of society.

5 units, Win (Drekmeier)

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, Aut (Drekmeier)

259A. Limits of Economic Rationality I: The Nature of the Social Bond—(Same as French 288A, Economics 100B.) Confrontation of three ways to account for society in an individualistic framework: the Social Contract (Hobbes, Rousseau); the "Invisible Hand" of the market (Smith, Walras); society as a crowd (Tarde, Freud, Keynes). Comparison with the Durkheimian tradition.

2-3 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 (Drekmeier) given 1992-93

264I. Seminar: Professions and Professional Ethics—Explores tensions between professional ethics and pressures in the workplace. How the structure of careers and implicit gender norms affect men and women differently.

5 units (Hansot) given 1992-93

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 1992-93

267. Seminar: Relativism and Justification—Open to advanced undergraduates and graduate students. How can we justify practices? Considers 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, Rawls, Harmon, Scanlon), and anthropology (Geertz, Sahlins).

5 units, Win (Tunick)

268. Seminar: Contemporary Theories of Justice—Social and political justice. Facilitates understanding of major contemporary debates in political theory. Analyzes major recent works that develop principles of justice and the political arrangements that best satisfy their requirements.

5 units, Spr (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, Win (Barker)
290A, B. Seminar: Voting Research—Models of the vote in survey data. Readings cover theories of voting behavior and empirical research on aspects of the vote. Students formulate and execute research projects; the preliminary stages of these research projects are discussed during the last six weeks. Prerequisites: undergraduates—189 or 292B; graduate students—292B or an equivalent course. Recommended: some familiarity with statistical data analysis.

5 units, Aut, Win (Brody)

292A. Seminar: American Political Institutions—Theories of American politics, interest groups, political parties, Federalism.

5 units, Aut (Ferejohn)

292B. Seminar: Introduction to Political Behavior—Analysis of public opinion, ideology, political tolerance and political values, racism, and voting.

5 units, Win (Sniderman)

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)

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 (Sagan)

306. Seminar: Advanced Organization Theory—(Same as Business 676, Sociology 365.) Topics in organization theory for advanced students. Prerequisite: consent of instructor.

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 field. 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 (Karl, Rice)

313F. Seminar: The Political Economy of National Development—Focus is on late-developing peripheral nations and problems of accumulation, distribution, state and class forces, and the international system as it affects development. Participants select a country and a problem and examine them in detail. Prerequisites: 311 and consent of instructor.

5 units (Fagen) given 1992-93

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 (Schmitter) given 1992-93

317R. Indigenous Peoples and the UN System—(Same as Latin American Studies 317.) The political impact of indigenous social movements. Constitutional changes and universal declarations, collective human rights, peoples' rights and the right to self-determination. Seminar explores these issues and relates them to current theoretical concerns about social movements, the nation-state and international relations.

5 units, Spr (Stavenhagen)

323. Seminar: Theories of Development—Literature-review seminar for graduate students in the social sciences and area studies. Analysis of major theoretical approaches and empirical studies regarding political, economic, and social development in national units.

5 units, Win (Packerham)

327A. Graduate Seminar on Soviet Politics—(Same as History 422A.)

5 units, Win (Dallin)

328. Knowledge and Legitimation: The National and International Politics of Social and Educational Research—(Same as Education 307.) For doctoral students. Research seminar on the relationship between knowledge and power, construed as a relationship of reciprocal legitimation. Readings, seminar discussions, and student research projects focus on the politics of research support, cooperation, and dissemination. Consent of instructor required.

5 units (Weiler) given 1992-93

370. Gender, Law, and Public Policy—(Same as Law 380.) Seminar explores ways social policies affect and are affected by gender. Topics: employment, reproductive rights, sexual violence, and the family. Taught intensively over a six or seven
week period when Law School semester and Spring Quarter overlap.
5 units, Win/Spr (Okin, Rhode)

380A,B,C. Workshop on Political Economy.
5 units, Aut, Win, Spr (Ferejohn)

401. Seminar: Graduate Orientation—Open to first-year graduate students in Political Science.
1 unit, Aut (Goldstein)

402. Seminar: Workshop on Research Design and Field Experience in Comparative Politics—Sequel to 311 for majors in comparative politics to prepare graduate students for the design of dissertation projects, the drafting of research proposals, and the conduct of field research.
5 units (Schmitter) given 1992-93

OVERSEAS STUDIES

These courses are approved for the Political Science major and taught overseas at the campus indicated. Students are encouraged to discuss with their major advisers which courses would best meet individual educational needs. Course descriptions can be found in the “Overseas Studies” section of this bulletin, or in the Overseas Studies office, 126 Sweet Hall.

35X. International Politics since 1945—Oxford. DR:9(5)
5 units, Aut (Moshaver)

4-5 units, Aut (Lacorne)

40X. International Relations of the Middle East—Oxford. DR:9(5)
5 units, Win (Moshaver)

4-5 units, Aut (Mayer)

115X. Technology, Economic Development, and Knowledge Formation—Florence. (Same as Economics 114X, VTSS 114T.) DR:9(5)
5 units, Win (Carnoy)

116X. A United Germany and a Europe in Transition—Berlin.
4-5 units, Spr (Basler)

121X. U.S. and Western Europe after WWII—Florence. (Same as History 135V.) DR:9(5)
4 units, Spr (Mammarella)

125X. Contemporary West European Politics—Florence. DR:9(5)
4 units, Spr (D’Alimonte)

126X. Italian Political System—Florence. DR:9(5)
4 units, Aut (D’Alimonte)

141V. European Imperialism and the Third World 1870-1970—Oxford. (Same as History 141V.)
5 units, Spr (Darwin)

5 units, Aut (Thomas)

153X. From Socialism to Capitalism in East Germany: A Political Economy Approach—Berlin. (Same as Economics 126X.) DR:9(5)
4-5 units, Aut (Krueger)

156X. The Transition of Communism in Eastern Europe—Krakow.
4 units, Spr (Wasilewski)

158X. Italy: From an Agrarian to a Post-Industrial Society—Florence. (Same as History 106V.) DR:9(5)
4 units, Win (Mammarella)

218X. European Integration and 1992—Florence. DR:9(5)
4-5 units, Win (D’Alimonte)

MORRISON INSTITUTE FOR POPULATION AND RESOURCE STUDIES

Faculty: Marcus W. Feldman, Director (Biological Sciences), Sandra O. Archibald (Food Research), W. Brian Arthur (Food Research), Partha Dasgupta (Economics), Kingsley Davis (Hoover Institution), Carl Djerassi (Chemistry), William Durham (Anthropology), Paul R. Ehrlich (Biology), Shripad Tuljapurkar (Biological Sciences)

Although Stanford University does not currently have a formal degree program in population studies, it does have scholars of international reputation in such specialties as population biology, population genetics, epidemiology, demographic methods, demographic history, economic demography, 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**

   5 units (Staff)
   alternate years, given 1992-93

164. Ecological Anthropology—(Same as Human Biology 134.)
   3-5 units, Spr (Charnley)

168. Medical Anthropology—(Same as Human Biology 168.)
   5 units, Aut (Barnett)

**BIOLOGICAL SCIENCES**

117. Biology and Global Change.
   3 units, Win (Vitousek, Mooney)

175H. Problems in Marine Biology.
   15 units, Spr (Baxter, Denny, Epel, Gilly, Powers, S. Thompson)

176. Principles of Ecology—(Same as Geophysics 176.)
   3 units (Roughgarden)
   alternate years, given 1992-93

183. Colloquium on Population Studies—(Same as Food Research 188/288, Human Biology 60.)
   1 unit, Win (Feldman, Arthur)

188. Ecosystems of the Tropics.
   2-3 units (Vitousek)
   alternate years, given 1992-93

190. Population Biology of Butterflies—Must be registered in Winter Quarter to get credit for fieldwork in Spring.
   2-5 units (Ehrlich)
   alternate years, given 1992-93

   1-3 units, Aut, Win, Spr (J. Thomas, Ehrlich, Field, Vitousek)

286. Seminar in Theoretical Ecology—(Same as Geophysics 185Y/385Y.)
   2 units, Spr (Roughgarden)

   1-3 units, Aut, Win, Spr (Ehrlich)

   1-3 units, Aut, Win, Spr (Ehrlich, Roughgarden, J. Thomas, Vitousek, Watt)

   1-3 units, Spr (Feldman)

   1-3 units, Aut, Win, Spr (Roughgarden)

**ECONOMICS**

119. Development and Population Interactions in the Third World—(Same as Food Research 121.)
   5 units, Win (Yotopoulos)

133. Population Perspectives in the Third World—(Same as Food Research 136/236, Human Biology 136, Sociology 53.)
   5 units, Spr (Arthur)

143. Economics of Biological Resources—(Same as Public Policy 143.)
   5 units, Win (G. Brown)

**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, Fagen, Gupta)

**GENETICS**

205. Human Population Genetics and Genetic Epidemiology.
   3 units, Aut (Cavalli-Sforza)
   alternate years, not given 1992-93

**HEALTH RESEARCH AND POLICY**

270. International Health.
   2-4 units, Spr (Basch)

**HUMAN BIOLOGY**

120. Human Nutrition.
   4 units, Aut (Butterfield)

148. Environmental Policy.
   3 units, Spr (A. Ehrlich)

150. Gender-Specific Perspectives on Birth Control—(Same as Feminist Studies 145.)
   6 units (Djerassi)
   alternate years, given 1992-93

**MATHEMATICS**

126/226. Mathematical Models in Population Biology—(Same as Biology 279.)
   3 units (Karrin, Feldman)
   alternate years, given 1992-93
PSYCHOLOGY

Emeriti: (Professors) Albert H. Hastorf, Ernest R. Hilgard, Douglas H. Lawrence, Eleanor E. Maccoby
Chair: Mark R. Lepper
Assistant Professors: Laura L. Carstensen, Anne Fernald, John D. E. Gabrieli, David J. Heeger, Susan K. Nolen-Hoeksema, Felicia Pratto
Senior Lecturer: Lyn Carlsmith (on leave 1991-92)
Affiliated Faculty: Maureen Callanari, Stuart Card, Douglas Daher, Vincent D’Andrea, Sam Edwards, Ronald Kaplan, Alejandro Martinez, Robert Matano, Thomas Moran, Charles Robert, Marilyn Reed-Hoskins, Barbaranne Shepard, Andrew B. Watson
Visiting Lecturers: Douglas Lisle, 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.

Group A: 102, 106, 107, 109, 120, 146, 148, 163
Group B: 111, 113, 115, 116, 121, 130, 136

The course lists for the two groups may change from year to year. Students should check with the Academic Assistant.

At least 35 of the 45 units of Psychology must be taken in courses other than independent study and practica. Independent study and practica courses (104, 167, 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.

SENIOR 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.

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.

GRADUATE PROGRAMS

There are no specific course requirements for admission to the doctoral program. However, an applicant should have research experience as an undergraduate, as well as the equivalent of an undergraduate major in psychology. The major focus of the doctoral program is on research training, and admission is highly selective.

Applicants for admission must submit their scores on the Graduate Record Examination (both general and psychology tests) as part of the application. This examination may be taken at most universities and colleges.

MASTER OF ARTS

The Department of Psychology offers an A.M. program only to students who are concurrently enrolled in another doctoral or professional program at Stanford. Students can be admitted to the master's program by submitting an application to the Department of Psychology's Graduate Education Committee. Applicants are admitted based on undergraduate transcripts, letters of recommendation, graduate record exams, and the agreement of a member of the psychology faculty to serve as an adviser.

Candidates for the A.M. degree must take Psychology 252 and five courses from the departmental core group defined in the Ph.D. program requirements. Students must complete 36 units in psychology at Stanford. Serving as a teaching assistant for Psychology 1 or 60 (by registering for 257A—Practicum in Teaching) may be substituted for one 3-unit course. Beyond the course work, master's students must complete a thesis under supervision of their psychology faculty adviser.
DOCTOR OF PHILOSOPHY

In addition to fulfilling the residence requirement for the degree, the following requirements are stipulated:

First-Year Course Requirement—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
209. Perception
210. Human Memory and Learning
214. Psycholinguistics
215. Mathematical Psychology
218. Mathematical Representation of Structures in Psychological Data
256. Decision and Judgment

GROUP B
211. Advanced Developmental Psychology
212. Social Psychology
213. Personality
216. Abnormal Psychology
254. Personality Change

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 Requirement—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 firsthand knowledge of, and practical experience with, the methods of psychological investigation and study. These methods do not exist in the abstract; they are ways of behaving with the people or animals who are being studied. They are skills and require guided practice for their perfection. Students are provided with whatever opportunities they need to reach those levels of competence representative of doctoral standing.

Continuing research programs, sponsored by members of the faculty, offer direct opportunities for experience in fields represented by the faculty’s many research interests.

Each student achieves competence in unique ways and rates. Each student and adviser share in planning a program leading to the objectives discussed. The student is expected to spend half of his or her time on research and normally takes no more than 9 units of course work per quarter.

FELLOWSHIPS, SCHOLARSHIPS, AND ASSISTANTSHIPS

Research and teaching assistantships, United States Public Health Service traineeships, and some University fellowships are available. The type of support offered may vary from year to year. The department, of course, depends on the fact that a number of its students receive outside awards. Qualified applicants are asked to take initiative in applying for predoctoral fellowships from the National Science Foundation, the Danforth Foundation, Ford Foundation, and the United States Public Health Service, among others. Applications may be made by college seniors planning to work for a higher degree. Students should apply early in Autumn Quarter of the senior year. For information concerning application forms and procedures, consult representatives from the financial awards office of your home institution.

TEACHING REQUIREMENT

The department views experience in supervised teaching as an integral part of its graduate program. Regardless of the source of financial support, all students serve as teaching assistants for four Psychology courses during their graduate study. Of the four courses, one of them should be Psychology 1, General Psychology, and another should be Psychology 60, Statistical Methods.

Students are discouraged from participating in teaching the first year of graduate study. Students typically progress from closely supervised teaching to more independent work. They usually begin by teaching sections of General Psychology and Statistics and then progress to more advanced courses in their area of specialization. They may offer a supervised, but essentially independent, seminar during their final year of graduate study.

Ph.D. MINOR

Candidates for the Ph.D. degree in other departments may elect a minor in psychology. To obtain a minor, the student must complete 20 units of course work at the graduate level in the Department of Psychology. 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 Session issued annually in February.

OPEN TO ALL STUDENTS

Additional courses not listed here are frequently offered in the areas of their special research competence by selected postdoctoral or terminal Ph.D. personnel. These are listed in the quarterly Time Schedules, and the course descriptions are circulated in advance.

1. Introduction to Psychology—Survey of theories and research in the major areas of psychology. Topics: brain and behavior, perception, learning, cognition, child development, psychopathology, and social psychology. DR:9(4)
   3-5 units, Aut, Spr (A. Fernald) TTh 11-12:15
   Win (Carstensen) TTh 10-11:15

2. Current Research in Psychology—Weekly seminars by faculty members on current research topics in psychology. Enrollment limited to declared Psychology majors. Prerequisite: prior or concurrent enrollment in 1.
   1 unit, Aut, Spr (A. Fernald, Staff) T 3:15-4:15

60. Statistical Methods—The elements of statistical description (measures of average variation, correlation, etc.). Develops an understanding of statistical inference. Emphasis 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, Spr (Listle) MTWThF 9

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:5(7) or 9(4)
   3 units, Win (Wandell) MWF 3:15-4:45

103A. Visual Sensing by Humans and Computers—(Graduate students register for 203A.) Topics in basic visual science including the physiology of human vision, basic human visual performance, and computational algorithms that characterize physiology and performance. Prerequisites: 102 or equivalent, calculus. DR:5(7)
   3 units, Spr (Wandell) TTh 3:15-4:45

103B. Visual Sensing by Humans and Computers—(Graduate students register for 203B.) Topics in the application of visual science to the design of images (television, computer terminals, avionics displays) for viewing, and the design of sensor systems for analyzing the content of image data (assembly line part inspection, object recognition). Prerequisites: 102 or equivalent; calculus.
   3 units (Wandell) not given 1991-92

104. Special Laboratory Projects—Independent study. Satisfactory/No Credit. Can be repeated for credit. Prerequisites: 1 and 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. Introduction to the Nervous System: 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. The Neuropsychology of Perception, Attention, and Memory—(Graduate students register for 209.) Analysis of the structure of our sensations and memories as determined by physiological encoding mechanisms. Examination of neuronal machines which produce our percep-
tion of color, brightness, movement, shape, and the selective attention and deposition-into-memory of those events. Prerequisite: 1 or equivalent.

4 units, Spr (Canz.) TTh 11-12:30

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:9†(4)

3 or 5 units, Aut (Flavell) MWF 11

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, Win (Lisle) MWF 11

114. Introduction to the Nervous System: Ion Transport and Intracellular Messengers—Ion channels, carriers, and ion pumps, and their regulation by intracellular messengers in a variety of cell types. Prerequisite: consent of the instructor. Recommended: introductory 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, not given 1991-92

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:9†(4)

3 units, Aut (Carstensen) TTh 10-11:30

117. Observation of Children—Seminar on learning about children through guided observations at Bing School, Stanford's Child Development Laboratory School. Physical, emotional, social, cognitive, and language development studied. Recommended: 111.

3-5 units, Win, Spr (Chandler)

Th 4-5:30 and by arrangement

118. Development in Early Childhood—Supervised experience with young children at Bing School, Stanford's Child Development Laboratory School. Three units involves four hours per week in Bing classrooms throughout the quarter; 4 units involves seven hours per week; 5 units involves 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)

T 4-5:30 and by arrangement

120. Cognitive Development—Topics and issues on cognitive development, developmental changes in memory, conceptual organization, logical reasoning, and communication skills. Prerequisite: 1. DR:9†(4)

3 units, Spr (Markman) MWF 10

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:9†(4)

4 units, Win (Pratto) TTh 11-12:15

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 indicators of what children value, and as indicators of where our society is headed. Writers and illustrators: Maurice Sendak, A. A. Milne, Russell Hoban, and E. B. White, etc. Fairy tales are discussed from several viewpoints including the psychoanalytic represented by Bruno Bettelheim. Enrollment limited to 20. Prerequisites: 1 or 117, and consent of instructor.

3 units, Win (B. Shepard) TTh 1:15-2:30


4 units each quarter, Aut/Win or Win/Spr (Carstensen) Th 2:15-4:15

125. Psychology and Law—(Same as Law 104.) Legal, psychological, and popular views of morality, responsibility, equity, intention, insanity, evidence, crime and punishment; the police; psychological processes in jury deliberation; homicide and aggression; treatment of accused persons.

3 units, Aut (Rosenhan) TTh 8:30-9:45

127. Afro-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, Aut (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, Win (M. Lepper) TTh 2:30-4:30

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.

3-4 units (A. Fernald) not given 1991-92

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, Win (Nolen-Hoeksema) TTh 1:15-2:30

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.

3-4 units, Spr (Nolen-Hoeksema) MWF 11

137. The Interpersonal Basis of Abnormal Behavior—The role of interpersonal problems and processes in producing different forms of psychopathology, from neurotic reactions to schizophrenia. Combines clinical (case study) approach with conventional empirical approaches to clarify the origin, nature, and treatment of emotional disorders. Prerequisite: 136.

3 units, Spr (Horowitz) TTh 9:30-11

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

142. Peace Studies—(Same as Education 173X, History 154, Political Science 133, Religious Studies 158, 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. 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 on behalf of peace. Lectures on how our world is changing; the nature of peace and peaceful processes; peace at the operational level (the causes of war, building negative peace, building positive peace); peace—moral and normative considerations; peace and you.

5 units, Spr (Bernstein, Bland, Drekmeier, Dornbusch, Moses, Noddings, Ross) TTh 2:15-4:05 and by arrangement

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 adaptations in animal systems.

3 units, Aut (R. Fernald) TTh 8:40-9:55
151. Computational Models of Cognitive Development—Classical and recent procedural/process models of learning that specifically address human developmental phenomena. Detailed study of models, and the psychological data that each model is intended to capture. Topics: quantification and arithmetic development, acquisition of syntax and semantics (including concept acquisition), acquisition of perceptual and qualitative physical knowledge, neo-Piagetian models, and various modeling technologies (e.g., production systems, connectionism, concept induction). Programming is not required, but participants should have experience with programming and be comfortable thinking about process models.

3 units, Win (Shrager) TTh 1:15-3:45

152. Statistical Methods for Behavioral and Social Sciences—For undergraduates; see 252.

153. Statistical Theory, Models, and Methodology—(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; examples relating to other social institutions. 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.

3 units (Snow) not given 1991-92

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) MW 1:15-2:30


3 units, Aut (Rumelhart) TTh 9-10:15

163. Mathematical Models of Psychological Processes—(See 215.)

164. Mathematical Representation of Structures in Psychological Data—(See 218.)

167A. Peer Counseling: Bridge Community—Instruction in peer counseling. Topics: verbal and non-verbal attending and communication skills, the use of open and closed questions, working with feelings, and summarization and integration. Instruction through lectures, individual training, group exercises and discussion, role play, and videotaped practice. Students develop and apply the above skills in a variety of contexts. Enroll for credit in only one quarter.

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 videotape practice.

2 units, Aut, Spr (Martinez) M 3:15-5:05 section by arrangement

167C. Peer Counseling: The Black 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 3-5, W 4-5

167D. Peer Counseling: Contraceptive Advising—Preference is given to students who make a commitment to staff at the Contraceptive Information Center in subsequent quarters, but all interested students are encouraged to enroll as space permits. Trains staffers for the student-run Contraceptive Information Center at Cowell. Instructors and guest speakers provide a thorough training in contraceptive issues. Topics: reproductive anatomy and physiology; the effectiveness, mechanism of action, and usage of available birth control methods; all aspects of abortion; and counseling techniques. Also, sexually transmissi-
ble diseases, future methods of contraception, and sexuality.

 3 units, Aut, Win, Spr (Cowell Staff)  
  T 7-10 p.m.

167F. Peer Counseling: Asian Community—Instruction in peer counseling with Asian students. Topics: the Asian family structure, concepts of identity, ethnicity, culture, and racism in terms of their impact on individual development and the counseling process. Emphasizes the development of an appreciation and empathic understanding of Asians in America. Lectures, readings, discussion, and group exercises.

 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 (Staff) 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.

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. Prerequisite: 167A, B, or C.

 3 units, Spr (Matano) M 2:15-4

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 are explored through expert guest presentations and student group discussions.

 3 units, Spr (Staff) TTh 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 the data needed to formulate policy changes. Enrollment limited.

 4 units, Aut (Hastorf, Scott) TTh 11-12:15

178. Psychological Analysis of Time Perspective—Analysis of the ways in which individual differences in time perspective influence emotions, motivation, cognitive functioning, and a range of behavioral choices. The origins, correlates, and consequences of biased time perspectives. Research teams within the class design, execute, analyze, and write an original investigation on the topic.

 3-4 units (Zimbardo) not given 1991-92

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 con-strual 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, Spr (Steele)

180. Undergraduate Seminar: Selected Topics in Psychology—(Refer to quarterly Time Schedule for seminar listings.)

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 and Spring Quarters: complete the research and write the thesis. Students present their completed projects at a convention near the end of Spring Quarter.

 4 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 (Carlsmith) not given 1991-92

185A,B,C. Experience-based Study on the Meaning of Being Handicapped—Comprehensive look at a number of handicaps; 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 handicapped person. Weekly seminars; students also teach swimming and/or other skills to children and adults with different handicaps (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)

188. Reading and Special Work—Independent study. Satisfactory/No Credit. Can be repeated for credit. Prerequisite: consent of instructor.

1-3 units, any quarter (Staff)

189. Behavioral Endocrinology—(Same as Human Biology 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 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. Prerequisite: Human Biology core, or consent of the instructor.

3 units, Win (Levine) TTh 3:15

not given 1992-93

190. Early Experience—(Same as Human Biology 143.) Experimental literature related to the effects of pre- and postnatal environmental factors on development and adult function. Animal and human research, and behavioral and psychological function. Prerequisite: consent of instructor.

3 units (Levine)

alternate years, given 1992-93

191. Undergraduate Seminar: Personal and Social Change—Analysis of social cognitive approaches to personal and social change. Applications to the modification of psychological dysfunctions in familial, educational, organizational, and clinical settings. Ethical and value issues in behavior change. Prerequisite: consent of instructor.

3 units, Win (Bandura) T 2:15-4

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 nuclear deterrence doctrines. Prerequisite: consent of instructor.

3 units, Spr (Bandura) M 2:15-4

193. Undergraduate Seminar: 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. Prerequisite: 121.

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

194. Undergraduate Seminar: Development of Children's Knowledge about the Mind—Prerequisite: consent of instructor.

3 units (Flavell)

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 women and gender. Prerequisite: 116.

3 units (Carstensen) not given 1991-92

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 1991-92


3 units, Spr (Rumelhart) TTh 10:30-12

PRIMARILY FOR GRADUATE STUDENTS

Undergraduate students admitted only by consent of instructor.
203A. Visual Sensing by Humans and Computers—(See 103A.)
203B. Visual Sensing by Humans and Computers—(See 103B.)

206. Behavioral Neuroscience—The biological substrates of behavior emphasizing topics currently being investigated by resident and visiting neuroscientists at Stanford. Example 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 1992-93

207. Proseminar for First-Year Graduate Students—Survey of major issues in contemporary psychology with their historical backgrounds. Required of and limited to first-year graduate students in psychology.
3 units, Aut (M. Lepper) 10-11:30

209. The Neuropsychology of Perception, Attention, and Memory—(See 109.)

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.
3 units, Aut (Bower) MW 10-12

211. Developmental Psychology—Prerequisite: graduate standing in psychology or consent of instructor.
3 units, Win (A. Fernald, Flavell, Markman) TTh 3:15-4:45

212. Social Psychology—Prerequisite: graduate standing in psychology or consent of instructor.
3 units, Aut (M. Lepper, Ross) TTh 1:15-3:05

213. Personality—Survey of methodologies appropriate for personality research: relations among major theoretical perspectives: parental, peer, and genetic influences; mediating cognitive and emotional processes; and applications to clinical, community, and health psychology. Prerequisite: graduate standing or consent of instructor.
3 units (Staff) not given 1991-92

214. Psycholinguistics—(Same as Linguistics 246.) Prerequisite: graduate standing in Psychology or consent of instructor.
3 units, Spr (H. Clark) TTh 1:15-2:30

215. Mathematical Models of Psychological Processes—(Undergraduates register for 163.) Survey of uses of mathematical models in psychology emphasizing measurement theory, perception, and learning. Prerequisite: graduate standing in psychology or consent of instructor.
3 units (A. Toersky, Wandell) alternate years, given 1992-93

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 or consent of the instructor.
3 units, Win (Horowitz) TTh 9:30-11

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.
3 units, Aut (R. Shepard) TTh 3:15-4:45

219. Graduate Seminar on Selected Topics in Cognition—Prerequisite: consent of instructor.
3 units, Aut (B. Tversky) T 3:15-5

220. Graduate Seminar: Special Topics in Cognitive Development.
3 units, Aut (Markman) alternate years, not given 1992-93

224. Survey of Research Topics in Artificial Intelligence—(Same as Computer Science 520.) Topics vary yearly. Some 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 research topics. Prerequisite: Computer Science 121 or 221, or equivalent.
1 unit, Spr (Staff) T 11

225. Psychology and Law Proseminar—(Same as Law 345.) 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.
3 units (Rosenhan) not given 1991-92

228. Ion Transport—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).
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, Win (Foster) TTh 4:15-6:05 bi-weekly.


4 units, Win (Thoresen) TTh 12:15-2:05 alternate years, not given 1992-93

234. The Affective Disorders—(See 134.)

236. Graduate Seminar on the Development of Children's Knowledge About the Mind—Pre-requisite: graduate standing in psychology or consent of instructor.

3 units (Flavell) alternate years, given 1992-93

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.

3 units (Krumholz) alternate years, given 1992-93

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.

3 units (Flavell) alternate years, given 1992-93

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.

4 units, Aut (E. Clark) M 2:15-4:45 alternate years, not given 1992-93

241. Language Acquisition II: Morphology—(Same as Linguistics 241.) Focus is on verbs, overregularization, stem choices, suppletion, inflectional patterns, tense, aspect, person, number; and agreement systems in acquisition.

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.

3 units (Markman) alternate years, given 1992-93


1-2 units, Win (A. Fernald, Flavell, Markman) by arrangement

244. 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: 60 or Statistics 60, or equivalent.

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: 152 and 248, or Education 250B and 252, or equivalent.

3 units (Haertel) alternate years, given 1992-93

249B. Problems in Measurement: Factor Analysis—(Same as Education 353B.) Models, methods, and applications of factor analysis. Models for factor analysis; estimation procedures; factor rotation; factor scores; using factor analysis in research; confirmatory factor analysis, methods for dichotomous variables. Prerequisites: 152 and 248, or Education 250B and 252, or equivalent.

3 units, Aut (Haertel) MW 9-10:30 alternate years, not given 1992-93

250. Individual Counseling Psychology Methods—(Same as Education 227S.) Techniques for helping individual clients learn successful procedures for coping with problems, e.g., shyness, depression, anxiety, obesity, and aggression.

3 units, Spr (Foster) W 1:15-4:05


252. Statistical Methods for Behavioral and Social Sciences—(Undergraduates register for 152; same as Education 257X.) 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. Prerequisite: Statistics 60/160.

5 units, Win (Rogosa) 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, factor analysis, discriminant analysis, and multivariate analysis of variance. Students analyze and report on several data sets, including their own (if possible).

3 units, Spr (Pratto) MWF 9

254. Principles of Personality Change—Analysis of the determinants and mechanisms of human motivation and psychological disfunctions. Social cognitive approaches to personal and social change. Prerequisite: graduate standing.

3 units (Bandura) not given 1991-92

255. Graduate Seminar: Selected Topics in Personality and Abnormal Psychology—Prerequisite: consent of instructor.

3 units, Aut (Horowitz) by arrangement

256. Decision and Judgment—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

257A. 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

258. Graduate Seminar in Social Psychology Research—For students who are already or planning to become involved in research on social construal and the role that it plays in a wide variety of phenomena, most notably the origin and escalation of conflict.

1-3 units, Win, Spr (Ross)

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.

3 units (Greeno)
alternate years, given 1992-93

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.

3 units, Win (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.

3 units, Win (Rumelhart) W 12-3

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 of 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.

4 units, Win (Matthews, Pierce, Shepard) Th 9-11

269. Graduate Seminar in Personality Research—Can be repeated for credit. Prerequisite: graduate standing in psychology.

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

270. Special Topics in Social Psychology—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.

3 units, Win (Steele, Ross)

272. Special Topics in Psycholinguistics—May be repeated for credit. Prerequisite: consent of instructor.

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 de-
terminant 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 4:5-3:30

275. Graduate Research—Research of intermediate nature; undertaken with members of departmental faculty. Prerequisite: consent of instructor.

(Staff) by arrangement

278. Graduate Seminar: Internal Representation—Can be repeated for credit. Prerequisite: consent of instructor.

1-3 units, Win (R. Shepard) W 1:15-3:15

279. Theoretical Approaches in Social Psychology—The field of social psychology organized by the theories and systems that tie together its 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, Spr (Steele)

280. Doctoral Research—For dissertation. Prerequisite: consent of instructor.

(Staff) by arrangement


1-2 units, Win (Arrow, Mnookin, Ross, A. Tversky, Wilson) T 4-6

285. Modeling of Knowledge and Cognitive Processes—(Same as Education 285.) Introduction to methods and concepts of constructing and testing cognitive models to explain performance in tasks such as reading, reasoning, and problem solving. Case studies analyzed and methods applied in individual student's research. Prerequisite: course in cognitive psychology or artificial intelligence, and a plan for research that includes development of a cognitive model.

3 units, Spr (Greeno) MW 3:15-4:40

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 1992-93

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.

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

351. Issues in Child Custody—(Same as Law 244.) How information from psychology and other behavioral sciences can be utilized in the development of legal policies affecting children, primarily child custody decisions. Applies existing knowledge about child development to the resolution of policy issues in each of these areas and designs research projects that provide new data relevant to policy makers. Seminar limited to 20 graduate and Law students. Admission by consent of instructors.

3 units, Aut (Maccoby, Wald) T 3:20-5:20

355. Jury Decision-Making—(Same as Law 327.) 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 units, Aut semester (Rosenhan) W 3:20-6:20

PUBLIC POLICY PROGRAM

Director: Roger Noll
Acting Director: David Brady
Associate Director: Barry Weingast
Affiliated Faculty: Lucious Barker (Political Science), David Brady (Political Science), Richard Brody (Political Science), Gardner Brown (Public Policy), Partha Dasgupta (Economics and Philosophy), Marcus Feldman (Biology), John Ferejohn (Political Science), Luis Fraga (Political Science), Victor Fuchs (Economics), Judith Goldstein (Political Science), Carl Gotsch (Food Research), Barry Keene (Public Policy), Michael Kirt (Education), Robert McGinn (VTSS), Catherine Milton (Public Policy), Terry Moe (Political Science), Lincoln Moses (Statistics), Sharyn O'Halloran (Public Policy), Leonard Ortolano (Civil Engineering), A. Mitchell Polinsky (Law), Nathan Rosenberg (Economics), Geoffrey Rothwell (Economics), Debra Satz (Philosophy), W. Richard Scott (Sociology), Bernard Siegel (Anthropology), Timothy Stanton (Public Policy), James Sweeney (Engineering Economic Systems), Nancy Tuma (Sociology), Michael Wald (Law)
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 non-profit 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 PROGRAM
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. The fields of concentration are:

- Advanced Methods of Policy Analysis
- Design of Public Institutions
- Developing Areas
- Education
- Government Regulation of Business
- 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 73 units of course work:

1. Thirty units of prerequisite courses: Statistics 60 and either Statistics 61 or Economics 102; Economics 1, 51 or 51Q, 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 the beginning of Autumn Quarter in the senior year.

4. Seniors are also required to participate in the year long 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. Seniors may also write an honors thesis, which requires obtaining approval from a thesis adviser and taking at least 10 units of thesis research (Public Policy 199). Students must apply for admission to the honors program no later than the first week of the Autumn Quarter of their senior year.

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, 180, 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 at Building 60, room 61D. For additional information drop by or phone (415) 723-4551.

COURSES

101. Politics and Public Policy—(Same as Political Science 101P.) The domestic policy-making process, emphasizing how elected officials, bureaucrats, and interest groups shape governmental policies in various areas including tax policy, environmental policy, 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.

5 units, Spr (Staff)

102. Organizations and Public Policy—(Same as Sociology 166.) Concepts and methods for analyzing the influence of organizations on the setting and implementation of public policy. Varying conceptions of organizations as corporate actors and as social contexts. Roles of organizations in relation to public policy: organizations as decision makers and problem solvers, as change agents, and as clients. Prerequisite: Industrial Engineering 100 or Sociology 160.

5 units, Win (Noll, Weingast) MTWThF 11

103A. Introduction to Political Philosophy—(Same as Philosophy 30, Political Science 51D.) Concepts of equality, justice, tolerance, liberty, utility, and rights approached through major works in political philosophy. Each work presents a distinct and systematic conception of human nature and social and economic conditions of a just association which expresses that nature. Readings: Hobbes, Locke, Mill, Marx, Rawls, and Nozick. DR:8(3)

5 units, Aut (Satz) MWF 11 plus section

103B. Philosophical and Ethical Issues in Public Policy—(Same as VTSS 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: nature of ethics and morality; 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 (abortion, euthanasia, in vitro fertilization, pre-determination of sex of offspring, and genetic testing); environmental affairs (endangered species, wilderness and landmark preservation, coastal development, noise, and high-rise proliferation); work policy (privacy, "whistle-blowing," worker participation); and international relations (warfare, food and development aid, immigration, and repatriation of artistic patrimony). DR:8(3)

5 units, Win (McGinn) MTW 2:15-3:05

2-hour section by arrangement

104. Economics and Public Policy—(Same as Economics 150.) The relationship between economic analysis and economic policies. Economic rationales for public policies; methods and techniques of policy evaluation and the role of benefit-cost analysis; economic models of political processes and their connection to the analysis of economic policy-making; and the relationship of income distribution issues to policy choice. How economic analysis is done, and why the political process regards it as useful but not as necessarily determinative of policy choices. Readings: the theoretical foundations of economic policy analysis and policy decisions, and the analysis of the adoption and implementation of programs in a variety of policy areas. Prerequisites: 51, 52 (52 may be taken concurrently).

5 units, Win (Noll, Weingast) MTWThF 11

105. Quantitative Methods and Their Application to Public Policy—(Same as Health Research and Policy 207, Statistics 209.) 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: Statistics 60 or equivalent, Statistics 61.

5 units, Spr (Moses) MW 8-10

106. Bureaucratic Politics—(Enroll in Political Science 106M.)

5 units, Win (Moe)

108. Organizational Leadership—(Enroll in Political Science 108, Sociology 165, Business 379.)

5 units, Aut (March)

109. Political Analysis—(Enroll in Political Science 101, Business 338.)

5 units, Win (Bendor)

110. Introduction to Urban Studies—(Enroll in Urban Studies 110.)

4 units, Aut (Stout)

112. Science, Technology, and Contemporary Society—(Enroll in VTSS 101.) DR:9(5)

4-5 units, Aut (McGinn)

113. Technology and Economic Change—(Enroll in Economics 113, VTSS 107.) DR:9(5)

4-5 units, Spr (Rosenberg)

114. The Political Economy of Development—(Enroll in Political Science 114K.) DR:2(*) or 9(5)

5 units, Win (Karl)

118. The Economics of Development—(Enroll in Economics 118.)

5 units, Spr (Kochar)

120. Poverty and Public Policy in America—(Enroll in Sociology 105.)

3-5 units, not given 1991-92

125. Seminar: The Rise of Industrial Asia—(Enroll in Political Science 125, Economics 130, VTSS 152.)

5 units, Aut (Lau, Lewis, Okimoto)
125L. Psychology and Law—(Enroll in Law 104, Psychology 125.)
3 units, Aut (Rosenhan)

3 units, not given 1991-92

129. Planning and Analysis of Development Projects—(Enroll in Food Research 129, Economics 129.)
5 units, not given 1991-92

130E. Environmental Earth Sciences I—(Enroll in Applied Earth Sciences 130.) DR:6(8)
5 units, Aut (Mader, Remson)

130M. Application of Mathematical Programming to Agricultural Systems—(Enroll in Economics 132, Food Research 130.)
3-5 units, not given 1991-92

130U. Current Issues in Urban Planning—(Enroll in Urban Studies 180.)
4 units, Aut (Icofano)

5 units, Spr (Arthur)

140. Public Decision Making Regarding Human Health—(Enroll in Health Research and Policy 220, Human Biology 40.)
4 units, Spr (Hlatky)

143. The Economics of Biological Resources—(Same as Economics 143.) Economic analysis of natural resources and their management where population dynamics plays a central role. Topics: fishing, the spotted owl and ancient forests, and other predator-prey models; foraging (search) theory, “selfish” genes, and other models of optimizing behavior among species. Prerequisites: Economics 51Q or 51V and background in multivariate calculus (Math. 21, 42, or Economics 180).
5 units, Win (Brown)

144. Economics of American Agriculture: Structure and Policy—(Enroll in Economics 144, Food Research 144.)
4-5 units, Aut (Falcon)

148. Urban Economics—(Enroll in Economics 148.)
5 units, Spr (Swinkels)

150U. Urban Sociology—(Enroll in Sociology 150.)
3-5 units, Spr (Conell)

154L. Economics of Legal Rules and Institutions—(Enroll in Economics 154.)
5 units, Aut (Polinsky)

154U. Urban Growth and Change—(Enroll in Sociology 154.)
5 units, not given 1991-92

155. Economics of Natural Resources—(Enroll in Engineering-Economic Systems 155/255.)
5 units, Aut (Sweeney)

156H. Economics of Health and Medical Care—(Enroll in Economics 156, Health Research and Policy 256.)
5 units, Spr (Fuchs)

156M. Decision and Judgment—(Enroll in Psychology 156.)
3 units, Win (A. Tversky)

157. Imperfect Competition—(Enroll in Economics 157.)
5 units, Aut (Bresnahan)

158. Antitrust and Regulation—(Enroll in Economics 158.)
5 units, Win (Steinmueller)

165. International Economics—(Enroll in Economics 165.)
5 units, Win (Huizinga)

166. International Trade Policy—(Enroll in Economics 166, Food Research 166/266.)
5 units, Spr (Pearson)

167. Environmental Policy Design and Implementation—(Enroll in Civil Engineering 266.)
4 units, Win (Ortolano)

168H. Medical Anthropology—(Enroll in Anthropology 168, Human Biology 168.) DR:9(5)
5 units, Aut (Barnett)

5 units, Aut (Tunick)

5 units, Win (Barker)

173. Meeting the Needs of Children: the Roles of Family and Society—Examines the status of children in American society. Issues: what rights should children have to care, protection, economic goods, and opportunity? Who should have responsibility for providing these goods to children? What values and assumptions underlie current social policies toward children and families? Should any of these values and assumptions be changed? Class discussion based on readings.
3 units, Spr (Wald)

176. Seminar: The Supreme Court—(Enroll in Political Science 176.)
5 units, not given 1991-92
177. Seminar: Courts, Politics, and Public Policy—(Enroll in Political Science 177.)
   5 units, Spr (Barker)

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 connected with faculty who can serve as sponsors of internship-related directed study.
   2 units, Win (Staff)

180. Washington, D.C.: Issues and Players—For undergraduates interning in a government agency the Summer Quarter following the course, particularly in the federal government in Washington, D.C. Provides a background on how public policy decisions are made in Washington, and develops skills to become effective interns.
   3 units, Win (Milton)

   2 units, Spr (Kirst)

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)

183. The Politics of Welfare Policy—(Enroll in Political Science 183D.)
   5 units, Spr (Brody)

184. California State Government: Politics, Process, Performance—Detailed examination of the development and implementation of public policies in California, beginning with study of elections and campaign strategies for state office; includes organization of state legislature and executive branch, role of the courts, and process and effects of initiative and referendum. Current policy issues illustrate the consequences of the design of state government institutions, including legislative reapportionment, ethics in politics, the budgetary process, and environmental regulation. Term paper. Enrollment limited to 25. Prerequisite: course in American politics (Political Science 1, 10, or Political Science/Public Policy 101.)
   3 units, Win (Keene)

185. The Distribution of Income and Wealth—(Enroll in Economics 185.)
   5 units, not given 1991-92

186. Urban Politics and Policy—(Same as Political Science 186.) Introduces the major actors, institutions, processes, and policies of sub-state government in the U.S., focusing primarily on city general purpose governments through an intensive comparative examination of historical and contemporary politics. Issues related to federalism, representation, voting, race, poverty, housing, and finances.
   5 units, Spr (Fraga)

   5 units, Aut (Ferejohn)

188. Politics and Policy for Children, Youth, and Families—(Enroll in Education 105, History 158B, Political Science 188K.)
   3 units, Aut (Kirst)

193. Political Economy of Institutions—(Same as Economics 153.) 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: Economics 51 and 150.
   3 units, not given 1991-92

195. Politics and Economic Policy—The interaction between political processes and resource allocation, emphasizing the political and organizational problems of designing and implementing public policies. Examples: international trade policy, health and safety standards, and environmental regulation. Prerequisites: Political Science 101P, Economics 51.
   5 units, not given 1991-92

196. Political Economy of Public Policy—(Same as Business 438.) Develops a unified approach to public decisionmaking based on techniques from
modern political economy. Provides a framework for analyzing questions of public policy formation, e.g., why is one policy outcome chosen instead of another? The role of congress, president, courts, regulatory agencies, interest groups. Policy topics: the S&L bailout, environmental regulation, the domestic consequences of the recent Gulf war, how to understand the Reagan "Revolution," and the politics of macroeconomic decisions. International topics: Japan and Korea. Offered through the business school; class covers material from the standpoint of managers of business firms, non-profit organizations, and public sector bureaucracies.

3 units, Aut (Weingast)

198. Directed Readings in Public Policy.
1-5 units (Staff) by arrangement

1-5 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. Prerequisite: completion of core courses in Public Policy or consent of the instructor.

200A. 1 unit, Aut (Brown)
200B. 1 unit, Win (Brown, Rothwell)
200C. 1 unit, Spr (Rothwell)

201. History of Education in the United States—(Enroll in Education 201, History 158.)
3 units, not given 1991-92

220A. The Social Sciences and Educational Analysis: Introduction to the Economics of Education—(Enroll in Education 220A.)
4 units, Aut (Strober)

3 units, Sum (Kirst)

221. Issues in Policy Analysis—(Enroll in Education 221.)
4 units, Win (McLaughlin)

4-5 units, Aut (Levin)

3 units, Win (Dantzig)

RELIGIOUS STUDIES

Emeritus: David S. Nivison (Asian Languages, Philosophy, Religious Studies), Edwin M. Good

Acting Chair: Van A. Harvey (Autumn, Winter), Arnold M. Eisen (Spring)

Professors: René Girard (French and Italian and, by courtesy, Religious Studies), Van A. Harvey, Lewis W. Spitz (History and, by courtesy, Religious Studies; on leave), Lee Yearley (on leave)

Associate Professors: Carl W. Bielefeldt (on leave), Arnold M. Eisen, Bernard R. Faure (on leave), Hester G. Gelber

Assistant Professors: Alice Bach, Howard Eilberg-Schwartz, Timothy P. Jackson

Professor (Teaching): Robert C. Gregg

Acting Assistant Professor: Philip J. Ivanhoe

Visiting Assistant Professor: Jan Nattier

Irvine Fellow: Rudy V. Busto

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. At least 40 units are to be taken in courses numbered above 100, including no fewer than three seminars.

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 is broken down into three subfields: East Asian Religions, Judaism, and Christianity. A list of courses fitting into these areas is available in the department office. 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. In addition, each major is also encouraged to write a senior essay in his or her concentration. The essay provides the opportunity for a sustained treat-
ment of a specific topic central to the student's interests. Research for and writing of the essay counts as a 5-unit course to be credited toward the required 60-unit departmental total, as well as toward the 25-unit concentration total.

The bachelor's degree with honors in Religious Studies may be earned by students who are endorsed by their advisers and the undergraduate director and who meet additional requirements, available from the director.

**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, which are 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, including 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 topics.

**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, and one prescribed essay.

**Teaching Internships**—At least two teaching internships under the supervision of faculty members are undertaken at a time negotiated with the graduate director. Students receive academic credit for the required internships, which are projects of academic training and not of employment.

**Qualifying Examination**—To qualify for writing a dissertation, the student must successfully pass a comprehensive examination in the chosen field, 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 (5 units)
197-199 Undergraduate Directed Reading (variable units)
201-259 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)

**INTRODUCTORY**

1C. Comparative Religious Thought.
4 units (Staff) not given 1991-92

1E. Eastern and Western Conceptions of the Self—Analysis and comparison among models of the self in various traditions, notably classical Greek, Christian, Confucian, Buddhist, Taoist, and Freudian. Limited enrollment. DR:8(3*)
5 units (Yearley) not given 1991-92

5 units, Win (Eilberg-Schwartz) TTh 11-12:15

7. American Indian Religions—Basic themes in the beliefs and traditions of Indian peoples in the American Southwest. Reconsideration of how American Indians have been studied and examination of cultural exchange among Indians, Mexican, and European Americans.
4 units, Win (Busto) MW 11-12:15

14. Introduction to Buddhism—Introduction to the life and teachings of the canonical Buddha, and to the various Buddhist cultures that have drawn inspiration from the movement he created. Materials from India, China, Japan, and Tibet examined in terms of their doctrinal content, institutional basis, ritual context, and implications for the changing Buddhist understandings of the path to liberation. DR:2(*) or 8(3*)
4 units, Spr (Nattier) MWF 11

15. The Bible—Diverse literature of ancient Israel read in translation: prose narrative, epic poetry, civil and ritual law, hymns, prophetic oracles. Primary historical, cultural, and religious factors informing biblical composition and transmission.
4 units, Win (Bach) MWF 1:15

18. Zen Buddhism—Introduction to Zen Buddhist religious thought, focusing on selected issues in several representative texts. DR:2(*) or 8(3*)
4 units (Bielefeldt) not given 1991-92

4 units (Fauve) not given 1991-92

23. Judaism—Historical development of Jewish religious thought and practice, from the biblical period to the present. Various kinds of texts reflecting that development: scriptural, liturgical, midrashic, legal, historical, and philosophical. DR:8(3)
4 units, Aut (Eilberg-Schwartz) MWF 11-12:30

24A. Christianity—DR:8(3)
4 units (Staff) not given 1991-92

5 units (Gregg) not given 1991-92

26. The Christianization of Western Europe, 500-1350—(Enroll in History 108.) How the Europeans came to believe in Christ, why the thought and conduct associated with that belief changed so radically, why different forms of religiosity and dramatic conflicts developed, how religious beliefs affected social organization, and how social changes modified religiosity.
5 units, Aut (Langmair)

27. Islam.
4 units, not given 1991-92

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, implications of science. Readings include traditional and modern texts. DR:8(3)
4 units, Aut (Gelber) MWF 1:15

47. Modern Christian Thought—Introduction to the important issues and thinkers who have influenced Christian theology (Catholic and Protestant) since WWII: neo-orthodoxy, existentialism, feminism, process theology, liberation theology.
4 units (Harvey) not given 1991-92
52F. Readings in Philosophy and Religious Studies—(Same as German 52F.)
3-4 units (Staff) given 1992-93

53. Jews and Judaism in America—(Same as Sociology 151.) Examination of the interaction between the character of the American Jewish community and the forms of Judaism developed in this country, against the background of American ethnicity. Historical, literary, sociological, and theological materials used. DR:3 or 8(3)
4 units, Spr (Eisen) TTh 11-12:15

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:8(3*)
4 units, Win (Ivanhoe) MWF 10

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, Spr (Jackson) MWF 1:15

TOPICS IN RELIGION

111. Religious Classics of Asia.
4 units (Staff) not given 1991-92

112. Women in the Ancient World—Biblical characters (Sarah, Hagar, Naomi and Ruth, Deborah, and Esther); postbiblical texts (Judith, Joseph and Asenath, Paul and Thecla, and Susanna). Attitudes toward women and women's religious activities and beliefs in the Greco-Roman world. Feminist analysis of attitudes toward women in biblical traditions and scholarly reconsiderations of images of women in antiquity.
5 units, Aut (Bach) MW 11-12:15

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) MWF 10

116. Japanese Buddhism—History and teachings of Buddhism in Japan, emphasizing the early and medieval periods. DR:2(3) or 8(3*)
5 units, not given 1991-92

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 1991-92

118. Death Rituals in East Asia—Focuses on various rituals and representations dealing with death and the other world in E. Asian religious traditions, e.g., Taoism, Confucianism, Buddhism, Shinto, and Chinese and Japanese popular religions.
4 units (Faure) not given 1991-92

119A. Neo-Confucianism—(Same as Asian Languages 231.) 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.
3 units (Ivanhoe) not given 1991-92

5 units (Bielefeldt) not given 1991-92

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.
5 units (Eilberg-Schwartz) not given 1991-92

130. Introduction to Feminist 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 have 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.
5 units, Win (Akiyama)

135. Introduction to Jewish Mysticism.
5 units, not given 1991-92

140. Religious Ethics.
5 units (Staff) not given 1991-92

142. Early Christianity—(Same as Classics 104.) The Christian movement to 500 A.D. and emergent beliefs/practices as these distinguished
Christians from other groups and as they varied among Christians. Study of primary documents (ancient texts in translation) and surviving art/architecture examines early Christianity’s modes of community organization, debates about orthodox and heretical teaching, and interaction with other religions. Thematic interest concerns deployment of "holy power" in people, places, objects. DR:8(3)
5 units (Gregg) not given 1991-92

145. Protestantism—Development of Protestantism from Reformation to the present.
5 units (Harvey) not given 1991-92

147. Modern Christian Thought.
5 units (Harvey) not given 1991-92

148. Social Theory and Religion—(Same as Sociology 148.)
5 units (Eisen) not given 1991-92

149. Theories of Religion—Attempts to explain the origin and persistence of religious behavior and belief in the modern period. Philosophical, sociological, historical, and psychological theories, "classic" and contemporary.
5 units (Harvey) not given 1991-92

150. Systems of Buddhist Thought—Introduction to the Lotus school of Mahayana; its Indian sources, Chinese formulation, and Japanese developments.
5 units (Bielefeldt) not given 1991-92

151. Buddhism in India: The First 500 Years—Exploration of the issues that united and sometimes divided the early Buddhist community. Topics: concepts of the path to liberation, lay/monastic relations, the social and institutional setting of the rise and development of the Buddhist community. Enrollment limited to 30. Prerequisite: previous course on Buddhism or consent of instructor.
5 units, Aut (Nattier) TTh 2:15-4:05

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 is on the ways these beliefs are embedded in practices and structures of social life and on Western categories and meanings, and their implications for theorizing. DR:8†(3)
5 units (Delaney) not given 1991-92

5 units, Spr (Gregg)

5 units, Spr (Gregg)

157. Readings in Greco-Roman Religion—(Same as Classics 118.) Texts present philosophical and religious thought and point towards activities of discrete groups.
5 units, Aut (Gregg) TTh 8:30-10

158. Peace Studies—(Same as Education 173X, 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. Creating and maintaining peace is analyzed from historical, social, psychological, and moral perspectives.
5 units, Spr (Berrustier, Bland, Dornbusch, Drekmeier, Moses, Noddings, Ross)

161. Modern Jewish Thought.
5 units (Eisen) not given 1991-92

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.
4 units, Win (Jackson) TTh 4:15-6:05

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.
5 units, Spr (Busto) MWF 10

164. Morality of Peace and War—(Same as Philosophy 174.) 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, Win (Jackson) MWF 1:15

165. Religious Ritual—Classical and contemporary theories of religious ritual with case studies from a variety of traditions.
5 units (Eisen) not given 1991-92

166. Anthropology of Ancient 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 (Eilberg-Schwartz) not given 1991-92
4 units, Win (Gelber) MWF 11

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, Spr (Gelber) MWF 11

171. Medieval Religious Thinkers.
5 units (Staff) not given 1991-92

174. From Kant to Kierkegaard—(Same as German 179K.) Survey of main currents of theology and religion in Germany, emphasizing themes of the knowledge of God and the problem of alienation.
5 units, Aut (Harvey) MW 11-12:30

176. Psychological Approaches to Religion—Theories of religion formulated by psychologists such as Freud, Jung, Maslow, and the "Object-Relations" school.
5 units, Aut (Harvey) not given 1991-92

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 1991-92

UNDERGRADUATE DIRECTED READING

196. 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

UNDERGRADUATE AND GRADUATE SEMINARS

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 1991-92

211. Philosophical Texts of the Ming Dynasty—(Same as Asian Languages 232, Philosophy 211.) Primary text: Huang Zongxi's Mingru xuean, a history of Ming Dynasty philosophers. Focuses on structure and theory of organization and approach to text. Additional readings from Wang Yangming and Li Zhi. Prerequisite: reading knowledge of Classical Chinese.
5 units, Aut (Ivanhoe) MW 2:15-4:05

212. Interpreting Confucian Texts—(Same as Asian Languages 230, Philosophy 212.) Illustrates critical importance of historical and philosophical issues to task of interpretation. Introduction to Chinese commentarial tradition. Seminar; pace and range determined by constituents. Prerequisite: consent of instructor.
5 units, Win (Ivanhoe) MW 2:15-4:05

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

217. China and the West: Religion and Cultural Encounters—Topics in the historical exchange between China and Europe, emphasizing the cultural disciplines in the Early Modern age. The reaction and response and the generalizations and distortions of one society's views of another.
4 units, Aut (Foss) TTh 1:15-3:05

218. The Trickster in Asian Religions—The various types of trickster figures (jester, buffoon, madman) and their roles in Asian religious traditions (Taoism, Buddhism, Chinese and Japanese mythologies).
4 units (Faure) not given 1991-92

221. Ch'an/Zen Tradition and Popular Religion—Relationships between Ch'an and Zen tradition(s) and Chinese or Japanese local cults. Forms of symbolic mediation (ritual, meditative techniques, etc. in both religious traditions, and the "unmediated vision" advocated by the "sudden" school of Ch'an. Prerequisite: consent of instructor.
5 units (Faure) not given 1991-92

222A. Rabbinic Literature—Introduction to various genres of Rabbinic literature. Close reading of selected Midrashic texts in translation. Additional section for students with Hebrew.
5 units (Staff) not given 1991-92
230A. Zen Buddhism Seminar—Selected topics in Ch'an and Zen; may be repeated for credit. 5 units (Bielefeldt) not given 1991-92

234B. The Virgin Mary and Images of Power—(Same as Feminist Studies 150.) Studies of emergence of Virgin Mary as a symbol of religious and cultural values from earliest legends to modern era through art and literature. Emphasis on the Middle Ages. 5 units (Gelber) not given 1991-92

245. Comparative Religious Ethics. 5 units (Yearley) not given 1991-92

255. Classics of Buddhist Literature: The Perfection of Wisdom Texts—Close reading of the major texts of the Prajnaparamita corpus, emphasizing cultic, institutional, doctrinal, and philosophical issues. Graduate students with appropriate background may read portions of these texts in the original languages. Prerequisite: consent of instructor. 5 units, Win (Nattier) TTh 2:15-4:05

258. Japanese Buddhist Texts—(Same as Asian Languages 258.) Readings in medieval Japanese Buddhist materials. 5 units (Bielefeldt) not given 1991-92

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, Win (Eisen) not given 1991-92

261. Modernization/Secularization—Re-examination of these two fundamental concepts in light of recent historical, sociological, anthropological, and philosophical developments. 5 units, Win (Eisen) MW 2:15-4:05

263. The Book of Job—Prerequisite: consent of instructor. 5 units (Good) not given 1991-92

264. The Body, Sex, and Gender in Ancient Judaism—Representations of the human body, sexuality, and gender in biblical and post-biblical Judaism. Focuses on primary and secondary sources. 5 units, Win (Eilberg-Schwartz) TTh 2:15-4:05

265. The Body in Religion, Culture, and History—Theoretical issues relevant to study of the human body. Ways in which it serves as vehicle for social representations and as locus for cultural processes of domination. The body and ritual, body politics, cultural constructions of body processes, bodily symbolism, the body and gender, the body and race, the body and sexuality. 5 units (Eilberg-Schwartz) not given 1991-92

266. Medical and Legal Ethics—Ethical problems and assumptions of medicine and law. "Principles and cases" approach to interrelated concerns of the two professions. Topics: euthanasia, informed consent, quality of life vs. medical indications policies, mens rea, confidentiality, and justice within an adversarial system. Prerequisite: consent of instructor. 5 units (Jackson) not given 1991-92

267. Anselm—Significance of Anselm's life and works within 12th-century Medieval culture and for the history of religion and philosophy. His proofs for existence of God, views about free will and sin, religious language, the Incarnation, Virgin Mary, and the Christian life. 5 units (Gelber) not given 1991-92

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, Spr (Gelber) TTh 2:15-4:05

272. Skepticism and Morality—(Same as Philosophy 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, and skepticism. Authors: Aquinas, Gewirth, Rorty, Stout, Kierkegaard, Nagel, and Hume. 5 units, Spr (Jackson) TTh 4:15-6:05

273. Aquinas' Ethics—Thomas Aquinas' general theory of human flourishing and his analysis of specific human excellences (e.g., love, courage, and magnanimity) and human deformations (e.g., vanity, pride, and envy). Limited enrollment. 5 units (Yearley) not given 1991-92

274A. Sigmund Freud. 5 units (Yearley) not given 1991-92

274C. Kierkegaard—(Same as Philosophy 130.) Examines 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 rather an elaborate poking-fun at anything resembling metaphysics, epistemology, ethics? 5 units, Spr (Jackson) TTh 4:15-6:05

274D. Friedrich Nietzsche. 5 units (Harvey) not given 1991-92

275. Justice and Human Nature—(Same as Philosophy 275.) The relation between various ac-
counts 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/communitarianism distinction still significant? Do we need a theory of human nature for political philosophy?

5 units (Jackson) not given 1991-92

277. Religious Existentialists.

5 units (Harvey) not given 1991-92


5 units, Win (Harvey) MW 2:15-4:05

281. Encounters Between Modern Philosophy and Judaism.

5 units (Eisen) not given 1991-92

282. Relativism and the Diversity of Religions—Inquiry into the relationship between conceptual relativism and the diversity of religious beliefs.

5 units (Harvey) not given 1991-92

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 pursued in modern works that analyze the issues and classical definitions, Western and Chinese, of human excellence. Limited enrollment.

5 units (Yearley) not given 1991-92

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 (Eilberg-Schwartz) MW 2:15-4:05

304B. Theories and Methods in the Study of Religion—(See 304A.) Required of all graduate students in Religious Studies. Theories and methods. Anthropological approaches to religion: Durkheim, Lévi-Strauss, Geertz. Prerequisites: consent of instructor, completion of 304A.

4 units, alternate years, given 1992-93


4 units, not given 1991-92

312. Workshop on Teaching “Introduction to Buddhism”—Seminar for graduate students, exploring issues and problems in structuring and effectively teaching an introductory Buddhism course. Students have the opportunity to create their own course syllabus, reading list, and pilot lecture(s); those enrolled have first preference for positions as teaching interns in course 14 the following Spring.

4 units, Aut (Nattier) by arrangement

313. Graduate Colloquium: The Religious Crisis of the 11th and 12th Centuries—(Enroll in History 308.)

5 units, Spr (Langmuir)

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 1991-92

319. East Asian Religions—Directed research.

(Bielefeldt, Faure, Yearley) by arrangement


5 units, not given 1991-92


5 units, Spr (Bach) MW 2:15-4:05


(Eilberg-Schwartz, Eisen, Gregg) by arrangement

339. Medieval Western Religions—Directed research.

(Celber, Yearley) by arrangement

349. Modern European Religions—Directed research.

(Eisen, Harvey, Jackson, Yearley) by arrangement

359. American Religions—Directed research.

(Eisen, Harvey) by arrangement


(Eilberg-Schwartz, Eisen, Faure, Jackson) by arrangement
371. Selected Problems in Philosophy of Religion.
5 units (Gelber) not given 1991-92
378. Analytic Philosophy of Religion.
4 units (Jackson) not given 1991-92
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
2-9 units (Staff) by arrangement

CENTER FOR RUSSIAN AND EAST EUROPEAN STUDIES

Committee in Charge: The Steering Committee on Russian and East European Studies.
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Assistant Director: Irina Barnes

Professors: Alexander Dallin (History and Political Science), Terence L. Emmons (History), Martin Esslin (Emeritus, Drama), Lazar Fleishman (Slavic Languages), Joseph N. Frank (Emeritus, Comparative Literature and Slavic Languages), Alexander L. George (Emeritus, Political Science), John Curley (Emeritus, Economics), David J. Holloway (Political Science; on leave Autumn, Winter), Alex Inkeles (Sociology and Hoover Institution), Vjacheslav V. Ivanov (Slavic Languages; Autumn only), Mark Mancall (History), Norman Naimark (History), Henry Rowen (Business and Hoover Institution, on leave), Richard D. Schupbach (Slavic Languages; on leave Autumn, Winter), Jan F. Triska (Emeritus, Political Science), Nancy B. Tuma (Sociology), Joseph Van Campen (Slavic Languages), Wayne S. Vucinich (Emeritus, History), Steven J. Zipperstein (History)

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Assistant Professors: Nina P. Halpern (Political Science, on leave Autumn), John M. Litwack (Economics), Debra Satz (Philosophy), Szonja Szelenyi (Sociology)

Acting Assistant Professor: Bertrand M. Patenaude (History)

Affiliated Professors: Donald L. Carpenter (Stanford Electronic Laboratory), Sidney Drell (SLAC), John W. Lewis (Political Science)

Lecturers: Jasmina Bojic (Slavic Languages), Rima Greenhill (Slavic Languages), C. Robert Hamrdla (German Studies), Jack Kollmann (History and Slavic Languages), Elena Lifschitz (Slavic Languages, on leave), Patricia Mueller-Vollmer (Slavic Languages), Wojciech Zalewski (Slavic Languages and Stanford Libraries)

Visiting Faculty: Ivana Bozdechova (Slavic Languages), Elemer Hankiss (Politiccal Science), Gail Kligman (Anthropology), Mikhail Kolesnikov (Art and Drama), Waldemar Martyniuk (Slavic Languages), Andrei Sinyavsky (Slavic Languages), Jacek Szmata (Sociology)

Affiliates: Dorothy Atkinson (AAASS), Robert Conquest (Hoover Institution), John P. Dulan (Hoover Institution), Joseph D. Dwyer (Hoover Institution)

The Center for Russian and East European Studies coordinates the University’s teaching, research, and extracurricular activities related to the Soviet Union and Eastern Europe, and administers a coterminal A.B./A.M. and an A.M. program in Russian and East European Studies.

PROGRAMS OF STUDY

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.

COTERMINAL A.B./A.M.

To qualify for a coterminal A.M. degree in Russian and East European Studies, a student must, besides completing University requirements for the A.B. degree:

1. Submit a coterminal application for admission to the program no earlier than the beginning of the eighth quarter, and no later than the end of the 11th quarter of undergraduate study. Students with advanced placement and transfer credit must apply at least four quarters before the expected master's degree conferral date. Applications may be obtained from the Graduate Degree Support Section of the Registrar's Office.

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.)

GRADUATE PROGRAM

MASTER 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 Support 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 Support 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. The University does not offer a Ph.D. in Russian and East European Studies.

REQUIREMENTS

For students in both the coterminal A.B./A.M. and the terminal A.M. programs, the 40 units toward 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 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 three years of Russian or East European language instruction. Credit is allowed for fourth- and fifth-year Russian courses.

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 toward 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 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 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

Students in degree-earning graduate programs whose course work includes Russian language study may be eligible for Foreign Area and Language Studies (FLAS) fellowships. 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.

Federal work-study research assistantships may also be available for A.M. students, but monies for these awards are subject to annual review and may not be available in a given year.

For further information, contact the Center for Russian and East European Studies, Encina Hall 200, Stanford University, Stanford, CA 94305-6055.

COURSES

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 E. European Studies. Introduction to methodologies and the status of research within the interdisciplinary area studies program.
1 unit, Aut, Win, Spr (J. Kollmann)

The courses listed below by department deal primarily with Russia, the Soviet Union, or Eastern Europe. Additional relevant courses by resident or visiting faculty may be offered; for updated information, consult the Center for Russian and East European Studies prior to each academic quarter. Students in the area studies A.M. program must have their course list approved by the department adviser prior to enrollment.

ANTHROPOLOGY

228. State and Society: Eastern Europe in Transition.
5 units, Win (Kligman)

ART

109/209. Early Russian Art and Architecture, 1050-1725—(Same as Slavic Languages 143/243.)
4 units, Aut (J. Kollmann) MW 3:15-5:05

109A/209A. The Art and Architecture of Imperial and Soviet Russia—(Same as Slavic Languages 144/244.)
4 units, Aut (J. Kollmann) not given 1991-92

109B/209B. Abstract Art in Russia, 1900-1925—(Same as Slavic Languages 141.)
4 units, Win (Kolesnikov)

109C/209C. From Suprematism to Constructivism in Russian Avant-Garde Theater—(Same as Slavic Languages 142, Drama 166R.)
4 units, Spr (Kolesnikov)

ASIAN LANGUAGES

152. Nomad Empires of Inner Asia—(Same as History 195.)
4-5 units, Win (Dien) MTWThF 2:15

DRAMA

166R. From Suprematism to Constructivism in Russian Avant Garde Theater—(Same as Art 109C/209C, Slavic Languages 142.)
4 units, Spr (Kolesnikov)

ECONOMICS

120. The Soviet Economy.
5 units, Aut (Litwack)

293. Socialist Economies.
5 units, not given 1991-92

FEMINIST STUDIES

173. Women and Feminism in Eastern Europe.
5 units, Win (Crnkovic) MW 3:05

179G. The German Democratic Republic: Its Rise and Fall.
4 units, Win (Hamrdla)

HISTORY

24A. Russian Civilization from 9th to 17th Centuries.
5 units, Spr (N. Kollmann) MTWTh 10

25S. Introductory Seminar: History and Modern Ideology—Ivan the Terrible in Historical Interpretation.
5 units, Win (N. Kollmann) W 1:15-3:05

120C. Russia in Revolution, 1861-1930.
5 units, Win (Emmons) TTh 1:15-2:45

122B. Soviet Foreign Policy since 1917—(Same as Political Science 136.)
5 units (Dallin) given 1992-93
122B. Soviet Foreign Policy since 1917—(Same as Political Science 136.)
   5 units (Dallin) given 1992-93

123A. Soviet Politics and Society since 1917—
   (Same as Political Science 119A.)
   5 units, Aut (Dallin) MTWTh 11

125. 20th-Century Eastern Europe.
   5 units, Aut (Naimark) MTWTh 10

127D. 20th-Century Germany.
   5 units, Aut (Sheehan) TTh 1:15-3:05

137. The Holocaust.
   5 units, Spr (Rodrigue) MWTh 1:15

195. Nomad Empires of Inner Asia—(Same as Asian Languages 152.)
   4-5 units, Win (Dien) MTWThF 2:15

218. Undergraduate Colloquium: Stalin and Stalinism.
   5 units, Win (Patenaude) Th 1:15-3:05

219. Undergraduate Colloquium: Major Problems in Soviet History—(Same as Political Science 226C.)
   5 units, Aut (Dallin) T 2:15-4:05

220. Undergraduate Colloquium: Religion and Politics in Russian and Soviet History, 1864 to Present.
   5 units, Aut (Young) Th 1:15-4:05

220S. Senior Research Seminar: Topics in U.S.-Soviet Relations.
   5 units, Spr (Patenaude) T 1:15-3:05

221S. Senior Research Seminar: Wartime and Postwar Poland.
   5 units, Win (Naimark) W 2:15-4:05

224. Undergraduate Colloquium: Stalinism in Eastern Europe.
   5 units, Spr (Naimark) W 2:15-4:05

   5 units, Spr (Kleiman) Th 2:15-5:05

261. Undergraduate Colloquium: Nuclear Weapons and International Relations—Theories and History—(Same as Political Science 24G.)
   5 units, Spr (Holloway, Bernstein) Th 2:30-4:30

285C. Undergraduate Colloquium: Russian and Soviet Jewish History.
   5 units, Spr (Zipperstein) MTWTh 9

317. Graduate Colloquium: War and Postwar Poland.
   5 units, Win (Naimark) W 2:15-4:05

319A Graduate Colloquium: Major Problems in Soviet History and Politics.
   5 units, Aut (Dallin) T 2:15-4:05

320A. Graduate Colloquium: Topics in Early Modern Russian History.
   5 units, Win (N. Kollmann) M 1:15-3:05

320B. Graduate Colloquium: Topics in Modern Russia.
   5 units, Spr (Emmons) by arrangement

   5 units, Spr (Kleiman) Th 2:15-5:05

420. Graduate Seminar: Topics in Modern East European History.
   5 units, Spr (Naimark) T 2:15-4:05

421B. Topics in Russian History.
   5 units, Spr (Emmons)

422A. Introduction to Graduate Research on Soviet History—(Same as Political Science 327A.)
   5 units, Win (Dallin) W 2:15-5:05

429. Graduate Seminar: History of German Democratic Republic.
   5 units, Spr (Naimark) Th 1:15-3:05

POLITICAL SCIENCE

117A,B. Eastern Europe in Transition.
117A. 5 units, Win (Hankiss)
117B. 5 units, Spr (Hankiss)

117R. The Role of the Military in Politics.
   5 units, Win (Rice)

119A. Soviet Politics and Society since 1917—
   (Same as History 123A.)
   5 units, Aut (Dallin) MTWTh 11

136. Soviet Foreign Policy since 1917—(Same as History 122B.)
   5 units (Dallin) given 1992-93

138A. Security and Global Order.
   5 units, Win (Lewis, Staff) MTWThF 1:15

138B. Seminar: Security and Diplomacy.
   5 units, Aut, Spr (Lewis)

217R. The Transformation of Europe.
   5 units, Win (Rice)

225. Seminar: Political Economy of Socialist Reform.
   5 units, Spr (Halpern)

226C. Colloquium: Major Problems in Soviet Politics and Society—(Same as History 219.)
   5 units, Aut (Dallin) T 2:15-4:05

227H. Seminar: The Question of Freedom in Western and East European Societies.
   5 units, Spr (Hankiss)

236. The Soviet Union and the International System.
   5 units (Holloway) given 1992-93
246. Colloquium: Nuclear Weapons and International Relations—Theories and History—(Same as History 261.)
5 units, Spr (Holloway, Bernstein)
Th 2:30-4:30

327A. Graduate Seminar on Soviet Politics—(Same as History 422A.)
5 units, Win (Dallin)

SLAVIC LANGUAGES AND LITERATURES

GENERAL

141/241. Abstract Art in Russia, 1900-1925—(Same as Art 109B/209B.)
4 units, Win (Kolesnikov)

142/242. From Suprematism to Constructivism in Russian Avant Garde Theater—(Same as Art 109C/209C, Drama 166R.)
4 units, Spr (Kolesnikov)

143/243. Early Russian Art and Architecture, 1050-1725—(Same as Art 109/209.)
4 units, Aut (J. Kollmann) MW 3:15-5:05

144/244. The Art and Architecture of Imperial and Soviet Russia—(Same as Art 109A/209A.)
4 units (J. Kollmann) not given 1991-92

4 units, Aut (Fleishman) MWF 10

146/246. Survey of Russian Literature in English Translation II: The Age of Realism.
4 units, Win (Cheith, Hodge, Sankovitch) MWF 10

4 units, Spr (Freidin) MWF 10

151. Fyodor Dostoevsky.
4 units, Spr (Frank) TTh 2:15-4:05

UNDERGRADUATE

1A. First-Year Russian A.
5 units, Aut (Mueller-Vollmer, Staff)
MTWThF 9, 10, 11, or 1:15

2B. First-Year Russian B.
5 units, Win (Mueller-Vollmer, Staff)
MTWThF 9, 10, 11, or 1:15

3C. First-Year Russian C.
5 units, Spr (Mueller-Vollmer, Staff)
MTWThF 9, 10, 11, or 1:15

5A,B,C. Beginning Polish.
4 units, Aut, Win, Spr (Martyniuk, Staff) by arrangement

6A,B,C. Intermediate Polish.
4 units, Aut, Win, Spr (Martyniuk, Staff) by arrangement

7A,B,C. Advanced Polish.
4 units, Aut, Win, Spr (Martyniuk, Staff) by arrangement

8A,B. Beginning Serbo-Croatian.
4 units, Aut, Win (Bojic) by arrangement

4 units, Aut, Win (Bojic) by arrangement

11A,B,C. Beginning Czech.
4 units, Aut, Win, Spr (Bozdechova) by arrangement

12A,B,C. Intermediate Czech.
4 units, Aut, Win, Spr (Bozdechova) by arrangement

51,52,53. Second-Year Russian.
3 units, Aut, Win, Spr (Van Campen) MWF 12 or 1:15

2 units, Aut, Win, Spr (Mueller-Vollmer) TTh 10 or 11

3 units, Aut, Win, Spr (Schupbach, Greenhill) MWF 2:15

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

3 units, Win (Greenhill) TTh 3:15

179/203. Advanced Russian.
3 units, Spr (Greenhill) TTh 3:15

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) MWF 11

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. Introduction to Slavic Bibliography.
1-3 units, Aut (Zalewski) TTh 4:15-5:05

211. Introduction to Old Church Slavic.
3 units, Aut (Van Campen) MWF 2:15

212. Old Russian and Old Church Slavonic Texts.
4 units, Win (Van Campen) MWF 2:15

4 units, Spr (Schupbach) by arrangement
214. Comparative Slavic Grammar—(Same as Linguistics 274.)
   4 units, Aut (Ivanov) TTh 10:30-12

   4 units, Win (Freidin) by arrangement

230C. 20th-Century Russian Literary Theory from Symbolism and Formalism to Semiotics.
   4 units, Aut (Ivanov) TTh 1:15-3:05

   4 units, Spr (Sinyavsky) by arrangement

299. Individual Work.
   1-12 units, any quarter, by arrangement

300F. Graduate Seminar: Literature of Russian Emigration.
   4 units, Win (Fleishman) M 1:15-3:05

300G. Mayakovsky, The Poet of Revolution.
   4 units, Spr (Sinyavsky) by arrangement

399A,B,C. Advanced Research Seminar in Russian Literature.
   2-4 units, Aut, Win, Spr (Staff) by arrangement

SOCIOLOGY

134. The Role of Political and Social Groups in the Revolution in Eastern Europe.
   5 units, Win (Szmatka) TTh 1:15-3:05

135. Socialist Societies in Transition.
   5 units (Szelenyi) given 1992-93

SLAVIC LANGUAGES AND LITERATURES

Emeriti: (Professors) Joseph Frank, Jack A. Posin, Lawrence L. Stahlberger; (Assistant Professor) Elisabeth Stenbock-Fermor
Chair: Lazar Fleishman
Professors: Lazar Fleishman, Vjacheslav V. Ivanov (Autumn only), Richard D. Schupbach (on leave Autumn, Winter), Joseph A. Van Campen
Associate Professors: Gregory Freidin, Andrew Wachtel (on leave)
Senior Lecturer: Elena Lifschitz (on leave)
Lecturers: Jasmina Bojc, Rima Greenhill, Jack Kollmann, Patricia Mueller-Vollmer, Wojciech Zalewski (Curator, Russian and East European Collection, Stanford Libraries)
Visiting Professor: Andrei Sinyavski
Visiting Assistant Professors: Ivana Bozdechova, Waldemar Martyniuk

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, and either 195, 196, or 211, 212, and 213. The remaining units are to be selected from: 114, 115, 116, 167, 168, 177, 178, 179, 187, 188.

Majors in Russian must earn a letter grade indicator (LCI) 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 help of their adviser a minimum of three general courses (9 units) in support of their major program.

HONORS PROGRAM

Majors with an LCI 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 as follows:

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 senior year. To receive honors, the candidate must receive an LCI 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. Recommended courses in Russian literature: 145, 146, 147, 187, 188.
2. Recommended 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.

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 falls below the department's standard. Students who fail this test are asked to complete appropriate courses.

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 145, 146, and 147 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 1700’s 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; 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 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.

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 individ-
135. The Other Europe—The sociocultural experience of contemporary Eastern Europe through 20th-century Polish, Czech, and Yugoslav writers: Schultz, Milosz, Kundera, Havel, Andric, Kis, and Pavic. Readings in English translation.

4 units (Wachtel) not given 1991-92

141/241. Abstract Art in Russia, 1900-1925—(Same as Art 109B/209B.) The history of abstract art from its beginnings in Western Europe to its wide adoption and development in Russia. Artists studied: Kandinsky, Kupka, Mondrian, Larionov, Malevich, and Tatlin.

4 units, Win (Kolesnikov)

142/242. From Suprematism to Constructivism in Russian Avant-Garde Theater—(Same as Art 109C/209C, Drama 166R.) Theatrical innovation in Russia during the first decades of the 20th century, examining the works of directors such as Meyerhold, Tairov, Vakhtangov, and Kurbas; choreographers such as Goleizovsky and Foreiger; and artists such as Kandinsky, Tatlin, Exter, Malevich and Lissitsky. The importance of the artist in the theater, the so-called "artists' theater," and the development of two-dimensional painted sets to three-dimensional stage constructions.

4 units, Spr (Kolesnikov)

143/243. Early Russian Art and Architecture, 1050-1725—(Same as Art 109/209.) 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. DR:7(2)

4 units, Aut (J. Kollmann) MW 3:15-5:05

144/244. The Art and Architecture of Imperial and Soviet Russia—(Same as Art 109A/209A.)

4 units (J. Kollmann) not given 1991-92

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.) Selected novels and short fiction by Turgenev, Dostoevsky, Tolstoy, and Chekhov. A continuation of 145 but may be taken independently. DR:7(2)

4 units, Win (Gheith, Hodge, Sankovitch) MWF

147/247. Survey of Russian Literature in English Translation after 1917: Invention of Tradition—(Graduate students register for 247.) Major works of Russian fiction and selected poetry, including the emigre and samizdat writings, in their literary and historical context (Bely, Blok, Mayakovsky, Babel, Zoshchenko, Kataev, Sholokhov, Nabokov, Olesha, Pasternak, Grossman, Solzhenitsyn, Sinyavsky, Brodsky, etc.). Attention to the way poets and novelists have constituted the post-revolutionary "historical experience" of the Russians. A continuation of 145 and 146, but may be taken independently. Required of all majors in Russian literature. DR:7(2)

4 units, Spr (Freidin) MWF 10

151. Fyodor Dostoevsky—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, Spr (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: Childhood, War and Peace, A Confession, Father Sergius, The Living Corpse, and Hadji Murat. DR:7(2)

4 units, not given 1991-92


4 units, not given 1991-92

UNDERGRADUATE

By special arrangement with the department, courses numbered 100-159 can be taken for graduate credit. Students are urged to take all three quarters of first-, second-, and third-year
language series consecutively in the same academic year.

1A. First-Year Russian A—Three-quarter sequence. Optional unit for extra work on pronunciation and grammar, by arrangement.
   5 units, Aut (Mueller-Vollmer, Staff)
   MTWThF 9, 10, 11, and 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 (Mueller-Vollmer, Staff)
   MTWThF 9, 10, 11, and 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 (Mueller-Vollmer, Staff)
   MTWThF 9, 10, and 1:15

5A. Beginning Polish.
   4 units, Aut (Martyniuk) by arrangement

5B. Beginning Polish—Continuation of 5A.
   4 units, Win (Martyniuk) by arrangement

5C. Beginning Polish—Continuation of 5B.
   4 units, Spr (Staff) by arrangement

6A. Intermediate Polish.
   4 units, Aut (Martyniuk) by arrangement

6B. Intermediate Polish—Continuation of 6A.
   4 units, Win (Martyniuk) by arrangement

6C. Intermediate Polish—Continuation of 6B.
   4 units, Spr (Staff) by arrangement

7A. Advanced Polish.
   4 units, Aut (Martyniuk) by arrangement

7B. Advanced Polish—Continuation of 7A.
   4 units, Win (Martyniuk) by arrangement

7C. Advanced Polish—Continuation of 7B.
   4 units, Spr (Staff) by arrangement

8A. Beginning Serbo-Croatian.
   4 units, Aut (Bojic) by arrangement

8B. Beginning Serbo-Croatian.
   4 units, Win (Bojic) by arrangement

9A. Intermediate Serbo-Croatian.
   4 units, Aut (Bojic) by arrangement

9B. Intermediate Serbo-Croatian.
   4 units, Win (Bojic) by arrangement

11A. Beginning Czech.
   4 units, Aut (Bozdechova) by arrangement

11B. Beginning Czech.
   4 units, Win (Bozdechova) by arrangement

11C. Beginning Czech.
   4 units, Spr (Bozdechova) by arrangement

12A. Intermediate Czech.
   4 units, Aut (Bozdechova) by arrangement

12B. Intermediate Czech.
   4 units, Win (Bozdechova) by arrangement

12C. Intermediate Czech.
   4 units, Spr (Bozdechova) by arrangement

51. Second-Year Russian—Intensive review and expansion of grammar and vocabulary. (Russian majors must also take 51A. Others are strongly advised to do so.)
   3 units, Aut (Van Campen) MWF 12 or 1:15

51A. Second-Year Russian: Conversation—Emphasis is on the development of "oral proficiency" in Russian. To be taken in conjunction with 51.
   2 units, Aut (Mueller-Vollmer) TTh 10 or 11

52. Second-Year Russian—Continuation of 51 focusing on vocabulary building, syntax. Russian majors must also take 52A. Others are strongly advised to do so.
   3 units, Win (Van Campen) MWF 12 or 1:15

52A. Second-Year Russian: Conversation—Continuation of 51A. To be taken in conjunction with 52.
   2 units, Win (Mueller-Vollmer) TTh 10 or 11

53. Second-Year Russian—Continuation of 52. Russian majors must also take 53A. Others are strongly advised to do so.
   3 units, Spr (Van Campen) MWF 12 or 1:15

53A. Second-Year Russian: Conversation—Continuation of 52A. To be taken in conjunction with 53.
   2 units, Spr (Mueller-Vollmer) TTh 10 or 11

   3 units, Aut, Win, Spr (Schupbach, Greenhill) MWF 2:15

   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 differences 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 1991-92

120/205. Advanced Russian for Students of the Physical Sciences, Mathematics, and Engineer-
ing—Develops reliable reading skills in technical language of this area, emphasizing mathematics and the physical sciences.

**1 unit, not given 1991-92**

**ADVANCED UNDERGRADUATE AND GRADUATE**

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—Closeup of Alexander Pushkin's major poetical works.

**4 units, not given 1991-92**

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 1991-92**

177/201. Advanced Russian—Reading, conversation, and composition.

**3 units, Aut (Greenhill) TTh 3:15**


**3 units, Win (Greenhill) TTh 3:15**


**3 units, Spr (Greenhill) TTh 3:15**

186. 18th-Century Russian Literature—18th-century literature in Russia evolved from a barely appreciated didactic tool to a major force for the expression of a wide variety of social and cultural ideals. The aesthetic development of 18th-century literature and the gradual rise of its socio-political function. Emphasis is on the aspects of 18th-century Russian literary culture that paved the way for the age of Pushkin.

**4 units, not given 1991-92**

187. Russian Poetry of the 18th and 19th Centuries—Open to undergraduates who have completed three years of Russian, and to graduate students. Major poetic styles of the 19th century as they intersected with late classicism, the romantic movement, and the realist and post-realist traditions. Representative poems by 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, Tsseteava, Pasternak, Sel’vinskii, Kharns, and others). Prerequisite: 187 or consent of instructor.

**4 units, Win (Freidin) MWF 11**

189/289. Old Russian Literature—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 1991-92**

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 1991-92**

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 1991-92**


**3 units, not given 1991-92**

196. Advanced Topics in Russian Grammar II: Morphology and Syntax—Problems in government and agreement: verbs, prepositions, quantifiers, and adjectives. Lectures with coordinated exercises. Students should have at least two years of college Russian or the equivalent. Students not possessing a solid control of Russian morphology must take remedial work.

**3 units, not given 1991-92**

197. Advanced Topics in Russian Grammar III.

**3 units, not given 1991-92**

198A/298A. Structural Typology of the Slavic and Balkan Languages—(Enroll in Linguistics 271.)

**3 units, not given 1991-92**

198B/298B. The History of Semiotics.

**3 units, not given 1991-92**

198C/298C. Semiotics of Film.

**3 units, not given 1991-92**
198D/298D. Literature, Folklore, and Mythology—The relation between early written literary texts and folklore mythopoetic traditions in the light of ancient Oriental, Greek, and Slavic texts. The role of collective and individual creation in relation to genres of oral and written literature. Structure of mythopoetic narration and its transformation in later literature. The use of archaic motifs and images of mythology in different European traditions in classical and avant garde literature. Links between Russian symbolist and post-symbolist (futurist, imaginist, and acmeist) poetry and folklore.

4 units, not given 1991-92

198E/298E. Modern Literature and Science—The relation between modern avant garde art and literature in the Russian writers Andrej Bely, Velimir Khlebnikov and artists (Sergej Eisenstein) and parallel figures in French and other traditions. New concepts of space, time, language, and sign are seen as notions common to science and art (including verbal art) 1900-1925. The rise of the Russian formalist school in the light of its link to Russian avant garde poetry and prose.

4 units, not given 1991-92

198F/298F. Seminar: Cultural and Linguistic Layers of Different Origins in Russian Poetic and Prose Texts—In each Russian text there are Slavic (literary and dialectal Russian) words and elements of Southern Slavic (Old Church Slavonic) and borrowed Western Slavic (particularly Polish), Western European, and Oriental vocabulary. The relation between these elements is important for diachronic (historic) study of origins of Russian culture and language and for literary and linguistic stylistics. Texts of Russian classic and avant garde writers and other texts are compared. Stylistic value of each element is analyzed and criteria for their determination introduced.

4 units, not given 1991-92

199. Individual Work—Open to Russian majors or students working on special projects. May be repeated for credit. Prerequisite: consent of instructor.

1-5 units, any quarter (Staff) by arrangement

200. Proseminar in Russian Literature—Required of all entering graduate students and all honors majors in Russian literature. Literary scholarship as a profession: languages of literary criticism; rhetoric, poetics, aesthetic theory, narrative, psychoanalysis, history and sociology of literature, reception. Students should also register for 200A.

4 units, Aut (Freidin) M 3:15-5:05

200A. Introduction to Slavic Bibliography—Open to graduate and undergraduate students. Historical and evaluated analysis of Slavic bibliographic and research tools, emphasizing Russian and Soviet materials. Application of bibliographic search methodology. Final bibliography project required. Knowledge of Russian and/or another Slavic language is helpful. Offered at beginning and advanced levels, which are taken over two consecutive years.

1-3 units, TTh 4:15-5:05

200B. The Self in the Medieval Literature of the Eastern Slavs—Uses E. Slavic texts from the 11th-17th century, to investigate the image of the person in the Middle Ages. Seminar traces evolution of a concept of self, characterized by self-consciousness, personal autonomy, and inner conflict. The impact of the medieval vision of the person on the modern Russian sense of self. Prerequisite: knowledge of Old Russian or consent of instructor.

not given 1991-92

211. Introduction to Old Church Slavic.

3 units, Aut (Van Campen) MWF 2:15

212. Old Russian and Old Church Slavic.

4 units, Win (Van Campen) MWF 2:15

213. History of the Russian Literary Language—Major structural and semantic changes from the 10th to the 19th centuries. Prerequisites: 211, 212.

4 units, Spr (Schupbach) by arrangement

214. Comparative Slavic Grammar—(Same as Linguistics 274.) Important features of Proto-Slavic reconstructed on the basis of comparisons of different Slavic languages (emphasis on Russian, Old Russian, and Old Church Slavonic), Baltic and other Indo-European languages (English, other Germanic languages, Latin and Romance languages, Greek). Main features of Slavic phonology (phonemic system, syllable structure), accentology, morphology, syntax and the schemes of Slavic texts. Recommended: knowledge of at least one Slavic language and other Indo-European languages (besides English).

4 units, Aut (Ivanov) TTh 10:30-12


4 units, not given 1991-92

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 1991-92
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 1991-92

223. Russian Literature and the Literary Milieu of the NEP Period: The Problem of Authorship (1921-1928)—A variety of texts (primarily journal fiction and criticism) which deal with the problem of authorship examined in the contemporary literary and socio-historical context. Emphasis on non-Party authors. Babel, Eikhenbaum, Mandelstam, Olesha, Tynianov, Zamiatin, and Zoshchenko.

4 units, Win (Freidin) by arrangement

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 1991-92

225A. Bulgakov—Close analysis of Mikhail Bulgakov's major prose works.

3 units, not given 1991-92


3 units, not given 1991-92

227. Boris Pasternak and the Poetry of the Russian Avant Garde—Pasternak's work examined within a broad cultural context to identify and analyze characteristic features of the Russian avant garde poetics.

4 units, not given 1991-92

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 1991-92

229. Russian Versification—History and theory of Russian versification from the 17th to the 20th century.

4 units, not given 1991-92

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 1991-92

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 1991-92

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 (Vyacheslav Iv. Ivanov, Belyi, Blok, Bryusov) 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, Propp, Frejdenberg, Polivanov, 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, Aut (Ivanov) TTh 1:15-3:05


4 units, Spr (Sinyavsky) 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 1991-92

270A. Pushkin's Eugene Onegin. 2 units (Fleishman) not given 1991-92

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 1991-92

270A. Pushkin's Eugene Onegin. 2 units (Fleishman) not given 1991-92

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 1991-92

272. Osip Mandelstam—Poetry, prose, and critical writings (1908-1938). Analysis and discussion of major texts in contemporary literary (Acmeism and Futurism), cultural (European Modernism),
and socio-political contexts. Approaches: from structuralist and intertextual to sociological and cultural-symbolic. Knowledge of Russian essential.

4 units, not given 1991-92

277. Gogol—Open to advanced undergraduates with instructor’s consent. Close reading of Gogol’s major prose and drama in context of literary and cultural trends in Russia and Western Europe in the 1830s and 40s. Readings in Russian.

4 units (Wachtel) not given 1991-92

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 1991-92

279. Dostoevsky—The writer’s shorter works in the context of European thought and literature.

4 units, not given 1991-92

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 (Fleishman, Freidin, Frank, Schupbach, Lifschitz, Mueller-Vollmer, Van Campen, Wachtel) by arrangement

300. Graduate Seminar: Theory of Narrative.

4-5 units, not given 1991-92

300A. Graduate Seminar: Literature as Institutions.

4 units, not given 1991-92

300B. Graduate Seminar—Utopianism in Russian literature.

4 units, not given 1991-92

300C. Introduction to Archival Research in Russian Literature and History.

3 units, not given 1991-92

300D. Graduate Seminar: The Voices of History—Analysis of the web of interrelationships linking belletristic 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 Karamzin, Pushkin, and Gogol.

4 units, not given 1991-92

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 OBERRUTY. Theater as seen through theoretical writings (Stanislavsky, V. Ivanov, Meyerhold, Tairov) and performances (Balganchik, Petrushka, Pobeda nad solntsem, Klop).

4 units (Wachtel) not given 1991-92

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 (Tsveetaeva, Khodaserich, Poplavsky, Bunin, Remizov, Nabokov).

4 units, Win (Fleishman) M 1:15-3:05

300G. Mayakovsky, The Poet of Revolution—Close reading of the major works of the poet.

4 units, Spr (Sinyavski) by arrangement

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 Diderot, Balzac, Gide, Camus, and Sartre.

5 units, not given 1991-92

399A,B,C. Advanced Research Seminar in Russian Literature—These seminars are offered as follow-up to 200- or 300-series seminars, as needed.

2-4 units, Aut, Win, Spr (by arrangement)

SOCIOLOGY

Emeriti: (Professors) Alex Inkeles, Dudley Kirk
Chair: Morris Zelditch, Jr.
Associate Professor: Susan Olzak
Assistant Professors: Carol Conell, David B. Grusky (on leave), Jerald R. Hertz, Leonard Hochberg (on leave Autumn), Szonja Szelenyi
Courtesy Professors: Jeffrey Pfeffer, Francisco Ramirez
Courtesy Associate Professors: Larry Diamond, Arnold Eisen, JoAnne Martin
Courtesy Assistant Professors: Patricia A. Gumport, Clifford J. Nass, Joel Podolny
Senior Lecturer: Ruth Cronkite
Lecturer: Lynn Eden
Consulting Professor: George Bohrnstedt
Consulting Associate Professor: Janet Johnston
Visiting Professors: Jacek Sztamka, Christopher Wilkes
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 field 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. Careers which relate to this study area include therapy and counseling of individuals, couples and families, and group 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.

Comparative Social and Political Institutions—This field encompasses all of the major types of social institutions (family, stratification, political, religious) that make up societies. Attention is also focused on the emergence over time of nation states and the processes which lead to convergence or similarity in institutional arrangements, as well as the processes which produce diversity. Evolutionary, ecological, institutional, and comparative perspectives are utilized. Foundation courses introduce students to these perspectives and to specific institutional areas. Careers related to this area include law and governmental service.

COURSE OFFERINGS

Most of the department courses can be categorized as primarily oriented to one of the three areas of concentration; a few courses are relevant to more than one area. Within each area of concentration, one or more 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: 5, 120, 121
   Other Courses: 104, 106, 107, 112, 118, 127, 142, 143, 220-230, 242B

2. Organizational Studies
   Foundation Courses: 160
   Other Courses: 118, 127, 141, 143; 161-169; 260-269

3. Comparative Social and Political Institutions
   Foundation Courses: 141, 142, 143, 144, 145

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. 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 60, Psychology 60).
4. 170, Classics of Modern Social Theory, or an equivalent course in social theory.
5. At least three foundation courses, one each from the three areas 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 three areas of concentration described above. To complete the requirements for the A.B. degree in Sociology with a specialization in Social Psychology and Interpersonal Processes, Organizational Studies, or Comparative Social and Political Institutions, 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 letter grade indicator (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.

Honors 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 coterminal master’s program as described in the “Degrees” section of this bulletin.

To apply for admission to the coterminal program, students should submit with the coterminal application the following: (1) a statement of purpose providing the rationale for the proposed program of study; (2) a proposed program that specifies at least 45 units of course work relevant to the degree program and at least 36 units in Sociology; (3) a current undergraduate transcript; (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 200 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 coterminal 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 coterminal students propose programs that concentrate on one of the three specialized areas of study offered by the department: Social Psychology and Interpersonal Relations; Organizational Studies; or Comparative Social and
Political Institutions. This approach helps to ensure program coherence. At the present time, however, such specializations are not formally recognized by the University, so that the degree obtained is an A.M. in Sociology.

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 Support 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 awards 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. 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 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 law, medicine, business, education, 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 co-terminal master's program as described in the "Degrees" section of this bulletin. Information may be obtained from the departmental secretary.

MASTER OF ARTS IN TEACHING

This degree 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 further academic preparation. The program consists of a minimum of 25 units in the teaching field and 12 units in the School of Education. Detailed requirements are outlined in the "School of Education" section of this bulletin.

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 fifth 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 or preparing a report of professional quality based on his or her experiences.

2. Complete a teaching apprenticeship, working for three quarters as a teaching assistant under the supervision of a faculty member.

3. Develop a thorough grounding in sociological theory and research methods. To accomplish this, five graduate courses are required: Sociology 370A, 370B, 382, 383, and 384. In addition, students entering with little background in statistics are required to take an elementary course in the first quarter after entering.

4. Select two fields in sociology as areas of special competence, and pass written examinations in these fields. Examples of fields are: small groups, socialization, family and kinship, sociology of education, comparative institutions, political sociology, and organizations. Theory or methods may be offered as a field only when the candidate has an exceptional grasp of material in the area.

5. 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.

OPEN TO ALL STUDENTS

INTRODUCTORY

1A. Introduction to Sociology—Three parts: the sociology of the person investigates the process by which the individual negotiates a role in society; the structure of society examines what sociology has to say about ethnicity, gender, and class relations, and how these structures influence and determine the outcomes of individual trajectories; the history of society examines the origins of the modern world system, the rise of the market and of the welfare state, and the prospects for the future. DR:9(5)

5 units, Aut (Wilkes) MWF 10

section by arrangement

1B. Introduction to Sociology—Introduction to theory and research in sociology. Topics: relation of the individual and society, formal organization, gender and the workplace, class and ethnic/racial inequality, social movements and collective action. The interrelations between the formulation of theories about social behavior and the collection and analysis of data in order to evaluate those theories. "Hands-on" experience in analyzing sociological problems. Students undertake guided research using computers to analyze sociological data. Necessary skills are covered in class and section meetings. DR:9(5)

5 units, Win (Hannan) MWF 10

1C. Introduction to Sociology: An Introduction to the Sociological Imagination—Introduction to significant aspects of contemporary American society. How social processes and structures limit or facilitate the realization of an individual's decisions. Lectures/discussions illustrate the major theories that guide sociological inquiry. Possible topics: power and status in small groups; family processes; the quest for equality: gender, race, and ethnic groups; church and faith; the foundations of American culture; social mobility and social inequality; the formation of a nation-state in a liberal democracy; the social foundations of American Exceptionalism; America and the world-system. Guest lecture on each topic by a different faculty member of the department. DR:9(5)

5 units, Spr (Hochberg) MWF 9

section by arrangement

5. Status, Friendship, and Social Pressure: An Experiential Approach—The basic social processes that structure the individual's experience in interpersonal situations, including group pressure on individual choices, social control of deviants, operation of status distinctions (sex and race), formation of friendships, and formation of intimate (love) relationships. Structured exercises and simulation gaming in section meetings provide experience with these processes. Lectures examine the processes in terms of theoretical ideas, empirical research, and clinical strategy. DR:9†(4 or 5)

5 units, Win (Berger) MWF 10 plus one 2-hour section M or T 2:15-4:05
53. Population Perspectives in 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 food resources, urbanization, and development; determinants of levels and trends in fertility, mortality, and migration; population projections and demographic methods; population and the environment; population policies.

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

SOCIAL ISSUES IN CONTEMPORARY SOCIETY

104. The 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 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, Spr (Ridgeway) TTh 9:30-10:45

105. 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 (Tuma) given 1992-93

106. Deviance and Social Control—Sexual deviance, drug abuse, mental illness, crime in the streets; corporate and governmental abuses. The social foundations of the detections, labeling, and processing of people as "deviants." The institutions and agencies mandated to keep the "public order," how labeled persons are separated from the rest of society physically and symbolically, and the consequences for those individuals and for society.

3-5 units, given 1992-93

107. Sociology of Mental Health—(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 disorders, 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

108. Peace Studies—(Same as Education 173X, History 154, Political Science 133, Psychology 142, Religious Studies 158.) 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. 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 on behalf of peace. Lectures on how our world is changing; the nature of peace and peaceful processes; peace at the operational level (the causes of war, building negative peace, building positive peace); peace—moral and normative considerations; peace and you.

5 units, Spr (Bernstein, Bland, Drekmeier, Dornbusch, Moses, Noddings, Ross) TTh 2:15-4:05 and by arrangement

112. Gender and Education—(Same as Education 170, 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. 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, Aut (E. Cohen, Strober) MW 1:15-3:05

117. Education and the Status of Women: A Comparative Perspective—(Same as Education 197, Feminist Studies 139A.) Theories and perspectives from the social sciences relevant to an understanding of the role of education in changing, modifying, or reproducing structures of gender differentiation and hierarchy. Cross-national research on the status of women and its uses to evaluate knowledge claims from varying perspectives.

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

118. Groups, Teams, and Organizations—What makes groups productive? What is an effective group member? How does "team spirit" affect individual performance? How do organizations expand and constrain individuals? Provides experience with group and organizational phenomena
through use of simulation games, structured exercises, and case studies. Lectures/reading provide tools for analyzing these experiences based on empirical research and theoretical ideas. Enrollment limited to 35.

5 units, Spr (B. Cohen) MW 2:15-4:05

SOCIAL PSYCHOLOGY AND INTERPERSONAL BEHAVIOR

120. Interpersonal Relations—Power, exchange, coalition formation, status, conformity, and deviance. Important traditions of research have developed from basic theories of these processes. Emphasis is on understanding basic theories and drawing out their implications for change in a broad range of situations, families, work groups, and friendship groups. DR:9(4 or 5)

5 units, Aut (Johnston) MWF 8 section by arrangement

121. Social Psychology and Social Structure—Understanding the individual's relationship to social groups, from intimate two-person groups to society at large. Emphasis on socializing institutions, the family, ethnic groups in American society, gender difference, and international comparisons of social processes.

5 units, Win (Dornbusch) MWF 11 section by arrangement

125. Children and Society—Provides an integrated view of childhood, including international comparisons, historical images of childhood, and ethnic differences. Emphasizes theoretical issues, empirical studies, 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 sensitize students to the issues and problems of contemporary childhood.

5 units, Win (Dornbusch) TTh 8-9:50

COMPARATIVE SOCIOLOGY: SOCIAL INSTITUTIONS AND SOCIAL CHANGE

132. The Social Foundations of Democracy—(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. Attention to worldwide development and re-emergence of democracy in the past decade. Case studies of individual national experiences with democracy.

5 units, Spr (Diamond) MWF 11

134. The role of Political and Social Groups in the Revolution in Eastern Europe—Analyzes and critically evaluates the role of various groups in the political life of Eastern European countries now undergoing essential changes. Destruction of Stalinist socialism in Poland began in the late 1970s and nearly ten years later in other East European socialist countries. Within this transition several groups (political opposition, social movements, peasants, intelligentsia, working class, and others) played different roles. Seminar evaluates the role that social and political groups in Eastern European countries played in breaking down the communist system and creating the new social order.

5 units, Win (Szmata) TTh 1:15-3:05

135. Socialist Societies in Transition—Surveys visions of socialism from the Romantic tradition of William Morris, to the scientific theory of Karl Marx, and the unique doctrine of Mao Zedong. These are contrasted with the realities of "actually existing socialist societies" by the examination of empirical material on the problems of centrally managed economies, the extent and dynamics of social inequalities, dissent and opposition under socialism, and recent strategies for economic reform. Alternative views on the nature of these societies. Their overall prospects for social transformation. Emphasis on the socialist experiments in China, Cuba, Czechoslovakia, E. Germany, Hungary, Mozambique, Nicaragua, Poland, the Soviet Union, and Yugoslavia.

5 units (Szelenyi) given 1992-93

136. Seminar: The Political Sociology of American Security Policy—(Same as Political Science 145L) By what internal social and political processes are the ends and means of national security policy determined? Utilizes system-, society-, and state-centered approaches (e.g., rational actor, organizational, and neo-Marxist) to explore goal-setting and the development of policy instruments in post-WWII American foreign and military policy. Issues: early Cold War strategy, U.S. intervention in Vietnam, the Gulf War, and thought and behavior of military organizations.

5 units, Spr (Eden) TTh 10-12

138. Gender and Society—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 (Szelenyi) given 1992-93

139. Introduction to Historical Sociology—Analysis of the relationship between historical events and sociological structures. Theoretical perspectives and comparative methods in recent literature by Michael Mann, Charles Tilly, Perry Anderson, and Immanuel Wallerstein. Themes: social and political revolution, capitalism and the rise of the West, development of the modern
world-system, and the origins and structure of the modern state.
3-5 units (Hochberg) given 1992-93

140. Social Stratification and Inequality—Study of processes and institutions that differentially distribute social rewards and resources in American society, including education, occupations, and income. How class, gender, and ethnic differences in stratification emerge and persist.
DR:9(5)
5 units, Spr (Olsak) TTh 9-10:30

141. Politics and Society—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 9-11 section by arrangement

142. 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, Win (Herting) TTh 2:15-3:45

143. Education and Society—(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 9-11

144. Social Mobility—Functions and consequences of mobility between social classes; the role of education, social contacts, cultural capital, and "lack" 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 1992-93

3-5 units, Win (Olsak) TTh 9-10:30

147. Sociology of Mass Schooling—(Same as Education 245X.) Introduction to issues regarding the rise, organization, and expansion of mass education throughout the world. Interdisciplinary readings with a comparative/historical and cross-national research focus. Evaluation of functionalist, conflict, incorporation, and other theories of mass education.
4 units (Ramirez) given 1992-93

148. Social Theory and Religion—(Same as Religious Studies 148.)
5 units (Eisen) not given 1991-92

149. Communication, Technology, and Society—(Same as Communication 169, VTSS 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.
4 units, Spr (Nass) TTh 10-11:50

150. Urban Sociology—Over the last 200 years the scale of the ecological communities in which people are embedded has increased more rapidly than the psychological communities with which people identify themselves and the political communities within which they are governed. The impact on the ability of people to govern themselves in all three kinds of communities, and the disparity between the scales of the ecological, psychological, and political communities.
3-5 units, Spr (Conell) TTh 10-11:50

151. Jews and Judaism in America—(Same as Religious Studies 53.) Examination of the interaction between the character of the American Jewish community and the forms of Judaism developed in this country, against the background of American ethnicity. Historical, literary, sociological, and theological materials used.
DR:8(3)
4 units, Spr (Eisen) TTh 11-12:15

154. 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 (Tuma) given 1992-93

155. Law and Society—Introduction to major issues in the sociology of law. Topics: law and social control; law and stratification; the legal profession; legal culture; law and politics; legal change. Legal materials from areas of criminal law, family law, and civil rights law is integrated with social science literature where appropriate.
5 units, given 1992-93

157. Seminar: Social and Geographic Foundations of American Political Development—Historical overview of the geographic and social con-
text of party conflict, voting behavior, institutional development, and public policy formation in the U.S. Various theories (sectionalism, the Annales School, world-system analysis, and sociogeography) are applied to the study of political events and processes. Students utilize a geographic information system for analyzing and displaying quantitative data via computer-generated maps.

3-5 units (Hochberg) given 1992-93

158. Social Movements and Social Protest—The underside of electoral politics, "the politics of disorder." How do new issues get placed on political agendas? What determines whether a given grievance leads to collective protest, and what role does formal organization play in the process? What determines whether protest leads to amelioration of the underlying grievances, to proto-revolutionary foment or to incorporation of new interest groups into the polity? What roles do the procedures for channeling protest, which are associated with the liberal state, play in preserving that state, and is that role sufficient to justify the charge that the liberal state's response to protest is essentially repressive?

3-5 units, Win (Conell) TTh 10-11:50

159. The Sociology of Revolution—The study of revolution, its causes, processes, and consequences. Readings are organized around major paradigms in the social sciences. Some of the major cases of revolution and revolutionary movements and the major issues (the significance of ideology, violence, class conflict, political regimes, and geographic structures) which cut across the cases. Emphasis is on cases and issues viewed in the context of the theoretical explanations of revolutionary crises.

3-5 units (Hochberg) given 1992-93

FORMAL ORGANIZATIONS


5 units, Aut (Scott) MWF 9
section by arrangement

163. Organizational Decision Making—(Same as Political Science 107, Business 37L) 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 1992-93

164. Organizations: Principals and Emerging Ideas—(Same as Education 255.) Analyzes basic ideas about the hows and whys of the ways organizations and the people in them function. Perspectives are drawn from psychology, sociology, political science, and economics to address questions about what holds organizations together (and in place) and what influences how (and when) they change. Emphasizes commonalities, differences, and implications of various theoretical approaches and their applicability to different types of organizations.

4 units, Spr (Hannaway) TTh 2:15-4:05

165. Organizational Leadership—(Same as 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) WF 8-9:50
optional section

166. Organizations and Public Policy—(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

167. Women and Organizations—(Same as Feminist Studies 135/235.) 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

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)

5 units, Spr (Szelengyi) MW 10-11:30
171. Theory and Method in Contemporary Sociology—How theory is used in contemporary sociology. How to analyze, evaluate, develop, and use theory. Analysis of varied examples of contemporary theoretically-oriented sociology from which are extracted models of theory and its relation to research design. Exercises identify sociological questions, propose theories that might answer them, and suggest research that might test the consequences of the theories. 5 units, given 1992-93

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. Students must enroll concurrently in 180A.
4 units, Aut (B. Cohen) by arrangement

181. Introduction to Statistical Methods for Sociologists—Elements of statistical description and statistical 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 Psychology 60 or Statistics 60 cannot be given credit for Sociology 60.
5 units, Aut (Staff) TWTh 11-1

182. Gathering Evidence for Urban and Policy Research—Introduction to social-scientific methods for gathering evidence for urban, policy, and other social research. Topics: usage of government documents, interviewing, and social surveys (public opinion polls). Students apply these methods in group projects that focus on issues in nearby cities.
5 units, given 1992-93

INDIVIDUALIZED LEARNING EXPERIENCES, PRIMARILY FOR UNDERGRADUATE MAJORS

190. Undergraduate Individual Study.
1-5 units (Staff) by arrangement

191. Undergraduate Directed Research—An opportunity to 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—An opportunity to work in an apprentice-like relationship with specific faculty member(s) in an on-going research project. Prior arrangement required.
1-10 units (Staff) by arrangement

193. Undergraduate Teaching Apprenticeship.
1-5 units (Staff) by arrangement

194. Departmental Seminar for Undergraduate Majors—Required of all sociology majors. Introduces sociology as an academic discipline, career opportunities in the field, and current faculty research interests.
2 units, Aut (Staff) W 12

196. Senior Thesis—An opportunity to work intensively on an honors thesis project under faculty supervision (see description of honors program). Must be arranged early in the year of graduation, or before.
15 units (Staff) by arrangement

FOR ADVANCED UNDERGRADUATES AND GRADUATE STUDENTS

207. Sociology of Mental Health—Same as 107 with special work for graduate students.
5 units, Spr (Cronkite) TTh 10:30-12

210. Problems in Sociology of Education—(Meets with 310; 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. Reading and evaluating social sciences research. Short written assignments and individual feedback.
4 units, Win (E. Cohen) MW 3:15-5:05

220. Interpersonal Relations: Lectures and Seminars—Same as 120 plus seminar for graduate students.
5 units, Aut (Johnston) MWF 8 section by arrangement

221. Theories of Social Psychology—Open to advanced undergraduates. Major theoretical perspectives in interpersonal processes and social psychology. Basic principles and assumptions of each perspective; techniques of investigation and methodological issues. Perspectives: symbolic interaction, field theory and exchanges, and problems associated with perspectives, e.g., power and influence, development of the self or attribution.
5 units, Win (Ridgeway) TTh 9:30-10:45

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.

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, Win (Staff) Th 2:15-5:05

230. Seminar: Evaluation Research, Issues, and Applications—For advanced students, co-sponsored by the Department of Psychiatry and Veterans Administration Far West Health Services Research and Development Field Program. The paradigms for evaluation research, the role of theory in formulating evaluations, and common issues in the design and execution of evaluations studies. Topics: general issues in program evaluation, development of assessment procedures, and examples of ongoing treatment and health services related evaluation projects. Prerequisite: consent of instructor.

2 units (Moos, Cronkite, Finney)

234. The Social Foundations of Democracy—Same as 132, with special work for graduate students.

5 units, Spr (Diamond) MWF 11

240. 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 1992-93

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

246. Seminar: Politics and Society—(Same as Political Science 226.) Theoretical and empirical analyses of the relationships between politics and society in a wide range of countries, as formulated by political scientists and sociologists. Focuses on the sources of variation in political systems.

5 units (Lipset) not given 1991-92

249. Sociology of Mortality and Fertility—Changes in mortality and fertility in the developed and developing world; historical and contemporary patterns. Interplay of social and demographic factors on basic demographic changes (i.e., transitions from high to low fertility) and their link to other demographic and social structures (i.e., marriage patterns, labor force structure, kinship patterns). Theories explaining changes and techniques for analyzing these relations.

5 units, given 1992-93

250. Modernization/Secularization—(Same as Religious Studies 261.) Re-examination of these two fundamental concepts in light of recent historical, sociological, anthropological, and philosophical developments.

5 units, Win (Eisen)

260. Formal Organizations: Lectures and Seminar—Same lectures as 160 plus seminar session for graduate students.

5 units, Aut (Scott) MWF 9

261. Seminar: Organizational Ecology—Recent research on populations of market and non-market oriented organizations. The processes that determine when new organizations emerge, what forms they assume, and how long they last. Relations between organizations and environment, and the competitive, commensal, and symbiotic relations that tie organizations together.

5 units, Win (Staff) T 2:15-5:05

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 submit 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, Spr (Webb)

265. International Perspectives on 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) MTh 3:20-5:05

266. Seminar: The Employment Relationships—(Same as Business 674.) Current theory and empirical research from social sciences disciplines bearing 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, Spr (Hannan)


3, 5, or 8 units, Spr (Hochberg) TTh 1-3

268. Seminar: Industrial Organization—Recent literature on work place organization, political economy, and industrial policy are used to examine the relations among workers, employers, and government agencies. Topics vary.

3-5 units, Spr (Conell) T 2:15-5:05

269A,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

282. Seminar: Topics in Comparative and Historical Sociology—The comparative and historical approaches to sociological analysis. Topics vary each year.

5 units, Spr (Conell) T 2:15-5:05

285. Political and Economic Organization of the World System—Seminar on current theory and research on the structures of the world polity, economy, and culture as they affect the organization and development of national societies. Dependency theories, world-economy theories, and world effects on the evolution, dominance, and modern forms of states and regimes. Prerequisite: previous work in comparative or political sociology.

5 units, Spr (Meyer) F 2:15-5:05

286. Seminar on Institutional Analysis—Reading and research on the nature, origins, and effects of the modern institutional system. Emphasis on the state system.

5 units (Meyer) given 1992-93

PRIMARILY FOR GRADUATE STUDENTS

300A,B,C. Graduate Proseminar—Limited to first-year graduate students in Sociology.

2 units, Aut, Win, Spr (Staff)

by arrangement

306. 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) MW 1:15-3:05

and by arrangement

307. Research Seminar in Higher Education—(Same as Education 346X.) Overview of U.S. system of higher education and how it evolved. What are structural and cultural features of contemporary system? How did organizational structures and purposes get defined? How and why have they changed? Examines major topic areas (e.g., organization and governance, faculty, students, curriculum) and recent system-wide issues (e.g., stratification, decentralization, excellence and diversity).

4 units, Aut (Cumport) Th 2:15-5:05
310. Sociology of Education—(Same as Education 310.) 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.
4 units, Win (E. Cohen) MW 3:15-5:05

321. Research Issues in Social Psychology I—Selected current issues in sociological social psychology. Topics: 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; and effects of power and legitimacy on responses to inequity. Prerequisite: 120 or 122, or consent of instructor.
5 units (Berger, Staff) given 1992-93

322. Research Issues in Social Psychology II—Further examination of current research issues in sociological social psychology. Topics: reward expectations and the legitimation of power and prestige orders; the effects of shared expectations on the exercise of power in interpersonal situations; social structure and productivity in short-term and permanent work groups; and homeless families and their children. Prerequisite: 120 or 122 or consent of instructor.
5 units, Spr (Berger, Staff) TTh 2:15-4:05

361. Seminar: Social Psychology of Organizations—(Same as Business 671.) Research in micro-organizational behavior. Review of the current research literature in micro-organizational behavior, including its social psychological and psychological foundations. Topics: work attitudes, person-situation theories, organizational culture and commitment, leadership and industrial psychology. Prerequisites: enrollment in a Ph.D. program and consent of the instructor.
4 units, Win (Staff)

365. Seminar: Advanced Organization Theory—(Same as Business 676, Political Science 306.) Topics in organization theory for advanced students. Prerequisite: consent of instructor.
5 units, Win (March)

366. Workshop on Organizational Ecology—Workshop for designing collection and analysis of data on longterm change in populations and communities of organizations. Prerequisites: 261 (or equivalent) and consent of the instructor.
5 units, Win (Hannan) F 2:15-5:05

367. Seminar: Organizational Analysis—Doctoral-level introduction to research on organizations. Emphasizes recent organizational research in social science. Prerequisite: enrollment in a doctoral program.
5 units, Aut (Martin)

370A,B. Basic Problems in Sociological Theory—Two-quarter course on analysis and construction of theories and on basic strategies of sociological analysis: 370A introduces strategies of 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 elementary methods required to intelligently read and analyze theory. 370B refines these methods and extends them to the construction of new theory. It includes a self-directed computer course in logic. Prerequisite: consent of the instructor.
5 units, Aut, Win, Spr (Berger, Staff) TTh 2:15-4:05 by arrangement

371A,B,C. Research Practicum: Cross-National Studies of Educational and Political Organizations—(Same as Education 387A,B,C.) Analysis of quantitative and longitudinal data on national educational systems and political structures. Prerequisite: consent of instructor.
5 units, Aut, Win, Spr (Meyer, Ramirez) by arrangement

372A,B,C. Research Practicum: Stratification and Mobility—Analysis of research problems in social stratification.
1-5 units, Aut, Win, Spr (Szelenyi, Tuma) M 12

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: Introduction to 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. Students must enroll concurrently in 381B.
4 units, Aut (Staff) TTh 11-1

381B. Sociological Methodology IB: Introduction to Social Scientific Computing—Introduct-
tion 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, Aut (Staff) W 11-1

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, 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 (Herting, Tuma) TTh 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) TTh 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, Aut (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 1992-93

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 1992-93

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 1992-93

389A.B. Workshop in Research Design and Methods—Practicum in research design. Prerequisite: consent of instructors.

389A. 2-5 units, Win (Staff) by arrangement
389B. 2-5 units, given 1992-93

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

(Staff) by arrangement

CENTER FOR SPACE SCIENCE AND ASTROPHYSICS


Director: Robert A. Helliwell
Deputy Director: Peter A. Sturrock
Associate Directors: Robert V. Wagoner, Arthur B. C. Walker


Associate Professors: Umran S. Inan, Bruce B. Lusignan, Peter F. Michelson

Professors (Research): C-W. Francis Everitt, Philip H. Scherrer, J. Gethyn Timothy

Consulting Professor: Martin Walt

The center is an interdepartmental organization coordinating teaching and research in space science and astrophysics. Its members are drawn from the Departments of Applied Earth Sciences and Geology in the School of Earth Sciences; the Departments of Aeronautics and Astronautics, Electrical Engineering and Mechanical Engi-
neering in the School of Engineering; and the Departments of Applied Physics, Chemistry, and Physics in the School of Humanities and Sciences.

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; the application of information sciences to the transfer and analysis of space data; 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 through the NASA-Ames-Stanford-University Joint Institute for Space Research, and with scientists at the Lockheed Palo Alto Research Laboratory through the Stanford-Lockheed Institute for Astrophysical and 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, and also of the University Corporation for Atmospheric Research in Boulder, Colorado.

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 either the director or deputy director.
MECHANICAL ENGINEERING

260. Geophysical Fluid Dynamics.

PHYSICS

15. Cosmic Horizons.

364. Gravitation.

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

Professors: Mary Louise Pratt, Michael P. Predmore, Jorge Ruffinelli (on leave), Guadalupe Valdés (on leave), Sylvia Wynter

Associate Professor: Wilfrido H. Corral

Assistant Professors: Francisco Caetano Lopes, Jr., Adrienne L. Martin (on leave)

Associate Professor (Teaching): María-Paz Haro

Senior Lecturer: Karin Van den Dool

Lecturers: Irene Corso, Juergen Hahn

Visiting Professor: Ann Cruz (Autumn), Luis Leal (1991-92), María del Carmen Sigler (Spring)

Director, Undergraduate Language Program: María-Paz Haro

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 in the Department of Spanish and Portuguese, the following major paths have been designed. Each has different objectives and requirements. Students should consider, in consultation with a faculty adviser, which major path corresponds most closely to their own personal and professional objectives.

Literature Emphasis—This path is recommended for those who enjoy reading literature and wish to acquire a knowledge of poetry, prose, and drama in the Hispanic world. Courses provide historical perspective and develop critical skills in approaching literature. Candidates complete a minimum of 50 units from courses in the department numbered 100 or higher.

Requirements: Spanish 140, Introduction to Methods of Literary Analysis; 170, Undergraduate Winter Colloquium; 201 and 202, Advanced Grammar and Composition; three courses in Peninsular literature; three courses in Latin American literature. Among the courses taken, two should be literature prior to 1750.

Recommended: Spanish 203, History of the Spanish Language; Chicano literature; linguistics; literary theory.

Literature and Society Emphasis—This path allows a broader major than is possible in the other areas of concentration. The student can combine the study of Spanish, Portuguese, or Latin American literature with such fields as political science, history, anthropology, and economics. Students must complete a minimum of 40 units in the department from courses numbered 100 or higher, and 10 units in related fields with adviser approval.

Requirements: Spanish 140, Introduction to Methods of Literary Analysis; 170, Undergraduate Winter Colloquium; 201 and 202, Advanced Grammar and Composition; three courses in Peninsular Literature; three courses in Latin American literature.

Chicano Studies Emphasis—This path allows concentration in Chicano Studies. Students acquire a broad knowledge of the roots of Chicano literature by taking courses designated Chicano Studies (CHST) and courses in, for instance, the Departments of Anthropology, History, or Linguistics. Candidates must complete a minimum of 50 units, including 10 units in Latin American and/or Peninsular literature from courses numbered 100 or higher in the department.

Requirements: Spanish 140, Introduction to Methods of Literary Analysis; 170, Undergraduate Winter Colloquium; 201 and 202, Advanced Grammar and Composition; three courses in Chicano literature; four courses in Latin American and/or Peninsular literature.

Language Emphasis—This path is for students whose primary interest is in the structure and use of Spanish. Students must complete a minimum of 50 units from courses in the department numbered 100 or higher.

Requirements: Spanish 140, Introduction to Methods of Literary Analysis; Spanish 170, Undergraduate Winter 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 109 (Portuguese for Speakers of Spanish.)

SUGGESTED SEQUENCE
A series of core courses designed to fulfill the requirements for all the major paths are offered each year. All majors must take Spanish 140 and 170. Courses numbered 150-151 (Peninsular literature) and 160-161 (Latin American literature) are introductory survey courses which satisfy the minimum literature requirements for all the paths. It is recommended that majors enroll initially in 150-151 or 160-161. It is also expected that they go on to take courses at the 200 level.

Courses numbered 130B, 131B, 132B are 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.

It is also recommended that all Spanish majors take Portuguese 109, 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 field such as history, Latin American studies, etc.

For students in the honors program in Humanities, up to 6 units of that program may be applied toward completion of the Spanish major.

STANFORD PROGRAMS ABROAD
SALAMANCA, SPAIN
Students with two years of college Spanish or the equivalent may spend two quarters in Spain in the Stanford Program at the University of Salamanca. Application forms may be obtained from Overseas Studies (room 126, Sweet Hall).

Students reside in residencias de estudiantes and attend university courses. Two types of courses are offered: those under departmental listings in Overseas Studies, given or organized by the Director in Residence, and courses taught at the University of Salamanca. Special courses for Stanford students include:

Overseas Studies 101A, Bases sociopolíticas de la evolución cultural española (5 units)
Overseas Studies 101B, Literatura Española Contemporánea (5 units)
Overseas Studies 102A, Historia de España, s.XIX (4 units)
Overseas Studies 102B, Historia de España, s.XX (4 units)
Overseas Studies 103A, Advanced Grammar and Composition (3 units)
Overseas Studies 103B, Advanced Grammar and Composition (3 units)

These courses are required for all students in the Salamanca program. Three are offered in Autumn Quarter and three in Winter Quarter.

Each Stanford student enrolls in two additional courses at the University of Salamanca from among those offered to Spanish students. The course list is available at the Overseas Studies office. Courses taught at the University of Salamanca include: Spanish Linguistics; History of Modern Philosophy; Anthropology; Pre-Columbian and Hispanic-American Art; Medieval History; etc.

For other information and course lists, consult Dr. Haro or the office of Overseas Studies.

BRAZIL AND PORTUGAL
For information on programs in Brazil, consult Professor Van den Dool. For information on programs in Portugal, consult Professor Lopes. For credits in these and other programs abroad, consult your adviser.

INTENSIVE SUMMER PROGRAM
Stanford University offers first-year intensive language study in Spanish and Portuguese 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 who need 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 be accepted by a faculty member who serves as adviser and write an honors essay of 20 to 25 pages. 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 CERTIFICATION

Advanced students are encouraged to qualify by examination for the ACTFL Language Proficiency Notation which certifies foreign language competence. For further information, contact Dr. Haro.

GRADUATE PROGRAMS

MASTER OF ARTS IN SPANISH

This A.M. degree program is for students who do not intend to continue their studies through the Ph.D. degree. Students must complete a minimum of 45 units, 36 of which must be completed at Stanford.

Requirements: Spanish 201, 202, Advanced Grammar and Composition; 301, Methods of Teaching Spanish; 306, Introduction to Literary Theory or an equivalent course; 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).

In addition, students may take approved courses in related fields such as classics, comparative literature, education, history of art, linguistics, modern thought, and philosophy. Students planning a career in language teaching may also take part in the University's STEP teacher training program.

COTERMINAL A.B. AND A.M.

The requirements for the coterminus A.M. are the same as those outlined above for the A.M. No course can count for both the A.B. and A.M. degrees.

DOCTOR OF PHILOSOPHY

The requirements of the Ph.D. are: (1) 90 units of graduate-level course work; units completed toward the A.M. degree can be counted for the Ph.D.; (2) Spanish 201 and 202, Advanced Grammar and Composition; 301, Methods of Teaching Spanish; and 306, Introduction to Literary Theory or an equivalent course must be included; (3) a reading knowledge of Portuguese and one other foreign language; (4) the qualifying paper, and the comprehensive and the University oral examinations, as described below; (5) teaching of at least three courses in the department; (6) completion of a dissertation. 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 a proficiency examination in Spanish during the first week of Autumn Quarter to determine the degree of previous preparation. The student is required to remedy deficiencies indicated by this examination before a teaching assignment is awarded.

In preparation for teaching, Ph.D. candidates must take Spanish 301, Methods of Teaching Spanish, in the Spring Quarter of the first year.

In consultation with the adviser, students select one major field of study from the following: (1) Spanish Medieval Literature, (2) Spanish Literature of the Golden Age, (3) 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 field 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 field 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 should consult with their adviser and take relevant courses in other departments and programs, such as the Graduate Program in Humanities, Comparative Literature, Modern Thought and Literature, Feminist Studies, or History. It is also possible to complete a minor in another department with approval of the adviser. Normally, not more than 25 units are taken outside the department.
After the first year of study, the student 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 end of the third year of study. Early in the fourth year, a written comprehensive examination on the major field and secondary areas is 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 adviser requests that the chair approve a committee to supervise the dissertation. The committee may advise extra preparation within or outside the department, and time should be allowed for such work. The University oral examination usually takes place one or two quarters after passing the comprehensive examination. The oral examination covers plans for the dissertation based on a prospectus approved by the 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 are required to reinstate their 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

OVERVIEW

1. First- and Second-Year Spanish (1-99)
   - Culture and Bilingual (130-139)
   - Literature (140-198)
   - Individual Work (199)

2. Intermediate Courses (100-199)
   - Advanced Language, Linguistics, and Theory (200-210)
   - Peninsular Literature (211-239)
   - Medieval and Golden Age Literatures (211-220)
   - Modern and Contemporary Literatures (221-230)
   - Genre Survey Courses (231-235)
   - Individual Authors (236-239)

3. Courses for Advanced Undergraduates and Graduates (200-299)
   - Latin American Literature (240-279)
   - Periods (240-247)
   - National and Regional Literatures (248-254)
   - Genres and Literary Movements (255-271)
   - Individual Authors (272-279)
   - Chicano Literature (280-289)
   - Special Topics (290-298)
   - Individual Work (299)

4. Graduate Seminars (300-399)
   - Linguistics, Methodology, and Literary Theory (300-313)
   - Peninsular Literature (314-339)
   - Latin American Literature (340-379)
   - Chicano Literature (380-389)
   - Special Topics (390-398)
   - Individual Work (399)
   - Dissertation Research (802)

5. Portuguese Program (1-399)
   - Language (1-199)
   - Brazilian Literature (240-279)
   - Individual Authors (280-289)
   - Special Topics (290-298)
   - Individual Work (299)
   - Graduate Seminars (300-398)
   - Individual Work (399)
   - Dissertation Research (802)

All courses are taught in Spanish or Portuguese unless otherwise noted.
SPANISH LANGUAGE PROGRAM

Students registering for the first time in a first- or second-year course should take a placement test if they 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 third-year (100 or above) courses in order not to lose their AP credit. 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)—A proficiency-oriented introduction emphasizing speaking and oral comprehension.

   5 units, Aut, Win, Spr (Staff) MTWThF
   plus language lab

2. First-Year Spanish (2nd Quarter)—As above, with additional development of reading and writing skills, and cultural readings. Prerequisite: 1 or equivalent.

   5 units, Aut, Win, Spr (Staff) MTWThF
   plus language lab

3. First-Year Spanish (3rd Quarter)—As above, with additional cultural and/or literary readings. Prerequisite: 2 or equivalent.

   5 units, Aut, Win, Spr (Staff) MTWThF
   plus language lab

10/110. 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. Satisfactory/No Credit only. Prerequisite: 1 or equivalent.

   2 units, Aut, Win, Spr (Staff) TTh

11. Second-Year Spanish (1st Quarter)—Intensive review of grammatical 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.

   4-5 units, Aut, Win, Spr (Staff) MTWTh

15/115. Intermediate Conversation—(Graduate students register for 115.) Recommended as complement to second-year courses. Satisfactory/No Credit only. Prerequisite: 3 or equivalent.

   3 units, Aut, Win, Spr (Staff) MWF
   Sum (Staff) MTWTh

100. Advanced Conversation—Satisfactory/No Credit only. May be 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—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. DR:7(2); entire sequence must be completed.

   5 units, Aut, Win, Spr (Staff) MTWTh

162B. Chicano Literature: Creative Writing for Bilingual Students—Basic creative writing. Students are encouraged to draw from their bilingual, bicultural 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 (First Quarter)—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

1B. Accelerated First-Year Spanish (Second Quarter)—Continuation of 1A. Equivalent to the second half of the regular first-year sequence.

   5 units, Win (Staff) plus language lab

15S, 25S, 35S. 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 15S/101S, 25S/102S, 35S/103S must attend 10/110, or pass a first-year
oral proficiency examination. Enrollment limited. Consent of instructor required.

3-15 units, Aut, Win, Spr (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 (Haro) MTWThF

20. Second-Year Intensive Spanish—Proficiency-oriented accelerated course recommended for students with previous training (three to five years of high school Spanish or the equivalent) whose progress would be best served by intensive study. Meets daily for two hours.

9 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 LGI of at least "B+".

3 units, Spr (Staff)

99. Individual Work—Cannot be taken as a substitute for any of the regularly scheduled language courses.

1-5 units (Staff) by arrangement

121M. Spanish for Medical Personnel—(Same as Health Research and Policy 280.) 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.

3 units, Aut (Corso)

122M. Spanish for Medical Personnel—(Same as Health Research and Policy 281.) Continuation of 121M. Prerequisite: 121M or equivalent.

3 units, Win (Corso)

123M. Spanish for Medical Personnel—(Same as Health Research and Policy 282.) Continuation of 122M. Prerequisite: 122M or equivalent.

3 units, 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.

3-5 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, Aut, Spr (Staff)

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, Puertorriqueño 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—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.

130B. Spanish Cultural Perspectives—

3-5 units, Aut (Haro)

131B. Hispanic American Cultural Perspectives—

3-5 units, Win (Staff)

132B. Mexican and Chicano Cultural Perspectives—

3-5 units, Spr (Staff)

LITERATURE

These provide a broad perspective on Hispanic literature and an introduction to literary studies. Prerequisite: 13 or equivalent.

140. Introduction to Methods of Literary Analysis—For students with little or no background in literary analysis. Introduces basic terminology of literary theory and critical approaches to literature through textual analysis. Emphasis varies with instructor. Prerequisite: 13 or equivalent.

3-5 units, Aut (Lopes)

150-151. Spanish Literature—Basic introduction to Spanish Peninsular literature. Sequence deals with major works from several periods and genres preparing for more specialized 200-level courses. Need not be taken in sequence. Content varies each year. Prerequisite: 13 or equivalent.

150. Spanish Literature I—The spirit of Spain in its early literature. Medieval and Golden Age masterpieces that establish and reflect Spain's unique identity (Christians, Jews, Moors) and create its traditions. Close reading of El libro de buen amor, Poema del Cid, La Celestina, Lazarillo de Tormes, El Burlador de
Sevilla, Gacilaso, Cervantes, Góngora, Lope de Vega, Calderón. DR:7(2)
3-5 units, Spr (Sigler)

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, Aut (Predmore)

160-161. Spanish American Literature—Basic introduction, with major works from several periods and genres. Prepares for more specialized 200-level courses. Need not be taken in sequence. Content varies each year. Prerequisite: 13 or equivalent.

160. Spanish American Literature I—Major themes, writers, and cultural debates from the Colonial Period to independence. Novels, poems, essays, and periodicals from Latin America. DR:7(2*)
3-5 units, Win (Corral)

161. Spanish American Literature II—Continuation of 160, from independence to the present. Readings: "El matadero," María, Santa, Los de abajo, Cien años de soledad, El aleph, and Gringo viejo. DR:7(2*)
3-5 units, Spr (Leal)

165. Latin American Novel of the Sixties—Study of the most important works published in the 1960s, a period of artistic and social ferment which led to international recognition of the Latin American novel. Readings: Benedetti, García Márquez, Fuentes, Vargas Llosa, Martha Lynch.
3-5 units (Ruffinelli)

170. Undergraduate Colloquium: Literature and Sexuality: The Latin American Case—Explores the role of women and gender/sexuality in Latin America as seen through contemporary fiction. Texts in English and Spanish include Lispector, Family Ties; Puig, El beso de la mujer araña; Santiago, Stella Manhattan.
3-5 units, Win (Lopes)

188. Mexican Visual Vernacular in the United States—(Same as Chicano Studies 128.) From Frida Kahlo to Madonna, from Mexican easels to the walls of the Metropolitan Museum of Art, Mexican popular culture influences cultural sensitivity in the U. S. How appropriated icons produce meaning in diverse communities. Films, magazines, plays, murals, and art exhibits that have crossed the border show how ideology migrates and is changed by new social contexts.
3-5 units, Win (Dever)

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

ADDITIONAL LANGUAGE, LINGUISTICS, AND THEORY

201. Advanced Grammar—Problems of grammar at an advanced level.
3 units, Aut (Haro)

3 units, Win (Haro)

203. History of the Spanish Language—Historical development of Spanish from Vulgar Latin. Combined with close readings of Old Spanish poetic and prose texts.
3-5 units (Valdés)

204. Dialectology of the Spanish Language.
3-5 units, (Valdés)

208. Theory of Literature and Society in Latin America—Analysis of themes and problems occurring in Latin American critical writings: acculturation and transculturation, eurocentrism or autonomy, historical periods and genres, literature nomenclature and the concept of America.
3-5 units (Ruffinelli)

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

3-5 units (Martín)

216. Don Quijote I—Don Quijote in relation to the principal literary traditions and cultural forces of the European Renaissance. In English.
3-5 units (Martín)

217. Don Quijote II—Continuation of 216.
3-5 units (Martín)

222. Introduction to 19th-Century Spanish Literature—Representative literary figures of 19th-century Spain: Larra, Espronceda, Zorrilla, Bécquer, and Galdós. Major directions in modern lyric poetry and in the modern realist novel studied against the background of Napoleonic inva-
sions, loss of overseas colonies, two Carlist civil wars, and frustrated attempts to establish the First Spanish Republic. Attention to close textual analysis.

3-5 units (Predmore)


3-5 units (Predmore)

224. The Spanish Republic, the Civil War, and the Aftermath—Significance of the Civil War for Spanish, European, and world history; the International Brigades. Effect of war on literary and cultural life of the country and the response of writers from Spain (Machado, Lorca, Alberti) and Latin America (Neruda, Guillén, Valdejo). Literary protest during the Franco regime by such figures as Alonso, Aleixandre, Cela, Santos, and Goytisoló.

3-5 units, Spr (Predmore)

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


3-5 units (Martín)

233. 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 historico-social forces. Issues of honor, limpieza de sangre, women’s voice, and institutional control. 

3-5 units, Aut (Cruz)

234. 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)


3-5 units (Martín)

LATIN AMERICAN LITERATURE

240. First Images of America in Colonial Prose—Overview of European impressions and assumptions of America on encounter and initial contact. Problems of reading these texts, fiction vs. history, the noble savage, the semiotics of quests, utopianism/materialism and the point of view of the conquered. Works by Columbus, Cortés, Bernal Díaz, Las Casas, Sagahún and selected historiographical texts.

3-5 units, Spr (Corral)

243. Taste, Wit, and What? in Spanish American Baroque—Three concepts/doctrines which guided Baroque poetics in Spanish America studied as phenomena that escaped traditional analysis. The social background and aesthetic theories underlying the Baroque prose and poetry of Sor Juana, Balbuena, Del Valle Caviedes, and Boaños.

3-5 units (Corral)


3-5 units (Corral)

248. The Caribbean-Americas: An Introduction to Their Literature, Thought, and Cultural Worlds—(Same as African and Afro-American Studies 248, English 262.) Literature, thought, and popular cultures of the Caribbean Basin within the context of an overview of its multiple cultural and linguistic worlds.

3-5 units, Aut (Wynter)

249. Afro-Hispanic Literature and Thought: An Introduction—(Same as African and Afro-American Studies 249.) 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, Win (Wynter)

251. Modern Mexican Narrative—Examination of important texts making up the body of the modern Mexican narrative in context of the socio-historical transformations taking place after WWII. Readings: Yañez, Rulfo, Fuentes, Pacheco, Poniatowska.

3-5 units
255. 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: Sor Juana, Neruda, Vallejo, Vilarino.
3-5 units (Ruffinelli)

258. Contemporary Latin American Short Story—A variety of recent short stories from Mexico, and Central and South America.
3-5 units

259. 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, Onetti, Sábato, Donoso, Fuentes, García Márquez, Poniatowska, and Pacheco.
3-5 units (Corral)

261. The Avant Garde Novel in Latin America—Survey of the neglected but increasingly important Avant Garde period of the 1920s and '30s. Readings: Owen, Novela como nube; Vela, El café de nadie; Palacio, El hombre muerto a puntapiés; Adán, La casa de cartón; F. Hernández, El caballo perdido; Villaurrutia, Dama de corazones; Torres Bodet, Margarita de Niebla.
3-5 units (Ruffinelli)

262. 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 Vorágine), and the "novel of the City" (Los siete locos, Ífigenia). Close readings survey the historical panorama of the 20th century.
3-5 units (Ruffinelli)

264. A New Literary Genre: Testimony—Latin American literature and politics viewed in light of a new narrative genre in works of Rodolfo Walsh, Omar Cabgas, Elena Poniatowska, and others.
3-5 units (Ruffinelli)

265. Spanish American Essay—Socio-historical accounting of the genre from the period of nation building to the present. Problematises the canonicality that has been created for the genre and its characteristics by focusing on the works of Mariátegui, Paz, Fernández Retamar, J. L. González, and A. Monterroso. Identity, culture, and generic displacement toward cultural studies.
3-5 units, Win (Corral)

266. Latin American Theater: Theory and Practice—The development of Latin American theater from pre-Columbian times to the present. Emphasis on recent trends in socially-committed theater. Reading and interpretation of dramatic texts.
3-5 units

275. 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, Spr (Gicovate)

279. The Narratives of García Márquez—Major works by the Colombian Nobel Prize winner, including Cien Años de Soledad.
3-5 units (Alegria)

CHICANO STUDIES

280. Introduction to Chicano Literature—Selected works by major Chicano writers of the 20th century, including poetry, fiction, and drama. Questions of genre and textual interpretation emphasizing the socio-historical cultural context of Chicano literature.
3-5 units

282. Chicano Poetry—(Same as Chicano Studies 282.) 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, Jimmy Santiago Baca, Gary Soto, Lucha Corpi, Juan Felipe Herrera, Ana Castillo.
3-5 units, Spr (Leal)

283. The Contemporary Chicano Novel—(Same as Chicano Studies 283.) 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: Tomás Rivera, Rudolfo Anaya, Miguel Méndez, Arturo Islas, Ana Castillo.
3-5 units, Win (Leal)

284. Chicana Writers—(Same as Chicano Studies 284.) Examines works of Chicana writers from various theoretical, critical approaches (feminist, semiotic, structural, anthropological, etc.) Authors: Villanueva, De Cervantes, Cisneros, Vioramontes, Portillo- Trembley, Corpi, and Vigil.
3-5 units

286. Study of Chicanas—(Same as Chicano Studies 161, English 162A, Feminist Studies 165.) Develops and applies an integrative ethnocultural and feminist approach to study of Mexican American women. Chicana identity from a variety of perspectives; controversies surrounding culture, gender, class and race for in-
sight into both the problems and the possibilities of a Chicana-identified ideology.

5 units, Win (Candelaria)

287. Contemporary Chicano Narrative—(Same as Comparative Literature 124B, English 124B.)
The developments in literary form represented in works by Paredes, Rivera, Acosta, Anaya, Islas, Rios, Cisneros, Monaré, Víramontes, Chavez, and Sanches as resistant ideological forces seeking to shape modes of perception and effecting new interpretations of social reality. The tendency of contemporary Chicano/a narrative toward dialectical patterns expressed as a “dialectic of difference.”

5 units, Spr (Saldivar)

289. Chicano Creative Writing Workshop—Prerequisite: knowledge of Spanish.

5 units

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 major texts related to the Event of 1492 and to the prelude voyage of the Portuguese around Cape Bojador to West 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, Spr (Wynter)

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, Martín) given 1992-93

293. Spanish Cinema: From Surrealism to the Postmodern—Introduction to the major Spanish film directors and award-winning films, and the relationship of film to literature, artistic production, and socio-economic and political change.

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. Explores the new cinematography which has gained international recognition and brought uniquely Latin American contributions to the art of film.

3-5 units, Spr (Ruffinelli)

295/395. How “Realistic” was European Literary Realism?—(Same as Comparative Literature 259B, French 259B/359B, German 293/393.) Part of the novelistic production in 19th-century European literature presented itself, and has been defined by literary critics, as a “realistic” (i.e., “adequate”) description of contemporary social life. A philosophical critique of this claim is applied to the results of such a discussion in different (especially Marxist) traditions of literary historiography and to the poetics of the 19th-century novel. Reconstructs the socio-historical background(s) out of which the need for “reality effects” emerged in different national contexts. Possible authors: Balzac, Stendhal, Flaubert and Zola, Perez Galdós and Clarín, Fontane, Raabe, and others.

3-5 units, Win (Gumbrecht)

297. Ideology and Culture: Benjamin, Bourdieu, Jameson, and A. Rama—Recent theories on the concept of ideology and its relation to culture compared with an emphasis on developments in Latin America. Intellectual debate is considered as a symbol of power, articulated on two levels: the interpretation of culture and ongoing social transformation. Investigates the relationship of ideology to culture through the writings of Benjamin, Bourdieu, Jameson, and Rama.

3-5 units, Aut (Machin)

298. Aesthetics and Politics in 20th-Century Latin America—The relationship between aesthetics and politics, as expressed in recent discourse, studied from a comparative approach and emphasizing two interparadigmatic areas: the debate on post-modernism and its repercussions in Latin America, and the “Caliban” paradigm (Retamar, Morse, Jameson). Aesthetics as a laboratory of social theory, and politics as the cultural creation of the image of the future, discussed through textual analysis.

3-5 units, Spr (Machin)

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
301. Methods of Teaching Spanish—(Same as Education 292.) Analysis and discussion of second language theory on teaching and learning, classroom practices, and Spanish instructional materials. 3-5 units, Spr (Predmore)

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, Aut (Pratt, Predmore, Wynter)

309. The Modern Tradition: Criticism and Colonialism—(Same as Comparative Literature 309, English 361, 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, Aut (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, Spr (Pratt)

318. Don Quijote. 3-5 units (Martín)

320. Garcilaso de la Vega and St. John of the Cross—Study of the achievements of Garcilaso as the voice of the Renaissance in Spain and of the transposition of the new forms to the expression of mystic rapture in San Juan de la Cruz. 3-5 units (Gicovate)

324. 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, Aut (Cruz)

325. The Code of Honor/Limpieza de Sangre in 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) given 1992-93

326. Lyric Poetry in the Spanish Baroque—The concept of the Baroque in 17th-century lyric poetry. Poetic masterpieces of the period, popular tradition, and development of new poetic genres. Love, metaphysics, and humor in Cervantes, Lope de Vega, Góngora, Quevedo. Intense practice in poetic analysis. 3-5 units, Spr (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 Bringuas, and Miau), Pardo Bazán (Los pasos de Ulloa), Pereda ("La leva") and Clarín (La Regenta). 3-5 units

336. Major Trends in Spanish Poetry: Machado, Jiménez, Lorca—Major trends and developments in 20th-century poetry in the context of Restoration Spain (1871-1930), and against the background of the democratic tradition of Spanish liberalism. Emphasis on close stylistic analysis and such concepts as Generation of 1898, Modernism, Kruasism, pure poetry, and symbolic system. 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, Aut (Predmore)

340. Latin American Literature of the Colonial Period—Study of crónicas, epic poetry, missionary theater, and Baroque literature by Spanish American born writers. 3-5 units (Corral)

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 Ramirez, Rodríguez Freile's El carnero and Carrió de la Vandra's El Lazarillo de ciegos caminantes. Critical literature
that proposes other works as models or novels is analyzed.

3-5 units (Corral) given 1992-93

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)

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 (Gicovate)

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 Güítherrez Nájera are studied in terms of the development of an aesthetic and a continental conscience and shows the influence of prose in proper perspective.

3-5 units, Spr (Corral)

360. Gender, Race, and Nation in 19th-Century Latin America—Readings in major female and male writers of the 19th century, emphasizing their relation to projects of nation-building and decolonization.

5 units, Win (Pratt)


5 units (Pratt)

362. Latin American Women Writers, 1945 to Present—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 Castellanos, Garro, Poniatowska, Lispector, Brunet, Menchu, Valenzuela, Marta Traba, Barros, Mercado, Alegría, Murillo, Belli, Peri-Rossi, Ferré, in conjunction with readings in history and social analysis.

Prerequisite: read and understand Spanish, but not necessarily speak it.

5 units (Pratt)

365. The Latin American Novel.

3-5 units (Ruffinelli)

369. Language and Post-Modern Conditions in Narrative—Works by M. Fernández, F. Hernández, Borges, Monterroso, and V. 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)

370. Public and Poles in Contemporary Intellectuals—The polemics surrounding the alliances of Spanish American writers on different sides of the political spectrum examined in the essays and fiction of Cortázar, Vargas Llosa, Benedetti, Fuentes, 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)

375. The Writings of José Revueltas—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)

376. La Familia Parra: Art, Literature and the Emancipation of Chile—Study of the transition from dictatorship to democracy in Chile, as represented by the artistic production of the Parra family (Violeta, Nicanor, Roberto, Angel, Isabel et al).

3-5 units, Spr (Alegria)

379. Onda y Escritura en Mexico—Main lines in the development of literary production in Mexico since 1968. Examination of the aesthetic and textual practices of writers identified with “La Onda” (José Agustín, Gustavo Saenz, García Saldaña Parmenides, etc.), etc. Analysis of key works by the younger generation of writers (Luis Zapata, Armand Ramirez, Cristina Pacheco) in this socio-historical context.

3-5 units

386. Colloquium: Chicano Cultural Studies, Gender, and Ethnicity: The Relevance of Theory—(Same as Comparative Literature 309J, English 309J.) Echoing Richard Johnson’s essay of 1987, asks “What is cultural studies anyway?”
and traces historical development of the project from Antonio Gramsci and Raymond Williams to Stuart Hall. Investigates how questions of gender, race, and ethnicity addressed implicitly by Gramsci, Williams, Hall, Jameson, and others, are made explicit by various contemporary Chican/o writers, including Paredes, J. Saldivar, Calderón, Moraga, Anzaldúa, and Alarcón.

5 units, Win (Saldivar)

388. Chicano Short Story—(Same as Chicano Studies 388.) 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. Authors: Tomás Rivera, Rudolfo Anaya, Rolando Hinojosa-Smith, Sandra Cisneros, Denise Chavez.

3-5 units, Aut (Leal)

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, Foucault, Bergson, Colie, Levin) to establish a poetics of Hispanic humor.

3-5 units (Martín)

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)

395. How "Realistic" was European Literary Realism?—(See 295.)

396. Cultural Movements and the Intelligentsia: Argentina, 1985-89—The changing function of the Latin American intellectual examined through the case of a group of Argentines who establish a structure of common perspectives and serve as diffusers of culture from 1985-89. Focus is on the relationship of ideology and culture, the self-image of the intellectual confronting democratic transformation, and the role of the transmitter of new cultural references, particularly changes in language and the concept of intellectual work.

3-5 units, Win (Machín)

399. Individual Work—Exclusively for graduate students in Spanish engaged in special work. 1-12 units, any quarter (Staff) by arrangement

PORTUGUESE LANGUAGE PROGRAM

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

5. Intensive Beginning Portuguese—Fast-paced, equivalent to the first-year sequence. Focuses on proficiency-oriented oral comprehension and speaking; also develops writing skills. Literary and journalistic readings supplement class discussions on aspects of Brazilian culture and current events. Activities include a "Portuguese table." For additional details, see bulletin Summer at Stanford.

9 units, Sum (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. Satisfactory/No Credit only. 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. Optional Friday conversations for 1 unit. Prerequisite: first-year sequence or consent of instructor.

4-5 units, Aut (Van den Dool) MTWTh(F)

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. Optional Friday con-
SPANISH AND PORTUGUESE 665

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. Optional Friday conversations for 1 unit. Prerequisite: 12 or consent of instructor.

4-5 units, Win (Van den Dool) MTWTh(F)

15/115. Intermediate Conversation—(Graduate students register for 115.) Conversation practice recommended as a supplement to the 2nd-year sequence. No study of grammar per se. Satisfactory/No Credit only. 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, Win Spr (Staff) by arrangement

100. Advanced Portuguese Conversation—Conversation practice recommended as a supplement to the second-year sequence. No study of grammar per se. May be counted only once for the major. Satisfactory/No Credit only. Prerequisite: 12 or consent of instructor.

3 units, Spr (Staff) MWF

109. Portuguese for Speakers of Spanish—For students with superior reading proficiency in Spanish; provides 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. Satisfactory/No Credit only.

3 units, Aut, Spr (Staff) MWF

109P. Practicum for Speakers of Spanish—Accelerated conversation course for beginners with superior knowledge of Spanish. When taken as a supplement to 109 provides a fast-paced equivalent of Portuguese 1. Completion of 109 and 109P allows students to continue with the first-year sequence (2 and 3).

2 units, Aut, Spr (Van den Dool) TTh

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

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 units, Win (Van den Dool) MWF

ADVANCED UNDERGRADUATE AND GRADUATE LITERATURE


3-5 units, Win (Van den Dool) MWF

240. Brazilian Literature I: Origins to Independence—Principle 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, Aut (Staff)

241. Brazilian Literature II: Naturalism to the Present—Continuation of 240A, from the late 19th century, emphasizing narrative and poetry: modernism and postmodernism. Essays and
autobiographical writings place the literary works in socio-historical perspective.

3-5 units, Spr (Lopes)

250. Luso-Brazilian Literature: Decolonization and Recolonization—Utilizing a comparative approach toward the sensitive issues of "sources" and "influences" in Portuguese and Brazilian literatures, analyzes works which deal with the representation of the "other(s)" in a new colonial "space." Readings: Lúcia Jorge, José Saramago and José Cardoso Pires (Portugal) and Silviano Santiago, Caio Fernando Abreu, and Marlene Felinto (Brazil).

3-5 units (Lopes) given 1992-93

270. Postmodernity: A Brazilian View—Major issues of postmodernity (feminism, redefinition of subjectivity, absence of political polarization, etc.) as developed in a "Third World" country, such as Brazil. Analysis of theoretical themes and problems based upon post-structuralist writers like Foucault, Barthes, Derrida, 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 Ana Cristina César, Silviano Santiago, Francisco Alvim, 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, Dalton Trevisan, Silviano Santiago, and others.

3-5 units, Spr (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)

299. Individual Work—Open to graduates or undergraduates who are majoring in Spanish. May be repeated for credit.

1-12 units (Staff) by arrangement

GRADUATE SEMINARS

380. Three Brazilian Writers: Machado de Assis, Graciliano Ramos, Guimarães—Two Brazilian novels (Memórias póstumas de Brás Cubas by Machado de Assis and Sao Bernardo by Graciliano Ramos) and a collection of short stories (Primeiras estórias by Guimarães Rosa) examined from various theoretical and critical approaches (feminism, post-structuralism, etc.).

3-5 units (Lopes)

399. Individual Work—Exclusively for graduate students in Portuguese engaged in special work.

1-12 units, by arrangement

STATISTICS

Emeriti: Theodore W. Anderson, Rosedith Sitgreaves, Herbert Solomon, Charles Stein
Chair: Bradley Efron
Associate Professors: Iain Johnstone, Art B. Owen
Assistant Professors: Anindita Adhikari, Amir Dembo, Thomas J. DiCiccio, Michael A. Martin, Joseph P. Romano
Courteous Professors: Byron W. Brown (Biostatistics), Helena Kraemer, Richard A. Olshen (Biostatistics), David R. Rogosa (Education), Patrick Suppes
Visiting Professor: Persi Diaconis

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 Research (Lieberman), Stanford Linear Accelerator (Friedman). The research activities of the department reflect an interest in both applied, and theoretical statistics and probability. There are workshops in biology, medicine and in environmental factors in health.

In addition to courses for statistics majors, the department offers a number of service courses designed for students in other departments. These tend to emphasize the application of statistical techniques rather than their theoretical development.

A candidate considering graduate work in statistics may be interested in the brochure "Careers in Statistics," which is available upon request from the American Statistical Association, 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 14 VT1200 X-terminals and 14 SUN 3/50 desktop workstations 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 CS 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, 209, 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 operations research, social sciences, engineering, computing, business, economics, and health.

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 (LCI) 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 which are offered for letter grades) 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 of three parts of the qualifying examination (beginning of second year); breadth requirement (second or third year); University oral examination (end of third year or beginning of fourth year); dissertation (fourth year).

First Year Core Courses—Statistics 300 systematically surveys the ideas of estimation and of hypothesis testing for parametric and nonparametric models involving small and large samples. 305 is concerned with linear regression and the analysis of variance. 306 surveys a large number of modeling techniques, related to but going beyond the linear models of 305. 310 is a measure-theoretic probability theory, beginning with the basic concepts of analysis.

Qualifying Examinations—These are intended to test the student's level of knowledge when the first-year program, common to all students, has been completed. There are separate examinations in the three core subjects of statistical methods, mathematical statistics, and probability theory, and all are given at the beginning of the Autumn Quarter of the student's second year.
Students may take two or three of these examinations and are expected to show acceptable performance in two examinations.

**Breadth Requirements**—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, 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 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 enroll in 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 (DiCicco) MWF 11

**60. Introduction to Statistical Methods I**—(Graduate students enroll in 160.) A nonmathematical study of statistical methods. Emphasis 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 (Rogosa) MTWThF 1:15

Win (Moses) MTWThF 1:15
Spr (Switzer) MTWThF 1:15
Sum (Staff) MTWThF 1:15

**61. Introduction to Statistical Methods II**—(Graduate students enroll in 161.) Chi-square tests, analysis of variance, regression, correlation, nonparametrics, sample surveys, elementary design of experiments. Prerequisite: 60 or consent of instructor. DR: 4(6) 5 units, Win (Martin) MWF 1:15

**70. Biostatistics**—(Enroll in Health Research and Policy 202.) Statistical reasoning and basic...
methods. Applications to biology and medicine. Prerequisite: high school algebra.
2 units, Win (Brown) WF 9-10:50

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 (Johns) MTWF 11
Sum (Staff) MTWThF 9

5 units, Aut (Donoho) MTWThF 10
Spr (Adhikari) MTWThF 10
Sum (Staff) MTWThF 2:15

140. Chance and Strategy—(See 40.) For graduate students.
3 units, Aut (DiCiccio) MWF 11

152. Introduction to Operations Research I—(Enroll in Engineering 62, Operations Research 152.) Theory and computation of optimal selection of decisions under certainty. Linear programming, network optimization models, dynamic programming, non-linear programming, and integer programming. Applications drawn 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 (Manne)
Spr (Hillier)

4 units, Win (Iglehart)

160. Introduction to Statistical Methods I—(See 60.) For graduate students.
5 units, Aut (Rogosa) MTWThF 1:15
Win (Moses) MTWThF 1:15
Spr (Switzer) MTWThF 1:15
Sum (Staff) MTWThF 1:15

161. Introduction to Statistical Methods II—(See 61.) For graduate students.
5 units, Win (Martin) MWF 1:15

190. Independent Study—For undergraduates. (Staff) by arrangement

3 units, Aut (Romano) MWF 1:15
Win (Martin) MWF 11

CONTINUATION

Courses in this category have been designed for particular use in applications. Generally, they have introductory statistics or probability as prerequisites.

201A. Statistical Methods—For the mathematically well-qualified student; moves quickly, covering descriptive statistics, tests of hypotheses, comparison of two samples, the binomial distribution, nonparametric methods, regression correlation, and elements of the analysis of variance. Can be followed by 202 or 203 (or both in any order). Prerequisite: 116 or equivalent.
3 units, Win (Bloch) MWF 3:15

202. Data Analysis—Elements of modern data analysis. Possible topics: bootstrap and jackknife methods for assessing variability; cross-validation; smoothing procedures and density estimation; multiple linear regression and variable selection; data transformation; nonlinear regression. Emphasis on conceptual rather than theoretical understanding. Prerequisite: 201 or equivalent.
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, nonlinear regression, analysis of residuals and model selection, design of one-way and two-way factorial experiments, fixed effects and random effects models. Prerequisite: 200 or 201.
3 units, Spr (Johns) 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, given 1992-93
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, given 1992-93

206. Applied Multivariate Analysis—(Same as Education 250 C.) 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, Spr (Olkin) MWF 11-12:30

207. Introduction to Time 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, given 1992-93

209. Quantitative Methods and Their Application to Public Policy—(Same as Health Research and Policy 107, Public Policy 105.) Applications of statistical methods, rather than methodology per se. Topics: risk assessment in the evaluation of biohazards and medical techniques and technologies; comparisons of information-gathering techniques (surveys, experiments, or simulation studies); methods of expressing and evaluating uncertainty; and the interpretation of quantitative techniques of data analysis (regression). Prerequisites: 60 and 61.
3 units, Spr (Moses) MW 8-10

211. Statistical Methods for Meta-Analysis—(Same as Education 493 B, Health Research and Policy 206.) Meta-analysis enables researchers to synthesize the results of overlapping studies so that the combined weight of evidence can be considered and applied. Topics: randomized clinical trials, literature search, statistical methods (contingency tables, Bayesian methods, sequential methods, sensitivity analysis, nonparametric methods), issues of bias. Prerequisites: a basic sequence in Statistics and consent of instructor.
3 units, Win (Olkin) MW 2:15-3:30

3 units, Aut (Karlin) MWF 2:15
Win (Lai) MWF 10

218. Introduction to Stochastic Processes—Renewal theory, point processes emphasizing the Poisson process. Also, Wiener and Gaussian processes and second order processes. Prerequisite: 217.
3 units, Win (Cover) MWF 2:15

229. Selected Topics—Topics vary each year. Prerequisite: 200 or equivalent.
3 units, by arrangement

3 units, Spr (Iglehart)

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; 217 or equivalent.
3 units, Spr (Glynn)
Sum (Staff)

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. CAMS/MINOS software is used. Corequisite: Math. 103.
3 units, Aut (Cottle)
Sum (Staff)

260A,B,C. Workshop in Biostatistics—(Same as Health Research and Policy 260A,B,C.) Primarily for doctoral students in statistics. Applications of
statistical techniques to current problems in medical science. Enrollment for more than 2 units of credit involves extra reading or consulting and requires consent of the instructor.

260A. 1-5 units, Aut (Brown, Efron, Johnstone, Moses, Olshen) Th 1:15-3:05
260B. 1-5 units, Win (Brown, Efron, Johnstone, Moses, Olshen) Th 1:15-3:05
260C. 1-5 units, Spr (Brown, Efron, Johnstone, Moses, Olshen) Th 1:15-3:05

300A,B,C. Theory of Statistics—Elementary finite sample theory of point estimation: statistical models; sufficiency; applications to exponential families, group families, and nonparametric families; minimum risk unbiased estimation; minimum risk equivariant estimation; Cramér-Rao inequality. Elementary decision theory: loss and risk functions, Bayes estimation; minimax estimation; shrinkage estimators. Large sample estimation theory: asymptotic efficiency; maximum likelihood estimation; delta method; asymptotic distribution of quantiles and trimmed means; differentiability of statistical functionals; robustness and influence. Hypothesis testing and confidence intervals: Neyman-Pearson theory; uniformly most powerful tests and uniformly most accurate confidence intervals for distributions with monotone likelihood ratio; systematic use of sufficiency and conditioning to eliminate nuisance parameters in exponential families; use of invariance to eliminate nuisance parameters in group families; asymptotic theory of likelihood ratio test; Pitman asymptotic efficiency; rank, permutation and randomization tests; jackknife, bootstrap and sample reuse methods. Density estimation: kernel density estimation; bias vs. variance tradeoff; choice of bandwidth and kernel. Time series: first- and second-order autoregressive processes; conditions for stationarity; use of maximum likelihood in time series with asymptotic theory. Other possible topics: sequential analysis; optimal experimental design; empirical processes with applications to statistics; Edgeworth expansions with applications to statistics.

300A. 3 units, Aut (Romano) MWF 10
300B. 3 units, Win (Siegmund) MWF 10
300C. 3 units, Spr (Siegmund) MWF 10

305. Introduction to Statistical Modeling—Descriptive statistics. Effects of correlation, nonnormality, and heteroscedasticity on one and two sample t tests. Linear models: simple linear regression, correlation, one way anova, multiple comparisons, the general linear model, testing nested models, regression diagnostics, weighted least squares, blocking random effects, two way anova, mixed effects, calibration, prediction, confidence bands, lack of fit and pure error sums of squares, contrasts, Gauss-Markov theorem, polynomial regression, orthogonal series regression, transformations, dummy variables, model selection, partial correlation, modeling heteroscedasticity. Emphasis on problem sets involving substantial computations and realistic data. Prerequisites: 200, Computer Science 106A, Math. 113, or consent of instructor.

3 units, Aut (Johnstone) MWF 11

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, T², factor analysis, principal components) and other topics briefly. Prerequisite: 305 or equivalent.

306A. 3 units, Win (Johnstone) MWF 11
306B. 3 units, Spr (Donoho) MWF 11


310A. 3 units, Win (Adhikari) MWF 1:15
310B. 3 units, Win (Adhikari) MWF 1:15
310C. 3 units, Spr (Adhikari) MWF 1:15

314. Matrix Theory and Inequalities—(Same as Math. 252A.) Frobenius theory of positive matrices, stochastic matrices, determinant inequalities, total positivity, variational characterizations, generalized compound matrices; Schur functions and majorization, stochastic orderings; probability inequalities, matrix inequalities. Emphasis on applications to probability, statistics, combinatorics, and models in engineering, biological, decision, and social sciences. First in a two-quarter
sequence followed by Operations Research 373. Can be taken independently.

3 units, alternate years, given 1992-93


alternate years, given 1992-93


3 units, Aut, Win, Spr (Lai) by arrangement


3 units, Aut (DiCiccio) by arrangement

Win (Romano) by arrangement

Spr (Lai) by arrangement


3 units, alternate years, given 1992-93

326A. 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, given 1992-93

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, given 1992-93

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, Win (Johns) MF 1:15

336. Decision Theory and Statistical Inference—Minimax theorem, admissibility and complete class theorem, formulation of statistical decision problems, sufficient statistics, testing hypotheses, estimation, comparison of experiments, and sequential problems.

3 units, given 1992-93


3 units, given 1992-93


3 units, given 1992-93

346. Statistical Inverse Problems—Nonparametric estimation of mean functions and probability densities indirectly observed in linear or linearizable models in the presence of nontrivial statistical noise. Linear methods: linear filters, singular value decompositions. Nonlinear methods: constrained and regularized least squares and least absolute values, maximum entropy, use of prior information through constraints or spatial models (maximum a posteriori estimates and re-
348. Statistics of Experimentation—Methods for the design and analysis of experiments. Examples from biological and industrial experiments. Review of least squares theory. One way layouts, factorial designs, blocking, fractional factorials, Latin squares, analysis of covariance, split plots, response surfaces, Taguchi's methods (robust design, noise factors, orthogonal arrays, linear graphs, achieving additivity), computer experiments.

3 units, alternate years, given 1992-93

352. Spatial Statistics—Summary statistics, factorial designs, blocking, fractional factorials, Latin squares, analysis of covariance, split plots, response surfaces, Taguchi's methods (robust design, noise factors, orthogonal arrays, linear graphs, achieving additivity), computer experiments.

3 units, Aut (Switzer) MWF 11


3 units, Spr (Martin) MWF 9


3 units, given 1992-93

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, queueing networks, multiple channel queues in heavy traffic, and diffusion approximations. Prerequisite: 359.

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


3 units, Win (Iglehart)


3 units, given 1992-93


3 units, Win (Siegmund) TTh 9-10:15

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, Aut (Dembo) MWF 10

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, Win (Dembo) TTh 10:30-11:45


3 units, Aut (Gibson) TTh 11-12:15

390. Consulting Workshop—Provides skills required of practicing statistical consultants and
exposure to wide range of statistical applications. Students participate as consultants in the department’s drop-in consulting service, analyze client’s data, and prepare formal written reports. Seminar provides supervised experience in short term consulting. Prerequisites: course work in applied statistics or data analysis, and consent of the instructor.

3 units, Aut (Bloch) by arrangement
Win (Olshen) by arrangement
Spr (Owen) by arrangement

399. Research—Research work as distinguished from independent study of nonresearch character listed in 199 and 299.
(Staff) by arrangement

PROGRAM IN STRUCTURED LIBERAL EDUCATION

Emeritus: (Professor) John Goheen (Philosophy)
Director and Professor: Mark Manclall (History)
Lecturers: George Cattermole, Edward Frueh, Suzanne Greenberg, Jonathan Reider, Mollie Schwartz Rosenhan, Amy Sims
Coordinator: Suzanne Greenberg

The Program In Structured Liberal Education (SLE) is designed specifically for freshmen interested in an interdisciplinary approach to the liberal arts and sciences. The program emphasizes intellectual rigor and individualized contact between faculty and students. SLE has three basic purposes: to present a coherent program of instruction; to develop the student’s ability to ask effective questions of texts, teachers, the culture, and themselves; and to develop intellectual skills in logical reasoning, critical reading, expository writing, and group discussions.

SLE stresses inquiry, criticism, and a tolerance for ambiguity. Neither the faculty nor the curriculum provides “ready-to-serve” answers to the questions being dealt with; rather, SLE encourages a sense of intellectual challenge, student initiative, and originality.

APPLICATION

Freshmen should apply during the summer preceding the academic year in which they will enroll.

SLE is designed as a three-quarter sequence, and students applying should be willing to make a commitment for the entire program, although a student can withdraw from the program at any time.

Correspondence regarding the program should be addressed to Program in Structured Liberal Education, Florence Moore Hall, Stanford University, Stanford, California 94305.

COURSES

SLE is a demanding program which consumes approximately 60 percent of the average academic workload first-year students usually carry. Autumn Quarter concentrates on ancient Greece, Israel, and India. Winter Quarter examines the religious, ideological, and aesthetic transformations that occurred in Europe, Asia, and the New World as a result of the Middle Ages, Renaissance, Scientific Revolution, and Enlightenment. Spring Quarter focuses on the social, political, and artistic forces that shape the modern world. Completion of the SLE program satisfies the Cultures, Ideas, and Values Requirement DR:1, the Literature and Fine Arts Requirement DR:7(2), the Philosophical, Social, and Religious Thought Requirement DR:8(3), and the Writing Requirement.

91. 9 units, Aut (Staff) TWTh 3:15-5, TW 6:30-8 p.m., and Th 6-8 p.m.
92. 9 units, Win (Staff) TWTh 3:15-5, TW 6:30-8 p.m., and Th 6-8 p.m.
93. 9 units, Spr (Staff) TWTh 3:15-5, TW 6:30-8 p.m., and Th 6-8 p.m.

PROGRAM IN SYMBOLIC SYSTEMS

Director: Jim Greeno (Education)
Program Faculty: Joan Bresnan (Linguistics), Herbert H. Clark (Psychology), Fred Dretske (Philosophy), John Etchemendy (Philosophy), Solomon Feferman (Mathematics and Philosophy) Martin Kay (Linguistics), Jean-Claude Latombe (Computer Science), Ellen Markman (Psychology), John McCarthy (Computer Science), Nils Nilsson (Computer Science), John Perry (Psychology, on leave), Stanley Peters (Linguistics, on leave), Eric Roberts (Computer Science), David Rumelhart (Psychology), Ivan Sag (Linguistics), Peter Sells (Linguistics), Yoav Shoham (Computer Science), Barbara Tversky (Psychology), Terry Winograd (Computer Science), Tom Wasow (Linguistics and Philosophy, on leave)

Consulting Faculty: Phil Cohen (Linguistics), Joe Halpern (Computer Science), Per-Kristian Halvorsen (Linguistics), Pat Hayes (Computer Science), Bernardo Huberman (Physics), David Israel (Philosophy), Ron Kaplan (Linguistics), Lauri Karttunen (Linguistics), Kurt Konolige, Ray Perrault (Philosophy), Stanley Rosenchein (Computer Science), Brian Smith (Philosophy), 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 in the industrial sector 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:

1. Cognition
   a) Psychology 106, Introduction to Cognitive Psychology.

2. Computation and Artificial Intelligence
   c) Computer Science 221, Introduction to Artificial Intelligence.

3. Foundations
   a) Philosophy 80, Mind, Matter, and Meaning.
   b) Philosophy 186, Philosophy of Mind or Philosophy 181, Philosophy of Language.

4. Language
   a) Linguistics 120, Introduction to Syntax.
      (Students with a special interest in Natural Language may take, instead, Linguistics 220A, Cross-Linguistic Syntax, by consent of instructor.)
   b) Linguistics 130, Introduction to Semantics and Pragmatics, or Linguistics 230A, Semantics and Pragmatics.

5. Logic
   a) Philosophy 159, Basic Concepts in Mathematical Logic.
   b) Philosophy 160A, First Order Logic.
   c) 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 Program 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
   - 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 195 or 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.) A writing focus course. DR:8(3)

5 units, Aut (Bratman)

Spr (Zalta)

105. Introduction to Cognitive Psychology—(Enroll in Psychology 106.) DR:9(4)

4 units, Win (B. Tversky)

106B. Programming Abstractions—(Enroll in Computer Science 106B.)

5 units, Aut (Parlante)

Win (Staff)

Spr (Roberts) sec 1 (Staff) sec 2

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

5 units, Aut Johnson

Spr (Floyd)

109A,B. Introduction to Computer Science—(Enroll in Computer Science 109A,B.)

109A.—DR:6(8)

4 units, Aut Johnson

Win (Ullman)

109B. 4 units, Win (Staff)

Spr (Ullman)

120. Introduction to Syntax—(Enroll in Linguistics 120.)

4 units, Aut (Sag)

130. Introduction to Semantics and Pragmatics—(Enroll in Linguistics 130.)

4 units, Win (Zucchi)

154. Introduction to Automata and Complexity Theory—(Enroll in Computer Science 154.)

4 units, Win (Mitchell)

Spr (Motwani)

159. Basic Concepts in Mathematical Logic—(Enroll in Philosophy 159, Linguistics 135.) DR:4(6)

4 units, Aut (Wasow) MWF 9 plus section

160A. First Order Logic—(Enroll in Philosophy 160A.) DR:4(6)

4 units, Win (Mints) MWF 9

160B. Computability and Logic—(Enroll in Philosophy 160B.)

4 units, Spr (Mints)

181. Philosophy of Language—(Enroll in Philosophy 181.)

4 units, Win (Moraccsik)

186. Philosophy of Mind—(Enroll in Philosophy 186.)

4 units, Spr (Dretske)

201. Senior Seminar.

3 units, Win (Staff)

220A. Cross Linguistics Syntax—(Enroll in Linguistics 220A.)

4 units, Aut (Bresnan)

221. Introduction to Artificial Intelligence—(Enroll in Computer Science 221.)

3 units, Aut (Nilsson)

Spr (Staff)

230A. Semantics and Pragmatics—(Enroll in Linguistics 230A.)

4 units, Win (Sag)

254. Automata, Languages, and Computability—(Enroll in Computer Science 254.)

4 units, Aut (Floyd)

**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—Weekly colloquium series. Faculty and researchers in the field of symbolic systems discuss their areas of expertise and ongoing research projects.

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) MWThF 1:15

100. Computers, Ethics, and Social Responsibility—(Same as Computer Science 201, VTSS 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 conse-
quences of their work. Small group discussion emphasizing developing analytical skills. Prerequisite: Computer Science 106B or equivalent.

3-4 units, Spr (Winograd) MWF 11-12:15

121. Intermediate Syntax—(Enroll in Linguistics 121.) Drawing upon data from a variety of languages, examines morphological and syntactic properties of case marking, word order, verb agreement, passives, anti-passives, raising, reflexives, causatives, and relative clauses. Similarities and differences among languages are given a typological and theoretical treatment.

3-5 units, any quarter (Staff) by arrangement

150. Introduction to Computational Linguistics—(Same as Linguistics 139/239.) Introduction to the computational aspects of basic linguistic processes in morphology, syntax and semantics, and their integration in applications such as machine translation and man-machine interfaces. Grades based on computer programs implementing key algorithms for parsing, generation, etc. done as homework exercises. Prerequisite: introductory course in prolog programming.

4 units, Aut (Kay)

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

3 units, Aut (Staff)

Win, Spr (Kay, Sag)

159. Basic Concepts in Mathematical Logic—(Enroll in Philosophy 159, Linguistics 135.) Introduction to basic concepts and techniques used in mathematical logic: sets, functions, structures, formalization, proof, mathematical induction, enumerability, and effectiveness. DR:4(6)

4 units, Aut (Wasow) MWF 9 plus section

160A. First Order Logic—(Enroll in Philosophy 160A.) Syntax and semantics of sentential and first-order logic. Introduction to the basic concepts of model theory. Godel's Compactness Theorem and its consequences: the Loenheim-Skolem Theorem and the Compactness Theorem. Prerequisite: 159 or consent of instructor. DR:4(6)

4 units, Win (Mints) MWF 9 plus section


3 units, Aut (Rumelhart)

190. Senior Honors Tutorial.

1-5 units, any quarter (Staff)

by arrangement

191. Honors Seminar—Senior year.

2 units, any quarter (Staff)

by arrangement

195. Microcomputer Programming Project—Students develop software illustrating concepts from symbolic systems. Project ideas that produce software useful in departmental courses are generated by faculty or by students. Projects of up to 9 units are under faculty direction. Prerequisites: Computer Science 106X or equivalent, and approval of basic proposal for software by instructor with the advice of department staff. Recommended: familiarity with Macintosh, IBM-PC or other microcomputer, or Computer Science 193.

3-5 units, any quarter (Staff)


3 units, Spr (Rumelhart)

201. Senior Seminar—Core seminar for department majors. Integrates themes from core course work. Studies contemporary cross-disciplinary research in learning, computation, formal systems. Class sessions led by department faculty who represent central sub-areas of the program.

3 units, Win (Staff)

228. Topics in Syntactic Theory: Ambiguity Resolution—(Enroll in Linguistics 228.)

4 units, Aut (Kay, Hobbs)

231. Topics in Semantics and Pragmatics—(Enroll in Linguistics 231.)

4 units, Spr (Zucchi)

294. Philosophy of Computation—(Same as Philosophy 395A.) Critical examination of the conceptual foundations of computation. Initial focus on: formal symbol manipulation; digital state machines; recursive function theory; and information processing. Other, non-standard views considered. Readings: Dretske, Goodman, Harel, Haugeland, Newell, Simon, Smith, Turing, and others.

3 units, Win (Smith) TTh 10-11:50 alternate years, not given 1992-93

295. Psychology of Program Solving and Reasoning—(Enroll in Education 295, Psychology 261.)

3 units (Greene) alternate years, given 1992-93

296. Philosophy of Cognitive Science—(Same as 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 (Dreyfus, Searle, Taylor, Winograd); the role of connectionism (Cussins, Fodor, Smolensky); and anti-repre-
sentationalism (Brooks, Chapman, Dretske, Rosenschein). Prerequisite: 294.  
3 units (Smith)  
alternate years, given 1992-93

356. Reasoning About Knowledge—(Enroll in Computer Science 356.)  
1-3 units, Win (Halpern)

4 units, Aut (Winograd)

PROGRAM ON URBAN STUDIES

Director: Leonard Ortolano (Professor of Civil Engineering)  
Chair: Paul Turner (Professor of Art)  
The Committee on Urban Studies: Albert Camarillo (Associate Professor of History), Steven Gorelick (Associate Professor of Applied Earth Sciences), Irwin Remson (Professor of Applied Earth Sciences), Karen Sawislak (Assistant Professor of History), Nancy Tuma (Professor of Sociology) Sylvia Yanagisako (Associate Professor of Anthropology; on leave 1991-92)  
Lecturers: Ed Everett, Gerald Gast, Susan Goltsman, Daniel Iacofano, David Neuman, George Sipel, Frederic Stout

Urban Studies brings together students, faculty, and outside specialists who are concerned with the people and problems of cities. The program stresses two basic themes: developing a critical understanding of how cities evolve and shape urban life, and developing the practical and analytical tools which can help improve the quality of life. Urban Studies enables undergraduates to examine urban problems through a number of disciplinary lenses and to address these problems in a practical way.

The Urban Studies major examines the city within the broader context of a liberal arts education. It treats urbanism as an interdisciplinary field and encourages students to inquire critically into both the nature of the urban environment and techniques used to modify that environment.

The major prepares students for a variety of careers and advanced academic pursuits. Graduates from the Program on Urban Studies have established careers in urban planning, city management, policy analysis, real estate development, architecture, environmental planning, and urban design. Many have obtained graduate degrees in urban planning, architecture, or urban design from major universities across the country including UC-Berkeley, Harvard, and MIT. A substantial number have opted to take degrees in business, law, or public policy.

UNDERGRADUATE PROGRAMS

All students majoring in Urban Studies must complete the Urban Studies core. Those who wish to specialize in either urban planning or architecture and urban design may complete their majors by meeting the appropriate Option Requirements. Students who wish to concentrate in a different area (e.g., health care) must complete the Urban Studies core and design the remaining units with an academic adviser who is a member of the Academic Council.

In all cases, a 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 (126 Encina Commons) 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 is a prerequisite to the following core courses: Art 280, Utopia and Reality in Modern Urban Planning; Urban Studies 130, The Politics of Development; and 131, Managing Local Government. Each of the following is required:  
110. Introduction to Urban Studies.  
Select at least one course from each of the following categories:  
Urban Politics:  
130. The Politics of Development.  
Urban History:  
140. Undergraduate Seminar: The Emergence of the American Modern City.  
141. Race and Ethnicity in American Cities: History and Public Policy.  
143. Undergraduate Colloquium: Race and Ethnicity in American Cities—History and Public Policy.  
145. Race and Ethnicity in the American Experience.  
Urban Sociology:  
150. Urban Sociology.  
151. Urban Growth and Change.  
152. Poverty and Public Policy  
Urban Anthropology:  
Urban Design:  
170. Introduction to Urban Design.
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>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 1. Elementary Economics</td>
<td>5</td>
</tr>
<tr>
<td>Economics 51. Economic Analysis I</td>
<td>5</td>
</tr>
</tbody>
</table>

REQUIRED COURSES TO COMPLETE THE MAJOR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Applied Earth Sciences 130.</td>
<td>5</td>
</tr>
<tr>
<td>Applied Earth Sciences 132.</td>
<td>5</td>
</tr>
<tr>
<td>Applied Microeconomics—select one of the following: Economics 148, 150, 154, 155.</td>
<td>4</td>
</tr>
<tr>
<td>Statistics—select one of the following: Statistics 60, 110; Psychology 60 or 153.</td>
<td></td>
</tr>
</tbody>
</table>

Students should take Urban Studies 180 or 181 before taking Applied Earth Sciences 132.

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 Economics 1 and Economics 51).

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Earth Sciences 131.</td>
<td>5</td>
</tr>
<tr>
<td>Environmental Earth Sciences II</td>
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<tr>
<td>Civil Engineering 172.</td>
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<tr>
<td>Air Quality Management</td>
<td>3</td>
</tr>
<tr>
<td>Sociology 160. Formal Organizations</td>
<td>5</td>
</tr>
<tr>
<td>Sociology 163. Organizational Decision-Making</td>
<td>5</td>
</tr>
<tr>
<td>Sociology 165. Organizational Leadership</td>
<td>5</td>
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</tbody>
</table>

Students considering graduate work in urban planning or public policy should note that elementary calculus is often either required or strongly recommended as a condition for admission into such programs. For further information, the Program on Urban Studies office contains catalogs of graduate programs on urban and regional planning.

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

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art 40. Basic Drawing.</td>
<td>3</td>
</tr>
<tr>
<td>Art 60. Basic Design.</td>
<td>3</td>
</tr>
</tbody>
</table>

REQUIRED COURSES TO COMPLETE THE MAJOR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art 140. Drawing I.</td>
<td>3</td>
</tr>
<tr>
<td>Art 160K or 160L. Design I—Intermediate Design</td>
<td>3</td>
</tr>
<tr>
<td>Mechanical Engineering 101.</td>
<td>3</td>
</tr>
<tr>
<td>Visual Thinking</td>
<td></td>
</tr>
</tbody>
</table>

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          Units
Civil Engineering 176. Small Scale Energy Systems 3
Civil Engineering 177. Building Energy Laboratory 2
Civil Engineering 180B. Elementary Structural Analysis 4
Engineering 10. Applied Mechanics: Statics 3
Engineering 11. Mechanics of Materials 4

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. 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:

Course No. and Subject          Units
Math. 19. Calculus and Analytic Geometry 3
Math. 20. Calculus and Analytic Geometry 3
Math. 21. Calculus and Analytic Geometry 3
Physics 21. Mechanics and Heat 4

Students seeking exposure to orthographic projection, sectioning, and other aspects of technical drawing should take Mechanical Engineering 103D, Engineering Drawing. Because of the increased use of computers in architecture, some graduate programs in architecture require "computer literacy." An introductory course (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.

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, 126 Encina Commons.

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.

40. Introductory Seminar: Social Change in Industrializing America—A Case Study of Chicago—(Enroll in History 67S.) Chicago offers a vivid context for an examination of the social and cultural transformations of American society between 1870 and 1920. Topics: immigration and assimilation, creation and experiences of a new industrial workforce, machine politics, architecture and city planning, social reform, and race relations. Readings from contemporary materials (fiction, photographs, memoirs, municipal records, and social criticism).

5 units, Aut (Sawislak) Th 1:15-3:05

110. Introduction to Urban Studies—Interdisciplinary introduction to the study of cities and urban civilization. Covers history of urbanization
through Lewis Mumford's *The City in History* and examines various disciplinary methodologists comprising the unified field of urban studies (sociology, economics, politics, architecture, urban design and urban public policy formation).

4 units, Aut (Stout) MW 1:15

111. Engineering the Built Environment—(Enroll in Civil Engineering 100.) Roles of project proponents, architects, engineers, contractors, and regulators in conceiving and implementing building projects of various types. Introduction to all stages of project development including planning, finance, design, construction, and operations. Case studies (e.g., high rise commercial buildings and toxic waste site clean-ups) demonstrate the importance of integrating various stages of project development to enhance efficiency and avoid adverse economic, social, and environmental effects. Commonly used engineering and economic analysis methods. Group exercises use the concept of integration of project stages to explain project outcomes that are viewed as triumphs or tragedies from an engineering, social, or environmental perspective. Corequisite: Math. 19 or 41.

3 units, Aut (Lexitt, Ortolano) TTh 1:15-2:30
plus one hour by arrangement

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 3:15-5:05

120. Urban Economics—(Enroll in Economics 148.) The economy of cities. Location and land use, urban transportation, housing, and local taxation and provision of public services. Emphasis on theory: some discussion of public policy. Students write a field essay which entails applying urban economic theory to some aspect of the San Francisco urban theme. Prerequisite: 51.

5 units, Spr (Swinkles) MTWThF 9

130. The Politics of Development—The reality of community development: the tug and pull that cities experience, interests of developers, and roles played by various publics. The politics of development: values, votes, revenues, conflicts, deals, mistrusts, negotiations, and compromise. Why are developers, environmentalists, and cities antagonists? What affect does this have on cities and the Bay Area in general?

4 units (Everett, Sipel) given 1992-93

131. 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; respective roles of legislators and administrators; and role and function of the city manager. The manager's role in dealing with contemporary urban problems: productivity, declining resources, housing, and transportation and growth management. Prerequisite: 110 (for Urban Studies majors only).

4 units, Spr (Sipel) MW 3:15-5:05

132. Urban Politics and Policy—(Enroll in Political Science 186, Public Policy 186.) Introduces the major actors, institutions, processes, and policies of sub-state government in the U.S., focusing on city general purpose governments through an intensive comparative examination of historical and contemporary politics. Issues related to federalism, representation, voting, race, poverty, housing, and finances.

5 units, Win (Fraga)

133. 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 connected with faculty who serve as sponsors of internship-related directed study.

2 units, Win (Staff)

134. 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, Spr (Stanton)

135. 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 policy, environmental policy, 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 10.
5 units, Spr (Staff)

140. Undergraduate Seminar: The Emergence of the Modern American City—(Enroll in History 257S.) The social, political, economic, and spatial contours of American urban life between 1840 and 1900. Topics: structure of national "urban system;" urban politics; social mobility as an urban phenomenon; the popular image of the city; experiences of ethnic and racial minorities; efforts of urban reformers.
5 units (Sawislak) not given 1991-92

141. Race and Ethnicity in American Cities: History and Public Policy—(Enroll in History 162A.) Compares urban histories of the nation's two largest minority groups, and the predominant themes which characterize the history of Chicanos, Puerto Ricans, and Blacks in American cities from 1870-1960. Topics: formation and development of ghettos and barrios, urban occupational structure and stratification, racial attitudes and institutional responses to the presence of racial minorities, ethnic community and political organizations, and family structure and the role of women in the household.
4 units (Camarillo) not given 1991-92

143. Undergraduate Colloquium: Race and Ethnicity in American Cities—History and Public Policy—(Enroll in History 262A.) Given at Stanford in Washington program.
5 units (Camarillo)

145. Race and Ethnicity in the American Experience—(Enroll in American Studies 164, History 164.)
5 units, Spr (Camarillo, Frederickson)
MWF 11-12:15

147. Early Modern London: The Politics and Culture of Growth—(Enroll in History 240.) Between 1580 and 1680, London's population doubled every 20 years and outgrew its medieval walls on the north bank of the Thames. The medieval merchant and artisanal city acquired its present day industrial East End and an upper-class West End. Why and how did London grow so rapidly, despite repeated attempts by the Crown to limit new building and a mortality rate that frequently eclipsed the birth rate? How was it able to retain its medieval guild-dominated governing structure in a period of rapid urban expansion, and what were the relations between the mayor and alderman and the monarchy? How did the city provide clean water, clean air, sanitation, and workable transport? How did the city provide for new urban poor? What new forms of culture emerged in the post-medieval metropolis?
5 units (Seaver) not given 1991-92

149. Senior Research Seminar: Poverty and Homelessness in America—(Enroll in History 251S.)
5 units, Win (Camarillo) 2:15-4:05

150. Urban Sociology—(Enroll in Sociology 150.) Over the last 200 years the scale of the ecological communities in which people are embedded has increased more rapidly than the psychological communities with which people identify themselves, and the political communities within which they are governed. The impact on the ability of people to govern themselves in the three kinds of communities, and the impact of the disparity between the scales of the ecological, psychological, and political communities.
3-5 units, Spr (Conell) TTh 10:30-12

151. Urban Growth and Change—(Enroll in Sociology 154.) 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 (Tuma) not given 1991-92

152. Poverty and Public Policy in America—(Enroll in Sociology 105.) 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 (Tuma) given 1992-93

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, not given 1991-92

160. Urban Problems in Anthropological Perspective—(Enroll in Anthropology 146.) Issues from current urban problems examined from the cross-cultural perspective of anthropology. Top-
ics: the social consequences of crowding, rural-urban migration, changing family and kinship patterns, urban ethnic communities and inter-ethnic relations, urban poverty, stratification, crime, and prostitution. DR:9(5)

5 units (Staff) given 1992-93

161. Women in Cities: A Cross-Cultural Perspective—(Enroll in Anthropology 145, Feminist Studies 142.) Women's experiences in cities throughout the world and the determinants of similarities and differences. Topics: women and migration, changing forms of the sexual division of labor, changing family and kinship structures, prostitution, and political activism. DR:9†(5)

5 units, Spr (Klinit)

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:9(4 or 5)

4 units, Aut (Rickford)

170. Introduction to Urban Design—Urban design in theory and contemporary practice. Theoretical overview of urban form and experience. Neighborhood conservation, downtown revitalization, preservation, and metropolitan growth are examined through comparative studies of urban design processes and issues in N. America and abroad. Student projects and workshops focus on case study urban design problems in San Francisco and the Bay Region.

5 units, Win (Cast) T 10-12 and 7-9 p.m., plus two required Sat. workshops

171. Urban Design Studio—(Undergraduates enroll in Art 168B; graduates enroll in Urban Studies 271.) 10-week comprehensive urban design project taken from a current problem in San Francisco. Systematic introduction to the urban design process and problem-solving methods. Graphic, diagrammatic, and other tools of analysis and communication are used Enrollment limited to 14. Prerequisite: 170.

5 units, Spr (Cast) TTh 7-10 p.m, plus one required Sat. workshop

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 each aspect of the course. Enrollment limited to 25.

3 units, Aut (Teicholz, Staff) MW 9 lab F 1:15-4:05

174. Architectural Design Process—Lecture/studio. Introduction to basics of the design process through building-type case studies and studio sessions, applying principles affecting site interactions with building program components. Visits and discussions with architects/landscape architects responsible. Student work is developed as a conceptual massing model, and simplified site and building related graphics. Result: demystification of the initial phase of the design process and providing a better understanding of the architect’s role. Enrollment limited to 15.

5 units, Win (Neuman) MTh 7-10 p.m, plus one required Sat. workshop

175. Technology and Aesthetics—(Enroll in VTSS 115.) The aesthetic dimension of technology in the modern world and in history. The role of subjective factors in technological and scientific problem-solving and in the response of users and observers to technological phenomena. Analysis of such concepts as beauty, elegance, quality, appropriateness, and function as they apply to specific works of technology and science. Technology as art and art as technology. Improving the ability to analyze the “fit” of technological products to individual needs and cultural values. Case studies of personal computers, buildings, machines, weapons, structures, and networks.

4-5 units (Adams, Katz) not given 1991-92


4 units, Aut (Katz) MW 2:15-4:05

180. Current Issues in Urban Planning—Focuses on current issues and professional challenges in the field of urban planning and policy development. Through presentations, seminar
discussions, and project assignments, students examine growth management, relationship of land use and transportation, environmental mediation and conflict management, and affordable housing. Also, emerging trends in urban general plans with respect to child care services, parks and recreational service, and hazardous waste management. Enrollment limited to 25.

4 units, Aut (Iacofano) MW 3:15-5:30

181. Environmental Planning—(Enroll in Civil Engineering 171.) Alternative strategies for air and water quality management; environmental impact assessment requirements; interactions between land use, physical infrastructure, and environmental quality; forecasting and evaluating environmental effects; survey of techniques for assessing visual, biological, noise, traffic, air and water quality impacts. Prerequisites: Civil Engineering 170 and Math. 20.

4 units (Ortolano) not given 1991-92

186. Management of Geologic Hazards—(Enroll in Applied Earth Sciences 184.) The application of earth science to the 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. Prerequisite: Geology 1 or consent of instructor. DR:6(8)

3 units, Spr (Cotton) TTh 1:15-2:30 lab and field trips by arrangement

190. Seminar on Planning and Design Professions—Informal luncheon seminar on vocational possibilities in urban planning, urban design, and architecture. 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 school admissions and the degree relevant to these fields.

1 unit (Staff) not given 1991-92

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


3-8 units (Staff) by arrangement

PROGRAM IN VALUES, TECHNOLOGY, SCIENCE, AND SOCIETY

Emeriti: (Professors) Raymond E. Crayton (Psychiatry), Eric Hutchinson (Chemistry), Alex Inkeles (Sociology), Bernard Siegel (Anthropology), Walter G. Vincenti (Aeronautics and Astronautics)

Chair: Timothy Lenoir
Associate Chair: Robert E. McGinn
Director, Technology and Culture Sequence: Barry M. Katz

Professors: James L. Adams (Industrial Engineering and Engineering Management), Barton J. Bernstein (History), Gregory Brumfiel (Mathematics), Peter Galison (History of Science), Stephen J. Kline (Mechanical Engineering), John McCarthy (Computer Science), William Perry (Engineering-Economic Systems), Nathan Rosenberg (Economics), Paul S. Seaver (History)

Associate Professor: Timothy Lenoir (History)
Assistant Professor: Clifford I. Nass (Communication)

Professors (Teaching): Gilbert Masters (Civil Engineering), Robert E. McGinn (Industrial Engineering and Engineering Management)

Senior Lecturers: Joseph J. Corn (History; on leave Winter, Spring), Barry Katz (Mechanical Engineering)

Lecturers: Renee Courey (VTSS), Naushad Forbes (VTSS), Keith Gandal (VTSS), Patricia Nabi (VTSS)

Consulting Professor: Richard Meehan (VTSS)

Technology and science are activities of pivotal importance in modern life, intimately bound up with industrial society's evolving character, problems, and potentials. If scientific and technological pursuits are to 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 practicing engineers and scientists. At the same time, lawyers, public officials, 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 a new form of liberal education adequate to the technical character of the contemporary era.

The Program in Values, Technology, Science, and Society (VTSS) is an interdisciplinary enterprise devoted to understanding the nature and significance of technology and science 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 VTSS courses study science and technology in society from a wide 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 the VTSS offering, and are requirements in some program curricula.

GENERAL INFORMATION

Selected VTSS courses may be used, individually or in integrated groups, for various purposes:
1. To satisfy University Distribution Requirements.
2. To satisfy the VTSS 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 VTSS honors program complementing any standard major (see below).
5. To satisfy requirements for majors in VTSS (see below).

VTSS 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 VTSS 1, 2, 3. This prize honors historian of technology Professor Walter G. Vincenti, founding member and the first chair of the VTSS program.

UNDERGRADUATE PROGRAMS

Degree programs in VTSS 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 philosophical, ethical, aesthetic, historical, economic and other social scientific 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 science-and-technology-in-society-related theme, sub-area, or problem. 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 the field of science and technology in society. The specific requirements for the bachelor's degree in VTSS are as follows:

BACHELOR OF ARTS

1. VTSS Core (8 courses)
   a) Foundational course (VTSS 101).
   b) Disciplinary Analyses (five courses with no more than two courses in each category):
      1) Philosophical perspectives (VTSS 110, 117, 118).
      2) Historical perspectives (VTSS 121, 125, 126, 127, 157).
      3) Social Science perspectives (VTSS 107, 155, 162).
   c) Advanced courses (one course in each category):
      1) Disciplinary analysis (VTSS 207, 210, 217, 221, 271, 303).
      2) Senior colloquium (VTSS 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 VTSS office), or
      2) completing the program's technical literacy sequence (VTSS 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 5 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 VTSS Policy Committee has certified the following topics as suitable Thematic Concentrations for the VTSS 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 VTSS 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 advisor. See the associate chair for details.

**BACHELOR OF SCIENCE**

The student pursuing the B.S. degree shall complete the VTSS 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**

The VTSS program 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 VTSS. The honors program is open to students majoring in any field (including VTSS). 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 VTSS honors program is typically made during the student’s junior year. By May 15 of the 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 VTSS Honors Committee (for details on proposal submission, see the brochure, “Honors Program Requirements,” available in the VTSS office). Students whose proposals are accepted by the honors committee 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 the Autumn Quarter of the senior year. VTSS majors pursuing honors in VTSS are exempt from the VTSS core Senior Colloquium requirement.

**REQUIREMENTS**

1. Foundation Course: VTSS 101.
2. Philosophical and Ethical Perspectives: VTSS 110.
3. Historical Perspective: one of VTSS 121, 125, or 126.
4. Social Science Perspective: one of VTSS 107, 135, or 162.
5. Honors Tutorial: VTSS 195A and B.
6. Honors Project: an original critical essay or investigative project with accompanying explanatory essay on a VTSS topic of general importance (12 to 15 units). Past honors projects are on file in the VTSS 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 VTSS 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

CULTURES, IDEAS, AND VALUES SEQUENCE

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 antiquity: Mesopotamia and Egypt, ancient Israel; the classical civilization of Greece and Rome; the contributions of China and Islam. DR: 1, three-quarter sequence.

5 units, Aut (Kate, Staff) MTW11

2. The Pre-Modern World—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, Win (Katz, Staff) MTW11


5 units, Win (Katz, Staff) MTW11

TECHNICAL LITERACY SEQUENCE

51. The Nature of Engineering—(Same as Engineering 1.) Open to all undergraduates and graduates. Investigation of the engineering process and the people and organizations involved in it. Topics: some history; the nature and source of engineering problems; the interaction between engineering, science, mathematics, and business; and specific aspects of engineering, e.g., design, development and test, production, and research. DR: 6(8)

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

52. An Introduction to Physics (Physics for Poets)—(Enroll in Physics 19.) 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 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, Win (Cabrera) TTh 11-12:15

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, Spr (Brumfiel)

CORE

101. Science, Technology, and Contemporary Society—Key social, cultural, and values issues raised by scientific and technological developments in contemporary life, focusing on the U.S. in the early 1990s. Topics: distinctive features of contemporary science and technology; influence of scientific and technological developments on 20th-century society, including major changes and problems in work, religion, ethics, the arts, and international relations; the social control of science and technology; effects of the organization of research and development on the ideals and ethical conflicts of scientific and engineering practice; and science, technology, and society in the future. DR: 9(5)

4-5 units, Aut (McGinn) MW 2:15-4:05

optional section for extra unit

110. Philosophical and Ethical Issues in 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 and landmark preservation, high-rise proliferation); the technical 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) MTW 2:15-3:05

plus two-hour section by arrangement
117. The History and Philosophy of Design—
(Same as Mechanical Engineering 117, Art 117.)
Survey of major schools of 19th- and 20th-century
design: Arts-and-Crafts movement, Beaux-Arts, Bauhaus, industrial
design, post-modernism. Relation of design to art, technology, and
politics. Readings from principal theorists and practitioners
(William Morris, Walter Gropius, Le Corbusier). Analysis of notable
successes and failures in modern design. Exercises involving application
of leading design concepts to modern problems.
4 units, Aut (Katz) MW 2:15-4:05

118. Design and Quality—(Same as Mechanical
Engineering 214.) The several dimensions of quality
(performance, economy, and reliability) emphasizing value beyond function.
Topics: emotional response of the user, cultural consistency, craftsmanship,
elegance, human fit, and compatibility with global and social constraints.
Not a course on quality assurance or quality control in production. What quality means in completed
industrial products, and what must happen in design, production, and business to achieve it.
4 units, Win (Adams) MW 11-1

121. Technology, Science, and European Expansion,
1500-Present—(Same as History 115, History of Science 121.) The interplay between
the growth of science and technology since the Renaissance and expansion of European influence.
Topics: military technology and empire building; science and technology in the periphery
or how the creation of botanical gardens, observatories, and similar institutions served the
needs of empire builders; and Europeanizing the world or how the transfer of European cultural
traditions and institutions changed their imperial holdings. DR:9(5)
4 units, Aut (Pang) MWF 1:15

125. Scientific Revolution—(Same as History
139, History of Science 145, Philosophy 145.)
Social, intellectual, and institutional background
of the 17th-century period that established modern science. Theories of matter and motion, Galileo, Descartes, Bacon, Boyle, and Newton.
Historical controversies: Yates' thesis on hermeticism and magic, Merton on Protestantism and science, Hessen on the economic basis of scientific change. Readings from era texts and modern historical studies. Interpretations of the revolution and what is meant by science and revolution. DR:8(3)
5 units, Win (Galison) TTh 11-12:15

126. History and Philosophy of Physics—(Same
as Philosophy 168, History of Science 168.) Philo-
osophical questions raised by historical developments in 20th-century physics. 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. What is meant by "unified" field theories in contemporary physics? Read-
ings: scientific, historical, and philosophical texts.
DR:8(3)
5 units, Spr (Galison) TTh 11-12:15

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 VTSS core courses, or consent of the instructor.
4 units, Win (Staff)

APPLICABLE TO CORE REQUIREMENTS

To satisfy the Social Science Core Requirement (see "Undergraduate Programs" section above), students select one of the following three courses:

107. Technology and Economic Change—
(Same as Economics 113.) 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 industrialized countries), economic growth and slowdown in industrial countries, and present concerns and future prospects (the influence of technology on employment, civilian "spillover" from military research and development, and coping with rapid technological change). DR:9(5)
4-5 units, Spr (Rosenberg)
optional section for extra unit

155. The Sociology of Scientific Knowledge—
(Same as Anthropology 158, History 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 writing on anthropological approaches in the works of Mary Douglas, Pierre Bourdieu, etc., a theory of practice and a critique of historically situated practical reason is explored as the foundation for the sociology of scientific knowledge.
4 units (Lenoir) given 1992-93

162. Communication, Technology, and Society—
(Same as Communication 169/269, Sociol-
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.

4 units, Spr (Nass) TTh 10-11:50

OTHER OFFERINGS

106. The Nature of Technology in Modern Society — (Same as Engineering 221.) Development of unified consideration of technology, science, society, and human values. Basic patterns underlying the physical bases of human societies. Systems covering areas of major human concern and the disciplines that study them. The world views of technology, science, and other disciplines, and the problems and advantages associated with combining them. Necessary routes to better connect science and technology with society and values and suggested agenda for clarification of unresolved conflicts and for the provision of a better basis for cooperative interdisciplinary work. The bases of cooperation in groups. Limited enrollment.

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


4 units, Spr (Meehan) TTh 9-10:50

116. War and Technology — The role of technology, military and civil, in human conflict; theories of aggression; origins of organized violence and changing relationship between specific technological innovations and warfare in history.

4 units (Adams) given 1992-93

122. History of High Technology — (Same as History of Science 122.) What is "high technology"? Who creates it? What is its place in contemporary social, political, and economic life? Topics: the rise of the engineering profession, the place of skilled workers in high-tech industry, the emergence of technocratic ideology in Western societies, and the development of the nuclear industry and space programs in Western and non-Western societies.

4 units, Win (Hecht) MW 11-12:15

123. Researching 20th-Century Technology — (Same as History of Science 123.) Seminar on problems that arise in researching the recent history of technology. Surveys methods used in the historical literature and primary sources: oral interviews, popular media, professional journals, company archives, government publications, etc. Emphasis on research and writing; required research paper on a 20th-century technology.

3 units, Spr (Hecht) W 3:15-5:05

124. Science and Technology in the Scientific Revolution — (Same as Classics 138B, History of Science 138B, History 138B, Philosophy 138B.) Lecture format covering issues on the relation between science and technology in the ancient, Islamic, Medieval, and Renaissance periods. Science and technology are linked to social changes leading to the legitimation of the new scientific world view. DR:8(3)

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

140. Literature and the Technology of Lifestyle — 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: Joan Didion, Hunter Thompson, Henry Miller, Toni Morrison, Hubert Selby, Jack Kerouac, and Abraham Cahan.

5 units, Spr (Gandal)

142. Islamic Science and Technology — (Same as Anthropology 111.) Interaction of Islam with science and technology. How has Islam encouraged and constrained their development through: doctrinal views of Islam on knowledge acquisition; need to reconcile scientific facts with divine revelation; imposition of moral and ethical standards; and the development or adaption of technologies to serve needs specific to the Islamic community? Emphasis on contemporary movement of Islamic scholars in the U.S. and abroad to “Islamize” all fields of science and technology.

4-5 units, Spr (Nabti) Th 3:15-5:05

152. Rise of Industrial Asia — (Same as Economics 130, Political Science 125.) Interdisciplinary seminar on the political, economic, security, social, and cultural aspects of industrial development and change in Asia as a region. Enrollment limited to 15.

5 units, Aut (Lau, Lewis, Okimoto) Th 3:15-5:05

157. The Rhetoric of Technology in 20th-Century America — (Same as American Studies 221, History 252.) Examination of technical artifacts as sites around which groups construct and contest cultural meaning. The rhetoric employed in popular media to discuss technologies (telephone, airplane, and computer), to illuminate changes in the autonomy or dependency of individuals and particular groups in amateurs; and in
the values, beliefs, and practices of individuals and groups vis-à-vis machines.

5 units, Aut (J. Corn) W 3:15-5:05

160. Technological Opportunities for Humanity—Opportunities for new technologies in daily life based on present science. Criteria for technological advances to be useful and wanted by individuals. Obstacles to implementation and use of different kinds of technologies. Products vs. systems. Discrepancies between what people want and use and what is thought to be good. Technology in fiction, especially science fiction. Futurism. Anti-technological attitudes and movements. Technologies include computers, transportation of goods and people, medicine, utilities, space travel.

3 units, Win (McCarthy) TTh 3:15-4:30

164. America and the “Bomb”, Politics, Diplomacy, and Culture in the Nuclear World, 1939-Present—Issues of nuclear weapons emphasizing early development, use on Japan in 1945, military planning and diplomatic leverage and threats, efforts at disarmament and arms control, the H-bomb decision and tactical weapons, disputes over nuclear testing and fallout, the development of deterrence and its critics, the roles of scientists and the strategy community, and various peace movements.

(Bernstein) given 1992-93

166. Innovation—The nature, processes, and management of research and development in industrial societies. Socio-technical systems as the physical bases of society. The creation of abundant societies and the rise of R&D in the final quarter of the 19th century in the U.S. and Germany. Conventional linear model and improved chain-linked model. Comparison of scientific (reductionist) view with the consistent view needed in innovation; operational consequences. Japanese and U.S. styles of innovation and their cultural bases. Modes of institutionalizing R&D. Barriers to innovation, and countervailing forces. Revolutionary and evolutionary innovation in small and large companies. Effects of management style on the development of group cooperation. Effects of industry and product life cycle. Government role in innovation. Limited enrollment.

3 units, Win (Kline) TTh 1:15-3:05


3 units (Kodama) given 1992-93

169. Development and Technology in the Third World—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 1:15-3:05

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 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 1992-93

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 development of the ICBM and SLBM after Sputnik, the decisions made in the wake of the energy crisis in the 70s, the space program, and current issues, e.g., high-density TV, the human genome project, and the SDI program. How decisions to develop the A- and H-bombs were made in the U.S.S.R. and China, and the roles of the U.S. and Soviet governments in their respective space programs. Focus: the process by which technical issues are synthesized into the decision process, and how they are explicated for the policymaker with no background in technology; the role of technical agencies, governmental committees, and science advisory boards and the way these groups interact to advise senior policymakers. Guest specialists lecture from business, technological, and governmental areas.

3 units, Aut (Perry) MW 4:15-5:30

190A,B,C. Honors Project—Project for students in VTSS 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
195A. Honors Tutorial—Problems of research and writing the honors essay. Required of seniors doing VTSS honors. 
1 unit, Aut (McGinn) by arrangement

195B. Honors Tutorial—Problems of research and writing the honors essay. Required of seniors doing VTSS honors.
1 unit, Win (McGinn) by arrangement

199. Individual Work.
1-5 units, Aut, Win, Spr (Staff) by arrangement

ADVANCED UNDERGRADUATE AND GRADUATE

210. Ethics and Technology—Seminar on ethical issues raised by recent developments in technology and science. Topics: technology, science, and the genesis of ethical controversy; ethical issues raised by developments such as in vitro fertilization, embryo experimentation and cryopreservation, and sex selection of offspring; electronic “bulletin boards,” software copyrighting, and computer “viruses”; genetic testing, therapy and “enhancement” of humans, and genetically engineered drugs and animals; nuclear deterrence and strategic defense; and moral rights and responsibilities in scientific and engineering practice. Prerequisite: 110, another course in ethics, or consent of the instructor

4 units (McGinn) given 1992-93

212. Seminar: Ethical Issues in Science and Technology—(Same as Philosophy 256.) Topics: objectivity and neutrality of science, science and society, science and ideology, norms and values in human actions, the role of values, the role of values in the social sciences, theoretical and practical rationality, moral judgment on science and technology, a systems-theoretic approach to the issue of freedom and responsibility of science.

4 units, Aut (Agazzi) TTh 3:15-5:05

215. Computers, Ethics, and Social Responsibility—(Same as Computer Science 201, Symbolic Systems 100.) 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) MWF 11-12:15

217. Technology and Cultural Theory—Open to graduate students and upper-division undergraduates. Theoretical perspectives on technology developed by the Frankfurt School (Marcuse, Horkheimer and Adorno, Benjamin); existentialism and phenomenology (Husserl and Heidegger); theorists of modernism and post-modernism (Lyotard, Baudrillard, Habermas); gender and sexuality (Foucault, de Lauretis); current debates over technology within the arts and architecture.

4 units, Spr (Katz)

GRADUATE

221. Technical Knowledge in the U.S.—(Same as American Studies 231, History 256S/356S.) Seminar on the production, dissemination, reception, and changing content of technical texts, including handbooks, household management guides, trade periodicals, popular science writing, owner’s instruction manuals, and trade and engineering textbooks to illuminate the history of education and the book, the experiences of users of technology, the culture of consumption, and cultural history generally. Prerequisite: prior course work in American history, the history of science or technology, or consent of instructor.

(J. Corn) given 1992-93

224. Science, Patronage, and Court Culture: 1500-1700—(Same as History of Science 231B.) Research seminar analyzes the connections between the emergence of political absolutism, of court culture, and the rise and legitimation of modern science.

4 units, Win (Biagioli) M 5:15-7:05

303. The Process of Industrialization: Europe, U.S., 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 five countries: England, the U.S., Brazil, Mexico, and the Soviet Union. Analysis of how differences in processes of industrialization reflected differences in prior socioeconomic settings. Also, analysis of 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) T 3:15-5:05

341. Science and the Writer—(Enroll in History of Science 241.) For graduate students. "People have said I have no passions, but that is because I have a passion for clarity" (Bertrand Russell). A workshop in clarity, particularly the written presentation of science and history of science to readers who are not themselves scientists. En-
692 SCHOOL OF HUMANITIES AND SCIENCES

enrollment limited to six. Prerequisite: consent of instructor.

5 units, Win (Judson) W 3:15-5:05

369. Workshop on Development and Technology—Open to any advanced graduate student working on development and technology. Seminar on recent significant work in the field and discussion of graduate student research findings.
2-4 units, Aut (Forbes) W 3:15-5:05

CROSS-LISTED

127. History of Biological Thought—(Same as History of Science 62, Philosophy 62, History 116A.) Central issues in biological thought since Darwin: teleological vs. mechanistic explanations, vitalism, reductionism, the units and levels of biological organization, the origins of life, development, inheritance, and evolution.
4 units, Aut (Smocovitis) MW 2:15-3:30

128. The Rise of Scientific Medicine—(Same as History 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? Focus is 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. The 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, Aut (Lenoir) TTh 2-3:15

130. The Darwinian Revolution—(Same as History 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 the Species. Difficulties the theory had to overcome and their resolution in the union of evolutionary biology and population genetics.
4 units (Lenoir) given 1992-93

3-4 units, Aut (Winograd) MWF 10

OVERSEAS STUDIES

114T. Technology, Economic Development, and Knowledge Formation—Florence. (Same as Economics 114X, Political Science 115X; also listed as International Relations Cluster C.)
DR:9(5)
5 units, Win (Carnoy)

115T. A Century of Media Technology in Germany: 1840-1940—Berlin. (Same as History 228V.)
4-5 units, Auf (Kaplan)

117T. Industrial Revolution and Its Impact on Art, Architecture, and Theory—Berlin. (Same as Art 173Y.) DR:7(2)
5 units, Aut (Neckenig)

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 at least three Academic Council faculty members from at least two separate departments or programs of the University; one of the faculty mem-


citation:
bers 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 a UAC adviser 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 also be accompanied by a statement from all three advisers giving separate appraisals of the academic viability of the proposed major.

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 the 60 may be taken on a Satisfactory/No Credit basis.
3. A maximum of 5 units of the 60 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. All three advisers must be on 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.

INNOVATIVE ACADEMIC COURSES (IAC)

Director: Margo Horn

IAC introduces alternative topics and methods into the standard University curriculum and, through SWOPSI, links students' academic experience to social and political activism. IAC encourages faculty and students to introduce experimental courses and develop alternative approaches to learning. These courses do not fulfill any Distribution Requirements, but do count as units toward graduation. IAC courses are se-
lected and approved by the program's Accreditation Committee. They include three types of offerings: The Peters Seminars for Freshmen and Sophomores, SWOPSI (Stanford Workshops on Political and Social Issues), and Undergraduate Special courses (UGS).

REGISTRATION

Registration for all IAC courses occurs on regular class sign-up days at locations designated by this office. All Peters Seminars for Freshmen and Sophomores, SWOPSI workshops, and UGS courses are listed in the IAC Program Catalog, available each quarter during class list sign-ups through the residences, at the Registrar's Office, and at the IAC office, 124 Sweet Hall.

GRADES

IAC courses are graded in accordance with regular University procedure, with the Satisfactory/No credit option available on the instructor's approval.

COURSE PROPOSALS

A proposal for a UGS or SWOPSI course may be initiated by a student, staff member, faculty member, or a member of the community. The IAC staff is available to help in the development of proposals, and those interested in teaching in IAC are urged to consult with them. The proposed instructor should submit, for review by the IAC Accreditation Committee, a proposal using forms available at the program office, 124 Sweet Hall, including:

1. A statement of course objectives.
2. The planned approach and an outline of general requirements and/or prerequisites.
3. Specific requirements, definition of special projects, method of evaluation, and intended grading system.
4. A reading list identifying required and suggested readings.
5. A week-by-week syllabus which is as detailed as possible and which links readings, lectures, discussions, and projects.
6. The name of the instructor(s) and any others who will assist in teaching the course and a statement of the qualifications of these individuals. Instructors who are not members of the Academic Council must obtain a sponsor statement from a council member indicating support for the course and the qualifications of the proposed instructor(s). The sponsor is responsible to the IAC Accreditation Committee for the quality of the course, the performance of the instructor, and the evaluation of individual student performance, in accord with the course description as approved by the committee.

Proposals are generally due by the fifth week of the quarter preceding the one in which the proposed course is to be offered. Contact IAC for exact timetables.

THE PETERS SEMINARS FOR FRESHMEN AND SOPHOMORES

The Peters Seminars bring together small groups of freshmen and sophomores with faculty in the professional schools. The seminars focus on an accessible aspect of the faculty members' current research, and introduce students to questions and scholarship rarely found in introductory courses.

ADMISSION PROCEDURES

Enrollment is limited to freshmen and sophomores. Seminar offerings are announced each Autumn Quarter in Approaching the Sophomore Year, as well as in the IAC Program Catalog (see above). Students enroll for seminars on the first day of class.

Inquiries may be directed to the IAC office, Sweet Hall.

SWOPSI (STANFORD WORKSHOPS ON POLITICAL AND SOCIAL ISSUES)

SWOPSI was initiated by students in 1969 to harness the research capabilities of Stanford in searching for solutions to urgent social and political problems.

SWOPSI workshops are led by community members and Stanford students, faculty, and staff; each course is sponsored by a faculty member. The program offers for credit approximately nine workshops each quarter. SWOPSI classes are small; enrollments of 8 to 15 students per instructor allow for personal contact between students and instructors and for a high level of student involvement.

Workshops combine academic analysis with direct exposure to the issue. Some conduct community-based research and publish the research findings and policy recommendations. For example, a 1977 workshop developed a solid waste recycling plan for the campus which grew into the ASSU Recycling Center. In other workshops, students have published periodicals, painted murals, worked on a rape crisis hotline, and developed dorm outreach programs on racism. All workshops seek to acquaint the community-at-large with the issue under study; workshop findings form the basis of publications, public forums, or concrete legal, political, or community action. Public events such as symposia or film series are frequently generated by workshops; SWOPSI
also sponsors or co-sponsors public events that deal with political or social topics of interest to the Stanford community.

SWOPSI takes an interdisciplinary approach to problem solving, gives students a substantial voice in the conduct of workshops, and encourages cooperative group work. Workshops are open to undergraduates and graduate students, as well as to interested members of the community. Participation by people with diverse backgrounds and differing perspectives enhances the possibility of a comprehensive analysis of the issue and the development of imaginative solutions to problems.

Any person interested in organizing, leading, or participating in a workshop or in exploring possible SWOPSI sponsorship of a public event should contact the IAC office at (415) 723-4305. For registration, see above.

**UNDERGRADUATE SPECIAL COURSES**

UGS courses widen the range of options open to undergraduate students by encouraging innovation in subjects and methods, and introducing experimental and interdisciplinary courses. UGS provides settings for testing new course ideas and approaches to unusual subjects. Recent courses include Political Theories of Sexuality, Chicano Poetics, and Principles and Practice of the American Conservative Movement. As in SWOPSI, instructors may be students, faculty, staff, and community members.

**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 Public and Community Service Opportunities 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. The staff assists students seeking credit for academic work based on public service by identifying a faculty member who might supervise and accredit their work. It is the responsibility of students to take the initiative; credit is arranged in the same manner as individual study.

The center coordinates campus activities for Stanford in Washington, an academic program for students in the nation’s capital. The center also houses and supports the Stanford Volunteer Network, Stanford in Government, the Stanford International Development Organization, the East Palo Alto Stanford Summer Academy (EPASSA), and the You Can Make A Difference Conference. It administers the Public Service Summer and John Gardner Fellowship programs, which provide financial support to students undertaking public 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), students offer supplemental tutoring to East Palo Alto elementary students. Through TEAM, students provide physical education programming to Ravenswood schools. Students wishing to tutor, teach, or mentor low-income, first generation college-bound youth may join Stanford Upward Bound.

Students interested in public and community service internships, study-service connections, community research, volunteer work, and fellowships should visit the Haas Center at Owen House or call (415) 723-0992.

**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 go 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

Since 1975, CTL has provided 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 details 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. Graduate students who enroll in lower division courses may sign up for 100-level courses (e.g., 101 instead of 1) for a limited number of units. They are expected to complete additional work.

1. Learning Strategies—Time management, self-management, notetaking, techniques for understanding and remembering what is read, concentration and memory, mapping, how to prepare for and take exams, flexible problem solving strategies, relaxation techniques and other strategies for dealing with test anxiety, and library research.

   1-2 units, Aut, Win, Spr, Sum (Hall)

4. Reading Rate Improvement—Aims to double one’s reading rate without loss of comprehension and to improve skills of critical analysis. Students learn to better understand and remember what they read in textbooks, articles, and essays in the sciences, humanities, and social sciences, and to develop flexibility in reading speed, which enables them to vary reading rate according to familiarity, difficulty, and purpose.

   1 unit, Aut, Win, Spr, Sum (Hall)

116. The Question Course—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 develop 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, Spr, Sum (Matthes)

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 then on developing skills in various speech types: exposition, entertainment, argumentation, and persuasion. In addition to reading a basic 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. Letter grades or Satisfactory/No Credit.

   3 units, Aut, Win, Spr, Sum (Staff)

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 (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 Program (URO) 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 since 1974 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 data bases designed to facilitate undergraduate research projects. The Odyssey and Faculty Interests files are available through Folio, the computer processor which includes Socrates, the online 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 Undergraduates' Research is administered by URO and is available exclusively to Stanford undergraduates. The deadlines for major grants (up to $2,500) for 1991-92 are Friday, April 3 for projects in social sciences, natural sciences and engineering and Friday, April 24 for projects in humanities and creative arts.

Small grants ($500 maximum) are awarded each quarter. The deadlines for 1991-92 are November 1, February 7, and April 24.

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 50 students whose projects reflect the highest level of creativity and independence and the greatest promise for exciting results. The faculty sponsor of each winning major grant project receives an unrestricted professional expense grant of $500. 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 6, 1991. The URO office has information on applications and criteria.

The two 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 total-
ing a maximum of $20,000. The deadline is Fri-
day, June 12.

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. Applications are ac-
cepted throughout the year.

**STANFORD IN WASHINGTON**

**Director:** David J. Danelski

The University offers 13-week “stretch quar-
ters” (mid-September to mid-December or late
March to the end of June) in residence at the
Stanford facility in Washington, D.C. The pro-
gram 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 a career in public service, the program
offers an opportunity to take advantage of the
city’s unique cultural resources.

Central in the student’s educational experi-
ence is an internship. Students serve as interns at
such institutions and agencies as the Senate, the
House of Representatives, the Office of Manage-
ment and Budget, the Securities and Exchange
Commission, the Smithsonian Institution, the
National Gallery, and the Departments of Com-
merce, Education, Health and Human Services,
Justice, and State.

In addition to the internship, students must
also complete an academic course of study con-
sisting of small tutorials taught by policy experts
(5 units), and weekly policy seminars taught by
Stanford faculty members (5 units). Students usu-
ally write a major paper related to their internship
for 3-5 units of credit.

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 Win-
ter Quarter of the previous year. For Spring
Quarter, apply early Autumn Quarter.

Students interested in the program may obtain
a brochure at Owen House, or call for informa-
tion, (415) 723-0992.

**COURSES**

**Seminar: Economics of Regulation**—(Enroll in
Economics 159.) The changing federal policies
toward microeconomics interventions. Topics:
recent efforts to reform regulatory policies and
institutions and to deregulate various sectors;
legal, political, and economic theories that pre-
valled prior to the reform movement; and the
effects of the reforms. Explores hypotheses pro-
posed by scholars in the context of specific regu-
latory institutions and issues.

5 units, Aut, Spr (Owen) T 4-6

**Undergraduate Colloquium: Race, Ethnicity,
and American Public Policies**—(Enroll in His-
tory 262A, Urban Studies 143.) Introduction to
major federal policy issues dealing with ethnic
and racial minorities in the U.S. Historical discus-
sion of policy formulation during the past genera-
tion. Focuses on contemporary policies and ad-
vocacy, African Americans and Hispanics, and
other immigrant and ethnic groups. Possible top-
ics: race and poverty, civil and voting rights,
wellfare, homelessness and the underclass, and
immigration policy.

5 units, Aut (Camarillo) T 4-6, 7:30-8:30

**Tutorial**—Individual and small-group dis-
cussions, conducted by tutors in areas such as
health, environmental, and foreign policy.

5 units, Aut, Spr (Danelski)

by arrangement

Dean: Paul A. Brest

Associate Deans: Ellen Borgersen, Frank Brucato, Sally M. Dickson, John Gilliland


Associate Professors: Janet Cooper Alexander, Henry T. Greely, Joseph A. Grundfest (on leave Autumn), Bill Ong Hing, Barton H. Thompson

Assistant Professors: Barbara H. Fried, Deborah M. Weiss, James Q. Whitman


Visiting Professors: Guyora Binder, Charles R. Calleros, Alex Johnson, Victor Hao Li, Carol Sanger, Kathleen M. Sullivan, Roman Weil, Joseph Weiler, Eric Wright

Acting Professors: Ian Ayers, Barbara Caulfield, Mervin N. Cherrin, Stanley B. Lubman, Karl Nygren

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 School of Law bulletin.) The school is on a two-term academic calendar. Autumn term classes begin on September 3, 1991. Spring term classes begin on January 21, 1992, and the term ends on May 22, 1992.

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—Viewing social science as an analytical tool, examines its role in the American legal process. Focus is on the relevance of social science theory and empirical findings for such legal issues as deterrence; pornography; desegregation; fair employment; jury selection and dynamics; child custody; and the nature of expertise. A separate emphasis is placed on social science method, and its implications for legal analysis.

3 term units (Rosenhan)

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; tax and estate problems of artists and collectors; legal services for artists; art napping and insurance; legal problems of art museums, etc.

3 term units (Merryman, Elsen)

244. Issues in Child Custody—(Same as Psychology 351.) How policy regarding child custody ought to be developed. How behavioral sciences information can be utilized in the development of legal policies regarding child custody decisions. Identifies research projects that provide new data relevant to policymakers. Seminar limited to 20
graduate and law students. Consent of instructor required.


1 or 2 term units, Win (Arrow, Mnookin, Ross, A. Tversky, Wilson) T 4-6

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, Aut semester (Rosenhan)

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)

337. Public Policy Towards Abused and Neglected Children—(Same as Education 379X.) 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 the 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 the school’s semester system. Prerequisite: consent of instructor.

3 term units or 5 quarter units, Win-Spr (Wald)

345. Psychology and the Law Proseminar—(Same as Psychology 225.) Current research on psychosurgical issues designed to acquaint faculty and students with each other’s current research and with contemporary issues in the field. Possibly topics: the role of social science experts in legal decision making, eyewitness identification, jury behavior, psychological assumptions in evidence law, the insanity defense, and others, depending upon the interests of the participants. Prerequisites: law student or graduate standing in psychology or postdoctoral fellow, and consent of instructor.

2 term units or 3 quarter units (Rosenhan) not given 1991-92

380. Gender, Law, and Public Policy—(Same as Political Science 370.) Open to law and graduate students. The way 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.

2 term units, Spr (Rhode, Okin)

381. Health Law and Policy—(Same as Health Policy and Research 210.) Introduces some of the legal, policy, and ethical issues spawned by the health industries. Focuses on: quality assurance through malpractice litigation, peer review, etc.; health care financing through Medicare, Medicaid, private insurance, and health maintenance organizations; and bioethical issues such as the definition of death and the “right-to-die.” Non-law students admitted by the consent of instructor. Class starts September 5.

5 units, Aut semester (Greely) ThF 10:40-12:10

440. Fatherhood, Law, and Construction of Family Relationships—(Same as Psychology 280.) Psychosocial studies in family law help examine how legal reform affects family functioning in intended and unintended ways. Revisions in sociopolitical policies derive from changes in normative family roles and relationships (e.g., gender and parenting roles), and help create these changes by institutionalizing intended modes of family functioning. Because families are complex social systems, legal reforms which influence aspects of family process may have unanticipated consequences for other aspects of family life. Emphasis on fatherhood and its sociolegal construction.

(Rosenhan)

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. Explores current issues in health law and policy. Focuses on conflicts of interest in medicine including financial conflicts between doctors, patients, and insurers or government financing bodies; ethical conflicts between doctors, patients, and society; and wide-ranging conflicts between medical researchers and patients. Develops an integrated view of the appropriate
role for law in limiting health provider’s discretion. Explores issues of interest through student-guided presentations. Enrollment is limited to 18. Prerequisite: 381 or Health Research and Policy 391 or equivalent. Class starts January 21.
5 units, Win semester (Greely) F 1-2:40

493. Strategies for Social Change—Open to graduate students and law students. The role lawyers do, and should, play in bringing about social change to benefit disadvantaged or subordinate groups. Through case studies and guest lecturers, examines how lawyers perceive their role, how they select issues and strategies, and the impact of various efforts at social change by “public interest” legal organizations. Alternative strategies including litigation, legislative activity, organizing, use of media.
3 units, Aut semester (Wald)

NONPROFESSIONAL

The following courses are 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.

103. Meeting the Needs of Children: The Roles of Families and Society—(Open to undergraduate students only.) The status of children in American society. Issues: what rights should children have to care, protection, economic goods, and opportunity? Who should have responsibility for providing these goods to children? What values and assumptions underlie current social policies towards children and families? Should our society change current approaches? Extensive reading and class discussions based on readings.
3 units, Spr (Wald)

104. Psychology and Law—(Same as Psychology 125.) The joinders between cognitive, social, and personality psychology and the law. Topics: role of memory and perception in eyewitness testimony; insanity defense and associated issues of prediction; educational and job discrimination; and the psychology of juries.
3 units, Aut (Rosenhan)

106. Introduction to American Law—(Same as American Studies 179, Political Science 182F.) Introduction to 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)
3 units, Win (Friedman)
Vice President for Medical Affairs and Dean:  
David Korn  
Senior Associate Dean for Education and Student Affairs: Charlotte D. Jacobs

The School of Medicine offers courses of study leading to the B.S., 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
Some departments offer programs leading to the M.S. degree, and most 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 Support Section of the Registrar's Office, Stanford University, Stanford, California 94305-3052.

The Combined Admissions Mode program (CAM), allows a small, 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, and psychiatry. The minimal requirement for the M.D. degree is satisfactory completion of 13 quarters of academic work; additional quarters may be taken at a nominal fee. Involvement in research and outside course work may extend the time spent in medical school. Completion of the M.D. degree must be achieved within six years, unless a petition is granted to extend this time frame.

There are a variety of opportunities for in-depth study of subject areas in the basic sciences. Students with strong interests in medical research as a career are urged to investigate opportunities available under the auspices of the Medical Scientist Training Program (MSTP). This program provides a limited number of students the opportunity to pursue an individualized program of research and course work leading to both the M.D. and Ph.D. degrees. The estimated time for completion of the program is seven years. Students interested in participating in the MSTP are asked to provide supplemental information relevant to their research background and are considered for entry into the MSTP at the time of their application to the School of Medicine.

The admissions process recognizes that some minorities and women are under-represented in the medical profession, and especially in academic medicine; the school has a strong commitment to identify, recruit, and educate such students.

Provided an applicant to the school has completed the basic courses in physics, chemistry, and biology, the choice of an undergraduate major may reflect other interests, including the arts and humanities. Course work in mathematics and the behavioral sciences is highly recommended because of its importance in understanding medicine. Extracurricular activities and breadth of interests and experiences play an important role in the selection of students from among those applicants having superior records.

Further details on the M.D. degree, including admission requirements, are in the Stanford University School of Medicine bulletin. 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

Co-Directors: John Boothroyd (Associate Professor of Microbiology and Immunology), Helen Blau (Associate Professor of Pharmacology)

Committee for Combined Admissions Mode (CAM): 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), James Mullins (Professor and Chair, Department of Microbiology and Immunology), Mark Musen (Assistant Professor of Medicine, Medical Information Sciences Program), Thomas Schwarz (Assistant Professor of Molecular and Cellular Physiology), James Spudich (Professor of Cell Biology)

GRADUATE PROGRAM

Through CAM, a small 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 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 enable students to experience a small slice of research activities at Stanford and then to choose from the myriad opportunities. Students are able to complete their degrees in the same time as students who enter a given Ph.D. program directly.

CAM applicants should have an undergraduate training in the biological or related sciences. Information may be obtained through the University’s Graduate Admissions Section of the Registrar’s Office. Application is made on the standard form used by all Ph.D. programs in the School of Medicine. Application review is by the CAM committee, which uses the usual criteria for assessing excellence and potential of students for productive careers in science. Such criteria include undergraduate academic record, 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 1991 application deadlines.

Entry to the CAM program is likely to be highly competitive as only about twelve students are admitted each year. CAM represents a unique opportunity to choose from and to experience the diversity of research at Stanford, with the ultimate goal of pursuing the Ph.D. degree in a department or program which is of manageable and comfortable size.

**BIOCHEMISTRY**

_Emeritus: (Professor) Arthur Kornberg_  
_Chair: Robert L. Baldwin_  
_Associate Professor: Douglas L. Brutlag_  
_Assistant Professors: Patrick O. Brown, Robert S. Fuller, Mark A. Krasnow, Suzanne R. Pfeffer_

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 either 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, 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, 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, and amino acid and radioisotope analysis. Computer and text editing facilities are available. 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.

General University regulations concerning the Ph.D. degree are summarized in the "Degrees" section in this bulletin. The department offers neither master's nor undergraduate degrees.

The Departments of Cell Biology and Biochemistry have a joint admissions program. Prospective students may apply to either department. Students who are admitted have the option of gaining 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 re-
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 January 1. 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 (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 American 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**

**200. Biochemical Structure, Metabolism, and Energetics**—Structure and function of biological molecules, enzyme kinetics and mechanisms, bioenergetics, pathways of intermediary metabolism and their control, and membrane structure and function. Lectures on special topics. Prerequisites: organic chemistry, cell biology.

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. Prerequisites: 200 and an understanding of basic molecular biology.

5 units, Spr (Baldwin, Berg, Brown, Brutlag, Chu, Davis, Kornberg, Krassow) 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 (Pfeffer) not given 1991-92

**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 1991-92

**211. Development in Microorganisms**—(Same as Developmental Biology 211.) Studies of cell differentiation and multicellular development. 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 1991-92

**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, biogenesis and function of the cytoskeleton, organelle biogenesis, protein transport and secretion, and membrane receptors and signal transduction. Lectures and a review of pertinent literature with extensive student participation. Prerequisites: 200 and 201 (or equivalent), and consent of the instructors.

3 units, Spr (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, Spr (Hogness, Krasnow)

### 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)

### 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)

### 218. Understanding the Genetic Message—(Same as Medical Information Sciences 231.) Describes 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 (Brutlag) not given 1991-92

### 221. The Teaching of Biochemistry—To be taken by all teaching assistants in 200, 201, or 217. Emphasizes practical experience in teaching on a one-to-one basis, and problem set design and analysis. Familiarization with current lecture and text material expected, along with evaluations of class papers and examinations. Prerequisite: enrollment in the Biochemistry Ph.D. program or consent of instructor.

3 units, Aut, Win, Spr (Staff)

### 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 and 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

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### CANCER BIOLOGY PROGRAM

Committee on Cancer Biology: Martin Brown (Chair and Program Director, Professor of Radiation Oncology); Michael Cleary (Assistant Professor of Pathology), Wray Huestis (Professor of Chemistry), Alan Krensky (Associate Professor of Pediatrics), Ronald Levy (Professor of Medicine), Sharon Long (Associate Professor of Biological Sciences)

The Cancer Biology Program is designed to provide a framework for students with an interest in the understanding and control of neoplastic growth and to build a curriculum in varied biomedical areas relevant to that subject. Students in this program are based in departments appropriate to their specialty and are subject to the core requirements specified below. A Ph.D. is offered in Cancer Biology. Basic University requirements for the Ph.D. are described under the "Degrees" section in this bulletin.

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### 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) Pathology 230A, General Pathology.
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 constituting 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 1992-93

251, 252, 253. Special Topics in Cancer Biology—Full-quarter courses or half-quarter mini-courses given by different lecturers on topics of major importance in cancer research. Units given proportionately.

251. Aut (Staff) TTh 4:15-5:35
252. Win (Staff) TTh 4:15-5:35
253. 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: Roger D. Kornberg
Professors: Roger D. Kornberg, Michael Levitt, David B. McKay, James A. Spudich, Lubert Stryer
Associate Professor: Peter Parham
Senior Lecturer: Patricia Cross

The department offers opportunities for course work and research in cell biology. Courses fall in two categories: (1) a series of one-quarter courses that treat special topics of current interest in cell biology at an advanced level; and (2) Structure of Cells and Tissues, a one-quarter course tailored to the needs of medical students that includes both lectures on structure-function relationships of mammalian cells and tissues, and a lab on medical histology.

The emphasis of research in the department is on understanding fundamental cellular processes in terms of the structure and function of organelles and molecular assemblies. Techniques used include standard methods of biochemistry, genetic engineering, and cell culture, as well as image processing and three-dimensional reconstruction from electron micrographs, x-ray and electron diffraction, fluorescence microscopy, nanosecond fluorescence spectroscopy, and microinjection of cells and nuclei. The department owns and operates a computing center equipped with the most 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-quar-
ter 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 and molecular genetic analysis of protein structure, cell motility, 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. Recurring motifs of excitation and adaptation, and transduction and their evolution are emphasized. 3 units, Aut (Stryer)

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) not given 1991-92

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) not given 1991-92

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) not given 1991-92

232. Macromolecular Structure: Diffraction Methods and Diffraction Results—(Same as Biophysics 233.) General methods and notable accomplishments of x-ray crystallography and solution scattering. Methodology topics: small-
angle scattering, fiber diffraction, and x-ray crystallography at a level that makes current literature in the field understandable to the non-practitioner. Protein folding patterns, enzymology, receptor-effector systems, proteins of the immune system, and membrane proteins. Prerequisite: knowledge of basic biochemistry.

3 units (McKay) not given 1991-92

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, Spr (Parham)

260. Supervised Study—Research or advanced tutorial for undergraduates.
1-18 units, any quarter (Staff)

299. Directed Reading.
1-18 units, any quarter (Staff)

399. Individual Research.
1-18 units, any quarter (Staff)

DEVELOPMENTAL BIOLOGY

Chair: Lucy Shapiro
Professors: Bruce Baker, David Clayton, David Hogness, Dale Kaiser, Matthew Scott, Lucy Shapiro, James Spudich, Irving Weissman
Associate Professors: Margaret Fuller, Roeland Nusse
Assistant Professors: Stuart Kim, David Kingsley

One of the major goals of the Department of Developmental Biology in the School of Medicine is to create a principal center of research and teaching in developmental biology. The Ph.D. program includes those pursuing the M.D./Ph.D. combination. Students are required to take, and satisfactorily complete, at least three lecture courses offered by the department, including Developmental Biology. In addition, students are required to take three courses outside the department, including a genetics course. 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. The first proposal is on a subject different from the dissertation research and must be prepared and defended no later than June 30 of the first year. The second proposal is on the planned subject of the thesis. It can be prepared and defended any time during the second year, but no later than July 31 of the second year. This allows ample time for both proposals to be prepared and defended satisfactorily in time to declare Ph.D. candidacy at the beginning of the third year.
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 9-11

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, Spr (Kaiser, Shapiro) TTh 10-11

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 (Kim, Shapiro)

M 5-6, W 4-5

225. Molecular Motor Proteins and the Cytoskeleton—(Same as Cell 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) given every 3rd year, not given 1991-92

399. Research—Must register by section numbers.

1-18 units, any quarter (Staff) by arrangement

GENETICS

Chair: David Botstein
Associate Professors: Michele P. Calos, Margaret T. Fuller, Huntington F. Willard
Professor (Research): Leonore A. Herzenberg

GRADUATE PROGRAMS

The Department of Genetics offers programs of study and broadly based research training in genetics and related fields of molecular, cellular, and developmental biology leading to the Ph.D. degree. In addition, a limited number of M.D. candidates can combine research training in the department with their medical studies.
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 and in a variety of private industries.

Although the program provides formal course work as well as informal seminars and lectures, the emphasis is on lab research involving close interaction between each student and his or her faculty adviser. At the same time, the program is designed to prepare the student for a career as an independent scientist. The principal subject areas for research training include molecular and cellular genetics, developmental genetics, biochemical genetics, population genetics, medical genetics, immunogenetics, and genome studies. There are also opportunities for the application of advanced instrumentation and extensive computer capabilities to certain specialized research problems, including cell detection and sorting, and aspects of human biochemical and population genetics. Research in the human genome program includes the computer and data base aspects. Interdisciplinary 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 specialization 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 students' dissertation research. When the interests of an incoming student are well defined at the time of admission, the student can be placed with a faculty preceptor soon after admission. Commonly, a formal dissertation proposal is submitted by the student following a qualifying examination given in the second year of study. 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 receive support from this source. Other student support can be provided by departmental funds and research grants awarded to individual faculty. Information 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, Biochemistry, Cell Biology, Developmental Biology, and Microbiology and Immunology.

201. Human Genetics—Theoretical and experimental basis for modern genetics emphasizing examples from humans. Lectures/reading in all aspects of genetics, including molecular, chromosomal, cellular, developmental, population, and medical genetics emphasizing the latter. Prerequisites: knowledge of biochemistry and basic genetics.

4 units, Spr (Steff) 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 pathways, developmental processes, and regulatory systems. Graduate students in any one of the biological sciences are welcome, but those with minimal experience in genetics should prepare themselves by working through problems in Suzuki, et al, or Hart, et al.

3 units, Aut (Botstein, Fuller, Brown) MWF


3 units (Cavalli-Sforza)

alternate years, not given 1992-93

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 re-
search problems involving study of vision and/or vision disorders.

1 unit, Spr (Cohen)

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

214. Topics in Genetics—Each of the faculty in the Department of Genetics presents two lectures covering their area of interest. Provides exposure to the faculty and the research being carried out in the department.

2 units, Aut (Staff) TTh 2:15

249. Trends in Cell Genetics—For graduate, medical, and advanced undergraduate students with good knowledge of biochemistry, biology, and genetics. Topics: genetic regulation and biochemistry of DNA replication in pro- and eukaryotes; gene rearrangements and novel mode of expressions in certain organisms; advances in genetics and biochemistry of cell division; applications of modern technology to problems of third and developing countries.

3 units, Win (Ganesan) alternate years, not given 1992-93

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

Chair: Byron Wm. Brown, Jr.
Director of Master's Program: Mark A. Hlatky
Associate Professors: Mark A. Hlatky, Iain M. Johnstone
Senior Lecturer: Ernie Young (chaplaincy Service)
Lecturers: Irene S. Corso (Spanish and Portuguese), Carole R. Price (Stanford University Hospital), Marilyn Winkleby (Medicine)
Participating Faculty: Kenneth D. Bloem (Stanford University Hospital), Alain C. Enthoven (Graduate School of Business), Stephen P. Fortmann (Medicine), James F. Fries (Medicine), Alan M. Garber (Medicine), Henry T. Creely (Law), Peter Gregory (Medicine), Halsted R. Holman (Medicine), David Hopkins (Stanford University Hospital), Rudolf H. Moos (Psychiatry), W. Richard Scott (Sociology), Edward H. Shortliffe (Computer Science and 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 diseases of unknown etiology. 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 School of Medicine bulletin.

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.

MASTER OF SCIENCE PROGRAM

The master's degree program in Health Services Research (M.S. in HSR) is designed to complement training in the medical and social sciences in preparation for careers in health services or health policy; for example, careers in medicine and nursing, in which responsibilities in administration and health policy are anticipated, and careers in health policy analysis in government, consulting firms, health planning agencies, education, business, or the law. The program provides specialized training in selected areas of health care policy and other health-related topics, in research methodology, and in the
application of these skills to a specific research problem. Course work requirements, based on an individually-designed multidisciplinary curriculum, allow students to design a program of study suited to their individual backgrounds and interests.

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 communication, sociology, political science, economics, education, engineering, and business 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 catalogue, as well as the following courses from other departments, have been approved as electives: Economics 150, Economics and Public Policy; Engineering Economic Systems 231, Decision Analysis; Medical Information Sciences 210, Computer Applications in Medicine and 211A, Computer-Assisted Medical Decision Making; Psychology 256, Decision and Judgment; Sociology 163, Organizational Decision Mak-

ing; 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 Building, Suite 7, Stanford, California 94305-5093.

**COURSES**

202. Biostatistics—Introduces statistical reasoning and the applications of biostatistics to research in biology and medicine through lectures and assigned problems. Emphasizes statistical computation on microcomputers.

3 units, Win (Brown) WF 9-10:50

203. Intermediate Biostatistics—(Same as Medical Information Sciences 203.) Introduction to more 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

205A. Medical Ethics I—Theories of ethical and moral decision-making. Emphasis on the dilemmas confronting medical practitioners. Seminar/discussion groups.

3 units, Win (Young) T 2:15-5:05

205B. Medical Ethics II—Advanced examination of a narrower range of topics at greater depth for those who have acquaintance with biomedical ethics. Objectives: examine the fundamental ethical principles underlying medicine and the life sciences, and the sometimes complex relationships between them, correlate these principles with ethical issues that have arisen and continue to arise in the practice of medicine, and suggest areas where greater conceptual clarity and methodological finesse is required to meet emerging new challenges in the field.

3 units, Spr (Young) T 2:15-5:05

206. Statistical Methods for Meta-Analysis—(Same as Statistics 211.) Meta-analysis enables researchers to synthesize the results of overlapping studies so that the combined weight of evidence can be considered and applied. Topics:
randomized clinical trials, literature search, statistical methods (contingency tables, Bayesian methods, sequential methods, sensitivity analysis, non-parametric methods), issues of bias.

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

207. Quantitative Methods and Their Application to Public Policy—(Same as Statistics 209, Public Policy 105.) Applications of statistical methods, rather than methodology per se. Topics: risk assessment in the evaluation of biohazards and medical techniques and technologies; comparisons of information-gathering techniques (surveys, experiments, or simulation studies); methods of expressing and evaluating uncertainty; and the interpretation of quantitative techniques of data analysis (regression). Prerequisites: Statistics 60 and 61, or equivalent.

4 units, Spr (Hlatky) MWF 11

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.

5 units, Spr (Moses) MW 8-10

210. Health Law and Policy—(Same as Law 381.) Non-law students admitted by the consent of the instructor. Class starts September 5. 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."

5 units, Aut semester (Greely) ThF 10:40-12:10

211. Advanced Issues in Health Law and Policy—(Same as Law 464.) Non-law students admitted with the consent of the instructor. Explores 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 is limited to 18. Class starts January 21. Prerequisite: 210, 391 or equivalent.

5 units, Win semester (Greely) F 1-2:40

220. Public Decision Making Regarding Human Health—(Same as Human Biology 40.) Goals: understand the role and limits of health care and prevention in achieving and maintaining health; develop a working knowledge of the organization, financing, and regulation of health care in the U.S.; plan and carry out analyses of problems in health policy, and to assess the validity of analyses carried out by others; and to understand the logical basis of clinical decision making (especially under uncertainty), and the resulting implications for policy. Credit cannot be given for both 200 and 220.

4 units, Spr (Hlatky) MWF 11


2 units, Win (Winkleby, Fortmann) TTh 1:15-3:05

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, Spr (Fuchs, Garber) 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 (Brown, Efron, Johnstone, Moses, Olshen) Th 1:15-3:05

270. International Health—Discussion on 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 (Bash) 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 (Hopkins, Bloem) 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 (Hlatky) 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 4-5:30

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

392. Cost-Benefit Analysis in Health Care—(Same as Business 432.) Not open to undergraduates. 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.

4 units, Spr (Enthoven) MF 8-10

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)

Acting Director, Spring, Summer: Peter Parham (Associate Professor of Cell Biology)

Committee on Immunology: Mark M. Davis (Associate Professor of Microbiology and Immunology), Christopher Goodnow (Assistant Professor of Microbiology and Immunology), Leonore A. Herzenberg (Professor of Genetics), Peter Parham (Associate Professor of Cell Biology), Jane R. Parnes (Associate Professor of Medicine/Immunology and Rheumatology), Dale T. Umetsu (Assistant Professor of Pediatrics), Irving Weissman (Professor of Pathology)

Participating Departments and Faculty:

Biological Sciences: Patricia P. Jones (Professor)
Cardiovascular Surgery: Carol Clayberger (Assistant Professor)
Cell Biology: Peter Parham (Associate Professor)
Chemistry: Harden M. McConnell (Professor)
Genetics: Leonard A. Herzenberg (Professor), Lenore Herzenberg (Professor, Research), Lawrence Steinman (Associate Professor)
Medicine/Immunology and Rheumatology: C. Garrison Pathman (Professor), Jane R. Parnes (Associate Professor), Samuel Strober (Professor)
Medicine/Nephrology: Bruce Hall (Associate Professor)
Medicine/Oncology: Ronald Levy (Professor)
Microbiology and Immunology: Mark M. Davis (Professor), Christopher Goodnow (Assistant Professor), Hugh O. McDevitt (Professor)
Molecular and Cellular Physiology: Richard S. Lewis (Assistant Professor)
Pathology: Eugene C. Butcher (Associate Professor), Michael Cleary (Assistant Professor), Gerald R. Crabtree (Associate Professor), Edgar G. Engleman (Professor), F. Carl Grunet (Associate Professor), Michael Lieber (Assistant Professor), Robert V. Rouse (Associate Professor), Roger A. Warnke (Associate Professor), Irving L. Weissman (Professor)

Pediatrics: Alan M. Krensky (Associate Professor), Dale T. Umetsu (Assistant Professor)

GRADUATE PROGRAM

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 sponsors; 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, graduate level (Biochemistry 200, 201)
   d) Cell biology, graduate level (Biochemistry 200, 201)
   e) Basic genetics
   f) Statistics (Biology 141 or Health Research and Policy 202)

3. 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.

4. Completion in the first year of three one-quarter rotations of research in immunology labs.

5. Teaching assistantship in one immunology course.

6. 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.

7. 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.

8. 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.

9. 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.

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 prerequisite: 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 (Jones) M 12:15

IMMUNOLOGY

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, Parham) MWF 10
202. 3 units, Spr (Lieber, Parham) MWF 10

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, Spr (Parham)

290. Teaching of Immunology—Practical experience in teaching by serving as a teaching assistant in an immunology course.

(Staff) by arrangement

300. Research—Research for graduate students in the Ph.D. program in Immunology.

1-15 units (Staff) by arrangement

MICROBIOLOGY AND IMMUNOLOGY

200. Immunology—(Same as Pathology 220.) Principally for medical, graduate, and advanced undergraduate students. Immunology as related to medicine is emphasized. Prerequisites: basic principles of genetics and introductory courses in biochemistry and histology.

3 units, Spr (Rosenberg, McDevitt, Weissman) MWF 10

200A. Problem Solving in Immunology—(Same as Pathology 220A.) Problems provide direct experience in understanding immunology. Each week three to five problems are corrected and discussed. Corequisite: simultaneous enrollment in 200.

1 unit, Spr (Rosenberg, McDevitt, Weissman) by arrangement

MEDICAL INFORMATION SCIENCES PROGRAM

Committee: Edward H. Shortliffe, Chair and Program Director (Professor of Medicine and by courtesy, Computer Science); Lawrence M. Fagan, Co-Director (Medical Computer Science); Terrence F. Blaschke (Associate Professor of Medicine), Alan M. Garber (Assistant 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 Medicine, and Computer Science)

Participating Faculty by Department:

Opportunities for research are not limited to the specific faculty and departments listed.

Anesthesia: David M. Gaba (Assistant Professor)
Biochemistry: Douglas L. Brutlag (Associate Professor)
Business, School of: Alain C. Enthoven (Professor)

Computer Science: Thomas O. Binford (Professor), Edward A. Feigenbaum (Professor), Michael L. Genesereth (Associate Professor), Marc Levoy (Assistant Professor), Mark A. Musen (Assistant Professor), Edward H. Shortliffe (Professor), Gio Wiederhold (Professor)

Economics: Victor R. Fuchs (Professor)

Education, School of: Lee S. Shulman (Professor), Richard E. Snow (Professor)

Electrical Engineering: Albert Macovski (Professor)

Engineering-Economic Systems: Samuel Holtzman (Consulting Assistant Professor), Ronald A. Howard (Professor), Ross D. Shachter (Associate Professor), Edison Tse (Associate Professor)

Genetics: Stanley N. Cohen (Professor)

Health Research and Policy: Byron W. Brown, Jr. (Professor), John P. Bunker (Professor), Alan M. Garber (Assistant Professor), Mark A. Hlatky (Associate Professor)

Medicine: Terrance Blaschke (Associate Professor), Robert W. Carlson (Assistant Professor), Lawrence M. Fagan (Senior Research Scientist), James F. Fries (Associate Professor), Alan M. Garber (Assistant Professor), Mark A. Musen (Assistant Professor), Richard L. Popp (Professor), Edward H. Shortliffe (Professor)

Obstetrics and Gynecology: Emmet J. Lamb (Professor)

Pathology: Howard H. Sussman (Professor)

Psychology: Amos N. Tversky (Professor)

Radiology: Dieter Enzmann (Associate Professor), Gary M. Glazer (Professor), Gary H. Glover (Professor), Norbert J. Pelc (Associate Professor), Leslie M. Zatz (Professor)

Statistics and Biostatistics: Byron W. Brown, Jr. (Professor)

Surgery: Michael Eliastam (Associate Professor), 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, PS/2, NeXT and SUN 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 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 Medicines and the Graduate Division 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. Medicine (7-21 units): the student is expected to acquire a basic knowledge of human physiology, anatomy, and disease. Required are Human Biology 111 (Human Physiology) or Human Biology 112, and Clinical Medicine 204. Also required are Clinical Diagnosis (MIS 202) and Introduction to Clinical Environments (MIS 203)

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, 161, and 221. With the exception of CS 110, all other courses applied to the
degree requirements must be numbered 137 or higher.

3. Decision Making (10-12 units): students are expected to learn basic probability theory, Bayesian statistics, decision analysis techniques, and experimental design techniques. It is assumed that students have taken a prior course in statistics at least equivalent to Statistics 60. Required courses are Psychology 252 (Statistical Analysis of Data) or Statistics 201A (Data Analysis I); Statistics 116 (Theory of Probability) or Engineering-Economic Systems (EES) 221 (Probabilistic Analysis); and EES 231 (Decision Analysis).

4. Medical Computer Science (9 units): all students are expected to acquire a general knowledge of the state-of-the-art and future frontiers for medical computer science. Required courses are MIS 210 (Computer Applications in Medicine), 211A (Computer-Assisted Medical Decision Making), and 211B (Project Course).

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 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 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 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:

1. Completion of the core curriculum.
2. A minimum of 9 additional units composed of courses in Computer Science numbered 137 or higher, courses in Engineering-Economic Systems or Operations Research or Statistics numbered greater than 200, or one of Psychology 256 or 260.
3. Electives: additional courses to bring total to 54 or more units.

MASTER OF SCIENCE (SPECIAL PROGRAM)

This special program is designed as post-doctoral training for individuals with established research credentials who may wish to acquaint themselves broadly with the field of medical information sciences, emphasizing formal course work. Candidates are required to complete the core curriculum and to supplement course work with approved electives to obtain a total of 42 units. A research project is encouraged but not required. Candidates are permitted to complete the program in no less than four quarters. Students in this program are drawn from applicants with doctoral degrees in medicine, computer science, decision theory, or related fields; for example, an academic physician on sabbatical might wish to undertake this program of study. The degree is designed to allow its graduates to complement their area of primary academic or research activity by providing them with a heightened ability to work effectively in collaborative research projects.

DOCTOR OF PHILOSOPHY

Individuals wishing to prepare themselves for careers as independent researchers in medical informatics should apply for admission to the doctoral program. The University’s basic requirements for the doctorate (residence, dissertation, examination, etc.) are discussed in the “Degrees” section 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 addition, doctoral candidates are expected to complete two additional courses
The student is expected to demonstrate an ability to present scholarly material orally and to present scholarly material in concise form as well. 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 adviser as suitable for submission to a refereed journal before the doctoral degree is conferred.

9. The dissertation must be accepted by a reading committee composed of the principal dissertation adviser, a second member of the program faculty, and a third member chosen from anywhere within the University. The principal adviser and at least one of the other committee members must be Academic Council members.

### COURSES

#### 200. Medical Information Sciences Colloquium—Series of colloquia, offered by program faculty, students, and occasional guest lecturers. Credit available only to students in an MIS degree program. (May be taken no more than three times for credit.)

1 unit, Aut, Win, Spr, Th 1-2

#### 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 1-2

#### 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 203 or consent of the instructor.

3 units, Spr (Staff) MVF 11

#### 205. Introduction to Clinical Environments—Open only to students in an MIS 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, psy-
chiatry ward, and clinical lab. Meeting time is adjusted to suit the student’s class schedule.

1 unit, by arrangement

210. Computer Applications in Medicine—
(4Same 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 2:15-3:30

211A. Computer-Based Medical Decision Making—
(4Same as Computer Science 271A.) 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, artificial intelligence/expert systems, and the synergies among such approaches. Prerequisite: at least one programming course.

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

211B. Computer-Based Medical Decision Making—
(4Same as Computer Science 271B.) Project course for students who have completed 211A and wish to implement some of those ideas in a computer program. Software tools provided. Prerequisites: 211A and programming experience.

3 units, Spr (Fagan, Musen, Shortliffe)

TTh 2:15-3:30

228. Influence Diagrams and Probabilistic Networks—

3 units, Win (Shachter) MW 12:30-2

229. Seminar on Expert-Systems Research—
(4Same as Computer Science 524.) 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 equivalent.

2 units (Musen, Shortliffe)

alternate years, given 1992-93

230. Seminar on Knowledge Acquisition for Expert Systems—
(4Same 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

alternate years, not given 1992-93

231. Understanding the Genetic Message—
(4Same as Biochemistry 218.) Describes 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 (Brutlag) not given 1991-92

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 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, Spr (Fuchs, Garber)

299. Directed Reading and Research—For students wishing to receive credit for directed reading or research time.
any quarter, by arrangement

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

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, Carlton E. Schwertd, John P. Steward, Bruce A. Stocker; (Research Professor) Esther M. Lederberg
Chair: James I. Mullins
Professors: Mark M. Davis, Stanley Falkow, Harry B. Greenberg (jointly with Medicine), Hugh O. McDevitt, James I. Mullins, Leon T. Rosenberg
Associate Professors: John C. Boothroyd, Abdul Matin, Edward S. Mocarski, Gary K. Schoolnik (jointly with Medicine), Lucy S. Tomkins (jointly with Medicine)
Assistant Professors: Chris Goodnow, Kasturi Haldar, Peter O’Hanley (jointly with Medicine)
Associate Professor (Research): Thomas E. Hamm (jointly with Medicine)

The Department of Microbiology and Immunology offers programs leading to degrees of Bachelor of Science and Ph.D. In addition, research experience, courses, and seminars are offered to postdoctoral trainees and medical students. Current research interests include microbial genetics and molecular biology of host/parasite interactions; molecular pathogenesis of bacterial and viral interactions; microbial physiology with emphasis on energetics and regulation; molecular and genetic studies of the immune system; molecular biology and pathogenesis of animal viruses, and molecular and cellular biology of parasites.

UNDERGRADUATE PROGRAM
BACHELOR OF SCIENCE

Requirements include: mathematics, including calculus, 9 units; biological sciences, 15 units; chemistry, 20 units (Chemistry 31, 33, 35, 36, 131, 135, or equivalent); physics, 12 units. Specific course requirements are the following: Microbiology and Immunology 101 and 102. Biochemistry 200 and 201; and a selection of three advanced (200 series) Microbiology and Immunology courses totaling at least 9 units.

Students in this program may arrange to take units in 199, Undergraduate Research. For outstanding research, a student may be awarded a degree with departmental honors.

Note: after 1992-1993, the B.S. in Microbiology and Immunology will no longer be offered. Students must complete the full B.S. program by June 1993.

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 listed above for the B.S. degree, or their 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 with background in biology, including some experience in biochemistry, molecular biology, and chemistry. 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 or molecular biology, or where appropriate in some other subject, e.g., 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.

The policy of the department is that entering predoctoral students be fully supported with a stipend and tuition award; however, 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 lasting one or two quarters). 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, an oral exam is taken based on a written research proposal prepared by the student, the subject of which is other than the intended thesis project. This tests the creative intellect of the student. Based 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 at least two quarters as part of their program.

COURSES


3 units, Aut (Matlin) MWF 11

101A. Laboratory—Introduction to bacterial pathogens. Topics on bacterial cell structure, physiology and molecular basis of virulence. Corequisite: 101

3 units, Aut (Haldar, Nardini, Staff)

102. Principles of Immunology—Introduction to immune responses in vertebrates. Also, immune-like reactions in nonvertebrate animals and in plants and bacteria.

3 units, Win (Rosenberg) TTh 1:15

198A-F. Undergraduate Directed Reading—Prerequisite: consent of instructor.

15 units maximum, any quarter (Staff) by arrangement

198A. Microbiology.

198B. Immunology.

198C. Virology.

198D. Bacterial Genetics.

198E. Parasitology.

198F. 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, bacterial genetics, 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 and histology.

3 units, Spr (Rosenberg, 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: simultaneous enrollment in 200.

1 unit, Spr (Rosenberg, McDevitt, Weissman) by arrangement

202. Medical Microbiology—Limited to medical students and graduate students who have the consent of the instructor. Lectures covering the fundamentals of pathogenic microbiology, including bacteria and animal viruses. Also, some aspects of immunology, lab diagnosis, and preventive measures.

6 units, Aut (Greenberg, Mocarski, Schoolnik, Arvin, Prober) 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, Spr (Matin, Hahn) TTh 3:30 alternate years, not given 1992-93


3 units (Mocarski, Mullins) alternate years, given 1992-93

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, not given 1992-93

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 1992-93

211,212. Advanced Immunology—(Same as Immunology 201, 202.) For graduate and advanced undergraduate students. Lecture/discussion featuring current problems in immunology. Topics: genetics and structure/function relationships of antibodies, T-cell receptors, MHC antigens; accessory molecules; lymphocyte differentiation and activation; cellular regulation of immune responses; autoimmunity and other problems in clinical immunology. Prerequisites: biochemistry, basic immunology, consent of instructor (for undergraduates). 211 is a prerequisite for 212.

211. 3 units, Win (Lieber, Parham) MWF 10

212. 3 units, Spr (Parham, Lieber) Th 3:15-5:05

215. Principles of Biological Technologies—Required of first-year graduate students in Microbiology and Immunology. The physical principles underlying commonly utilized technical procedures in biological research. Lectures on gel electrophoresis, nucleic acid hybridization, protein purification and stabilization, electron and fluorescence microscopy. Prerequisites: biochemistry, organic chemistry, and physics.

2 units, Aut (Davis, Staff) T 3:30-5:30

218. Papers in the Biological Sciences—Required of first-year graduate students in Microbiology and Immunology. Discussion of current and classic papers in modern molecular biology, emphasizing the fields of microbiology and immunology, and the perspectives of their logic and experimental design. In-depth discussion and critical analysis of biochemical and physical methods employed in testing hypotheses.

2 units, Win (Goodnow, Staff) T 6-8

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, Spr (Parham) Th 3:15-5:05

270. Seminar—Reports, discussions on selected topics by departmental speakers.
1 unit, Aut, Win, Spr (Staff) W 12

299. Directed Reading—Prerequisite: consent of instructor.
18 units maximum, any quarter (Staff) by arrangement

399. Graduate Research—Students who have satisfactorily completed 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) Frederick A. Fuhrman, Eugene D. Robin
Chair: Richard W. Tsien
Professors: Julian M. Davidson, Richard W. Tsien
Assistant Professors: Brian Kobilka (jointly with Medicine), Richard S. Lewis, V. Daniel Madison, Thomas L. Schwarz
Courtesey Professor: Jeffrey J. Wine
Courtesey Associate Professors: William T. Clusin, Allen D. Cooper, Andrew R. Hoffman
Courtesey Assistant Professor: Ron R. Kopito, Timothy Meyer
Courtesey Professor (Clinical): Mark G. Perlooth
Senior Research Associate: Erla R. Smith

The Department of Molecular and Cellular Physiology was created in July 1988, replacing the Department of Physiology. In February 1989, it moved into the new facilities in the Beckman Center for Molecular and Genetic Medicine, where the department occupies 17,500 square feet, mostly on the first floor. Other academic units in the center include a new Hughes unit of Molecular and Genetic Medicine, a new Department of Developmental Biology, and the already-existing Department of Biochemistry.

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 cell biology, molecular genetics, biochemistry, electrophysiology and imaging with light or electron microscopy. 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. Some students are still working on the Ph.D. degree in Physiology. A Ph.D. program in Molecular and Cellular Physiology has been approved for all entering students. No B.S. or M.S. degrees are offered.

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 Support 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 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 to be defended at the time of the oral comprehensive examination. The examination may be taken only after all course work has been completed to the required standard. Students undertake individual research studies as early as possible after consultation with their preceptor.

**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 Stephen Smith, Thomas Schwarz, and Daniel Madison, 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 (202, 1 unit; 203, 3 units; 204, 2 units)*

**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, Meyer) MWF 9-10:50*

**212. Human Sexuality in Medicine**—Multidisciplinary survey of physiological and psychosocial determinants of sexual behavior, basic concepts, and clinical approaches to diagnosis and therapy of sexual dysfunction, and related topics such as sexual differentiation and sexually transmitted disease.

*2 units (Davidson) not given 1991-92*

**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 (Smith, Schwarz, Madison) alternate years, given 1992-93*

**216. Ion Channels and Membrane Physiology**—(Same as Biophysics 216, 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)
alternate years, given 1992-93

218. Transmembrane Signal Transduction—Explores 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)
alternate years, given 1992-93


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, organelle biogenesis, cell division motility and adhesion, and multicellularity. 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, phase, interference, and polarized 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, Win (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. Fields of research include endocrinology, neuroendocrinology, and topics in molecular and cellular physiology.

any quarter (Staff) by arrangement

NEUROBIOLOGY

Chair: Uel J. McMahan
Professors: Denis A. Baylor, Eric I. Knudsen, Uel J. McMahan, Carla J. Shatz, Eric M. Shooter
Associate Professor: William T. Newsome

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 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 proper-
ties of neurons to the mechanisms and organization underlying higher functions. Coherent framework prepares for general work in neurology, neuropathology, clinical medicine, and for more advanced work in neurobiology. Lecture and lab components must be taken together.

9 units, Win (Aldrich, Baylor, Knudsen, McMahan, Newsome, Shatz, Shooter)
M 1:15-3:05, T 9, W 1:15-5:05, Th 9, F 1:15-3:05

216. Ion Channels and Membrane Physiology—
(Same as Biophysics 216, 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 1992-93

217. Formation of the Synapse—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) given 1993-94

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 1992-93

219. Developmental Neurobiology Seminar—
(Same as Biology 358.) For advanced undergraduate 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 systems 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. Prerequisites: Biology 153, Neurobiology 200, or consent of instructor.

4 units (McConnell, Shatz)
alternate years, given 1992-93

299. Directed Reading—Prerequisite: consent of instructor.
1-18 units, any quarter (Staff) by arrangement

399. Individual Research—Prerequisite: consent of instructor.
1-18 units, any quarter (Staff) by arrangement

NEUROSCIENCES PROGRAM

Chair: U. J. McMahan (Professor of Neurobiology)
Committee: Roland Ciaranello (Professor of Psychiatry and Behavioral Sciences), Russell D. Fernald (Professor of Psychology), Eric Knudsen (Professor of Neurobiology), Stuart Leff (Assistant Professor of Pharmacology), Susan McConnell (Assistant Professor of Biological Sciences), Istvan Mody (Assistant Professor of Neurology and Neurological Sciences), David A. Prince (Professor of Neurology and Neurological Sciences), Howard Schulman (Associate Professor of Pharmacology), Robert Sapolsky (Assistant Professor of Biological Sciences), Stephen Smith (Associate Professor of Molecular and Cellular Physiology), Richard Tsien (Professor of Molecular and Cellular Physiology), Jeffrey Wine (Professor of Psychology), Student Members: Eduardo Chichilnisky, Sam Wang

Participating Faculty:
Anesthesiology: Joan E. Kendig (Professor of Biology in Anesthesiology), Mervyn Maze (Associate Professor), Darrell Tanelian (Assistant Professor)
Biological Sciences: William F. Gilly (Associate Professor), H. Craig Heller (Professor), Ron Kopito (Assistant Professor), Susan McConnell (Assistant Professor), Robert Sapolsky (Assistant Professor), Stuart Thompson (Associate Professor), Robert Sapolsky (Assistant Professor), Stuart Thompson (Associate Professor), Richard Tsien (Professor of Molecular and Cellular Physiology), Jeffrey Wine (Professor of Psychology), Student Members: Eduardo Chichilnisky, Sam Wang

Cell Biology: Lubert Stryer (Winger Professor)
Mechanical Engineering: Felix Zajac (Professor)
Molecular and Cellular Physiology: Richard Aldrich (Associate Professor), Julian M. Davidson (Professor), Richard S. Lewis (Assistant Professor), Daniel Madison (Assistant Professor), Richard H. Scheller (Associate Professor), Thomas Schwarz (Assistant Professor), Stephen Smith (Associate Professor), Richard Tsien (Professor and Chair)

Neurobiology: Denis A. Baylor (Professor), Eric I. Knudsen (Professor), U. J. McMahan (Professor and Chair), William T. Newsome (Associate Professor), Carla J. Shatz (Professor), Eric M. Shooter (Professor)
**Neurology and Neurological Sciences:** Arnold Kriegstein (Associate Professor), Istvan Mody (Assistant Professor), David A. Prince (Professor and Chair), Marion E. Smith (Professor, Research), Lawrence Steinman (Associate Professor)

**Neurosurgery:** Gary K. Steinberg (Assistant Professor)

**Ophthalmology:** Michael F. Marmor (Professor and Chair)

**Pathology:** Lawrence F. Eng (Professor, Research)

**Pharmacology:** Helen Blau (Associate Professor), Stuart Leff (Assistant Professor), Howard Schulman (Associate Professor)

**Psychiatry and Behavioral Science:** Roland D. Ciaranello (Professor), William C. Dement (Professor), Seymour Levine (Professor), John Madden (Assistant Professor), Kazuhiro Tatehoto (Associate Professor, Research), Dona Wong (Assistant Professor)

**Psychology:** Russell D. Fernald (Professor of Psychology), David E. Rumelhart (Professor of Psychology), Brian Wandell (Associate Professor), Jeffrey J. Wine (Professor)

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**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. December 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: Integrative and Behavioral Neurosciences, Membrane Excitability, Neuronal Communication, Developmental Neuroscience, and Clinical Neuroscience.

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 in the second year of study and must be completed by the end of the second year. Students should begin research on entry or, at the latest, during the Winter Quarter of the first 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 in with their special circumstances.

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**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—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)

250H. Video Microscopy and Image Processing—Open to graduate and postdoctoral students and faculty. Advanced course in principles and confocal laser microscopy applications of digital image processing for observation of biological material. Hands-on lab with commercially available equipment staffed by manufacturers’ representatives. Guest lecturers discuss application of methods to cell biology. Taught at Hopkins Marine Station. Apply to Hopkins.

6 units, Sum (Thompson) by arrangement

333H. Molecular Approaches to Ion Channels—Advanced treatment of the function and regulation of ion channels and molecular-level
methods of study. Lectures integrated with intensive lab work provide a 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. Emphasis is on biophysical analysis of channel gating, identification of channel subtypes and routes to their production, and spatial localization of channels on living cells. Taught at Hopkins Marine Station. Apply to Hopkins.

6 units, Sum (Gilly) by arrangement

358. Developmental Neurobiology Seminar—(Same as Neurobiology 219.) Lecture/seminar for advanced undergraduate 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 systems 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. Prerequisite: Biology 153, Neurobiology 200, or consent of instructors.

4 units (McConnell, Shatz) alternate years, given 1992-93

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, Shatz, Shooter)

216. Ion Channels and Membrane Physiology—(Same as Biophysics 216, 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 1992-93

217. Formation of the Synapse—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) given 1993-94

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: Neurobiology 200 or consent of instructor.

4 units, Spr (Knudsen, Newsome) alternate years, not given 1992-93

219. Developmental Neurobiology—(Same as Biology 358.) Lecture/seminar for graduate students and advanced undergraduates. Principles of nervous system development: the molecular control of development and role of cell-cell interactions and trophic factors, level of neural systems and role of experience influencing brain structure and function. Topics: cell lineage, neurogenesis, neuronal migration, axon pathfinding and elongation, synaptic stabilization and
critical periods. Prerequisites: Biology 153, Neurobiology 200, or consent of instructor.
4 units (McConnell, Shatz)
alternate years, given 1992-93

NEUROLOGY

204. Physiology of Mammalian Central Nervous System—Lab for advanced students interested in neurological sciences. Introduction to a variety of techniques used in current research in the physiology of mammalian central nervous systems. Enrollment limited to 8. Prerequisite: consent of instructor.
4 units, Spr (Mody) by arrangement

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)

300. Neurosciences Journal Club—Students and faculty select and present for critical discussion articles from current journals.
1 unit, Aut, Spr (McMahan)

PHARMACOLOGY

202. Pharmacology—Major drug groups include chemotherapeutic agents, antibiotics, antiparasitic drugs, and anticancer agents. Also, toxicology. Emphasis is on the mechanisms of action of drugs in relation to the use of drugs in man.
5 units, Win (Staff)

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. Lectures/discussions.
2 units (Roth) given 1992-93

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) given 1992-93

219. Scientific Communication—Graduate students only. The techniques of scientific writing and lecturing. Students write several papers, present material orally, and evaluate the work of others with respect to clarity and efficient transfer of information.
2 units (D. Goldstein)

231. Regulation of Gene Expression in Differentiation and Development—Model biological systems for the study of differentiation and development are analyzed at a cellular and molecular level. Lecture and student discussion of recent research developments.
2 units (Blau) given 1992-93

PSYCHIATRY

248. Neuropeptides and Hormones—Lab/semianr focused on basic techniques of peptide chemistry. Experimental approaches studying neuropeptides and peptide hormones include: extraction and purification, structural determination, chemical synthesis, various assays including bioassay, radioimmunoassay and chemical assay. Students use HPLC instrument, protein sequencer, amino acid analyzer, and peptide synthesizer.
1 unit, Spr (Tatemoto) by arrangement

252. Neurobiological Substrates in Experimental Psychopathology—Lectures/discussions addressing animal model systems relevant to biological psychiatry. Emphasis on experimental paradigms pertinent to affective disorders including models of stress psychopathology, anxiety, coping, and learned helplessness. The biological processes subserving a particular model system are analyzed and its potential implications to the human condition explored.
3 units (Madden) by arrangement

253. Neurological Basis of Learning and Memory—Lecture/discussion addressing model systems of learning and memory, and organized to reflect increasing levels of system complexity, ranging from invertebrates to mammals. Format highlights the different levels of analysis used and the various contributions made within species and across phylogeny.
3 units (Madden) by arrangement

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 in-
structur plus either 167 or Biochemistry 200 and Neurobiology 200.

3 units, Spr (Wong)

PSYCHOLOGY

203A. Visual Sensing by Humans and Computers—Topics in basic visual science including the physiology of human vision, basic human visual performance, and computational algorithms that characterize physiology and performance.

3 units, Spr (Wong)

203B. Visual Sensing by Humans and Computers—Topics in the application of visual science to the design of images (television, computer terminals, avionics displays) for viewing, and the design of sensor systems for analyzing the content of image data (assembly line part inspection, object recognition).

3 units (Wandell) given 1992-93

206. Behavioral Neuroscience—The biological substrates of behavior emphasizing topics currently being investigated by resident and visiting neuroscientists at Stanford. Example 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 1992-93


3 units (A. Tversky, Wandell) alternate years, given 1992-93

228. Ion Transport—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)

PATHOLOGY

Emeriti: (Professors): Lysia K. Forno, Bruno Gerstl, David Click
Chair: Klaus G. Bensch
Associate Professors: Eugene C. Butcher, Michael Cleary, Joanne Combleet, Gerald R. Crabtree, Michael R. Hendrickson, Robert V. Rouse, Richard K. Sibley
Assistant Professors: Eric Davis, Timothy Donlon, Steven K. H. Fong, Michael Lieber, Kenneth Nowels, Donald P. Regula, Bruce R. Smaller
Research Associates: Claudia Benike, David Bieber, Peggy Bradshaw, Debra Hiraki, James Lipka, Anita Mehta, Hung T. Nguyen, Albert Yu
Lecturer: Glen B. Haydon
Acting Assistant Professor: Gerald Berry
Clinical Professors: James L. Bennington, John T. Differding, Seth L. Haber, Mahendra Ranchod
Clinical Associate Professors: Robert W. R. Archibald, Stephen S. Chen, Paul L. Herrmann, Steven Levine
Physician Specialist and Clinical Assistant Professor: Susan A. Galel
Staff Physicians and Clinical Associate Professors: Maie E. Herrick, Terri Longacre
Clinical Assistant Professors: Robert M. Cardelli, Barbara M. Egbert, Meredith Halks-Miller, Charles M. Lombard, William C. Pitts, William W. Ruehl, Jon C. Ross, Charles T. Uyeda, Staff Physicians and Clinical Instructors: Stephen Bell, Claire H. Hashimoto
Clinical Instructor: Sara Ann Miche

PROGRAMS OF STUDY

The Department of Pathology offers a sequence of basic courses in general pathology and special pathology, including neuropathology, which are open to medical students and to qualified graduate students. In addition, there are a number of advanced courses in selected aspects of pathology, and four major clerkships provide full-time, intensive participation in diagnostic, medical, surgical, and neuropathology. 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 and repair in prokaryotes and in cultured eukaryotic cells, genomic derepression in human neoplasms, molecular cyto genetics, structure of the mitotic spindle, ultrastructural and cytochemical studies of human tumors adapted to tissue culture, purification and characterization of marker proteins and lipids that are unique to the central nervous system, immunology and genetics of the human major histocompatibility complex, developmental and cellular immunology, tumor immunology, viral leukemogenesis, fundamental studies of the AIDS virus and its effects on the immune system, and a variety of clinical-pathological studies, with particular emphasis on disease of the cardiovascular 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 conforms 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—Seminarn 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 mechanic 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 consens-
munocytochemistry with antibody and molecular probes. Prerequisite: consent of instructor.

1-18 units, Spr (Eng, Forno)

292. DNA Repair and Mutagenesis—(Same as Biology 205, Biophysics 205, Radiation Oncology 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, Smith)

alternate years, given 1992-93

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

PHARMACOLOGY

Emeriti: (Professors) Robert H. Dreisbach, Avram Goldstein, Sumner M. Kalman
Chair: James P. Whitlock, Jr.
Professors: Terrence Blaschke (jointly with Medicine), Dora B. Goldstein, Tag E. Mansour, James P. Whitlock, Jr.
Associate Professors: Helen M. Blau, Richard A. Roth, Howard Schulman
Assistant Professor: Stuart E. Leff
Professors (by courtesy): Kenneth Melmon, Robert T. Schimke
Associate Professor (by courtesy): Brian Hoffman
Assistant Professors (by courtesy): Phyllis Gardner, Stephen Peroutka
Consulting Professors: Gordon Ringold, Alejandro Zaffaroni

GRADUATE PROGRAMS

The department offers an interdisciplinary approach to prepare students for independent research. Members of the department and faculty associated with the Ph.D. program are involved in studying major biological questions in a variety of topics that include signal transduction by hormones, neurotransmitters, growth factors and carcinogens, transcriptional and post-transcriptional regulation of gene expression via transacting factors, molecular parasitology, developmental biology, immunopharmacology and the regulation of ion channels in T-cell activation, biotransformation of xenobiotics and the development of multidrug resistance, molecular and cellular pharmacology, and molecular neurobiology. Diverse research opportunities allow training that utilizes a variety of techniques. These include recombinant DNA procedures; cell biological procedures such as cell culture, somatic cell genetics, monoclonal antibody technology and immunocytochemistry; and biochemical procedures that include enzymology, protein, and nucleic acid chemistry and protein modification. For students with a strong interest in biochemistry or molecular biology, pharmacology offers challenging career opportunities in biochemical research on the frontiers of medical science.

The program leading to the Ph.D. degree in Pharmacology includes formal and informal study in such related disciplines as biochemistry, genetics, physiology, neuroscience, and computer science. The requirements are flexible and adapted to individual needs. Students rotate in three labs before choosing a mentor. Participation in an active program of research seminars and colloquia begins early in the program. Postdoctoral research training is available to graduates having the Ph.D. or M.D. degree. Research opportunities also exist for medical students and a limited number of undergraduate students. The limited size of the labs in the department allows for close tutorial contact between students, postdoctoral fellows, and faculty.

The department presents two basic courses in contemporary pharmacology (201 and 202) and advanced courses open to qualified medical and other graduate students. Please 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 interac-
RADIATION ONCOLOGY 735

tion; kinetic aspects of drug absorption, distribution, and elimination; drug metabolism; problems of drug addiction. Also, major drug groups including those affecting the peripheral nervous system, the cardiovascular system and the central nervous system. Emphasis 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 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) given 1992-93

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) not given 1991-92

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 (Schulman, Scheller)

219. Scientific Communication—Graduate students only. The techniques of scientific writing and lecturing. Students write several papers, present material orally, and evaluate the work of others with respect to clarity and efficient transfer of information.

2 units (D. Goldstein)

221. Biochemical and Genetic Aspects of Chemical Carcinogenesis—Analysis of the multi-step mechanisms by which chemicals produce neoplasia.

2 units (Whitlock)

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, Spr (Mansour)

227. Regulation of Gene Expression in Differentiation and Development—Model biological systems for the study of differentiation and development are analyzed at a cellular and molecular level. Lecture and student discussion on recent research developments.

2 units (Blau) given 1992-93

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) Th 3:30, F 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

RADIATION ONCOLOGY

Emeritus: Clarence J. Karzmark
Chair: Malcolm A. Bagshaw
Assistant Professors: Eamonn P. Dunphy, Steven L. Hancock, Susan J. Knox
Professor (Teaching): Peter Fessenden
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.

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 major in Radiation Biology. 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 cell kinetics and reoxygenation in animal tumors after irradiation and chemotherapy; development of new anticancer 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; investigation of the role of viruses in the etiology of animal and human tumors; clinical and basic research relating to the effects on neoplasms of hyperthermia alone and in combination with irradiation and/or cancer drugs.

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.  
4 units, Aut, Win, Spr (Brown) Th 8

3 units, Aut, Win, Spr (Staff)  
alternate years, not given 1992-93

299. Directed Reading.  
any quarter (Staff) by arrangement

399. Research.  
any quarter (Staff) by arrangement

RADIOLOGY

Chair: Gary M. Glazer  
Professors: Dieter R. Enzmann, Gerald W. Friedland, Gary M. Glazer, Gary H. Glover, David A. Goodwin, Michael Goris, R. Brooke Jeffrey, Albert Macovski, I. Ross McDougall, William H. Northway, Jr., Bruce R. Parker, Lewis Wexler  
Associate Professors: Robert J. Herfkens, Norbert J. Pec, F. Graham Sommer, Stuart W. Young, Gerhard Wittich  
Assistant Professors: Colleen J. Bergin, Ann C. Bjorkengren, Michael Dake, John Drace, Elvira V. Lang, King C. P. Li, Michael Marks, Sheila G. Moore, Sandy A. Napel, Matilde Nino-Murica, George Segall  
Professors of Radiology (Clinical): William H. Marshall, Jr., Bruce R. Parker  
Associate Professors of Radiology (Clinical): Barton Lane, Robert E. Mindelzun  
Consulting Professor of Radiology: Alastair E. Kirkpatrick

Although the Department of Radiology 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. 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

200. Human Values in Medicine—Introduction to topics in ethics, economics, law, art, and literature as they relate to medicine.  
1 unit, Win (Parker, Camargo) Th 12:15-1:05

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 Nuclear War and the Nuclear Arms Race—One-day course covers nuclear weapons and the nuclear arsenal; medical consequences of nuclear war including radiation, blast and burn injuries, and psychological effects; the economic and societal effects of the arms race.  
1 unit, Win, Feb. 1, 8:30-5:30 (Jones, Staff)  
plus additional days and hours by arrangement

299. Research.  
any quarter (Staff) by arrangement
INDEPENDENT RESEARCH LABORATORIES, CENTERS, AND INSTITUTES

Vice Provost and Dean of Research: Robert L. Byer
Associate Dean of Research: Patricia L. Devaney

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 Dean of Research:

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 Mathematical Studies in the Social Sciences
Institute for Research on Women and Gender
Stanford Center for Chicano Research
Stanford Humanities Center
Stanford Synchotron Radiation Laboratory

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: Fernando Mendoza

The Stanford Center for Chicano Research (SCCR) is a research unit designed to conduct and promote interdisciplinary research on issues affecting Chicanos and other Latinos in American society. Research projects examine a variety of issues, including child development, health, education, social and political systems, business, and cultural citizenship. SCCR engages in collaborative research with Mexico as well as other private and public institutions in the U.S.; sponsors research colloquia and other public forums; and publishes research findings that significantly contribute to knowledge about Chicanos on a national level.

CENTER FOR ECONOMIC POLICY RESEARCH

Director: John B. Shoven
Deputy Director: Ed Steinmueller

The primary mission of the Center for Economic Policy Research (CEPR) is to foster rational and informed 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 from 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 activities. 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 actively encourages policy research in eight topical programs: Technology and Economic Growth, directed by Nathan Rosenberg of Economics and co-directed by Consulting Professor of Economics, Ralph Landau; Tax and Budget Policy Program (TAX), chaired by Michael Boskin (currently on leave) and John Shoven of Economics; Energy, Natural Resources, and the Environment Program, chaired by Alan Manne of Operations Research and James Sweeney of Engineering-Economic Systems; High Technology Impact Program (HTIP), chaired by Paul David of Economics; Program in Regulatory Policy, directed by Roger Noll of Economics; Macroeconomics and Monetary Policy Program, directed by Steven Durlauf and John Taylor of Economics; Program on Finance, chaired by John Shoven of Economics; and Program on the Economy of Japan, chaired by Masahiko Aoki of Economics.
CEPR conducts workshops, conferences, and other events designed to improve the flow of economic policy information among people from a wide variety of 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 Directors:** Marilyne A. Elverson, Robert V. Strena


**Associate Professors:** David M. Bloom (Electrical Engineering), Aharon Kapitulnik (Applied Physics)

**Assistant Professors:** Connie Chang-Hasnain (Electrical Engineering), Martin M. Fejer (Applied Physics)

**Professors (Research):** Bertram A. Auld (Applied Physics and Ginzton Laboratory), B. T. Khuri-Yakub (Electrical Engineering)

**Acting Professors:** Christopher P. J. Barty (Applied Physics and Electrical Engineering), Yoshihisa Yamamoto (Applied Physics and Electrical Engineering)

**Visiting Associate Professor:** Byoung Y. Kim

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, superconducting composites 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), F. Michelson (Physics), B. Parkinson (Aeronautics and Astronautics), P. Scherrer (Applied Physics), H. A. Schwettman (Physics), T. Smith (Physics), G. Timothy (Applied Physics), J. Turneaure (Physics), A. Walker (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.

STANFORD HUMANITIES CENTER

**Director:** Herbert Lindenberger (Interim)
**Associate Director:** Charles Junkerman

The purpose of the Stanford Humanities Center is to promote 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 1991-92 are shown below:

**COURSES**

**AMERICAN STUDIES**

221. The Rhetoric of Technology in 20th-Century America—(Same as History 252, VTSS 157.)
5 units, Aut (Corn)

**ART**

229K. Colloquium: Japanese Genre Painting.
4 units, Spr (Takeuchi)

**ENGLISH**

183A. Seminar: Shakespeare Through Performance—(Same as Drama 129D.)
5 units, Aut (Friedlander)

303. 18th-Century Narratives of Gender and Empire.
5 units, Win (Nussbaum)

306B. Colloquium: Theorizing the Body.
5 units, Win (Hayles)

5 units, Win (Esch)

**HISTORY**

239. Gender, Class, and Social Transformation in Modern Europe.
5 units, Aut (Canning)

248/348. Culture Contact and Cultural Transformations in Precolonial Africa.
5 units, Aut (Greene)

**SPANISH AND PORTUGUESE**

294. Latin American Cinema: Myths, Realities, and Style.
3-5 units, Spr (Ruffinelli)

326. Lyric Poetry in the Spanish Baroque.
3-5 units, Spr (Martín)

**THE INSTITUTE FOR INTERNATIONAL STUDIES (IIS)**

**Director:** Walter P. Falcon (Helen C. Farnsworth Professor of International Agricultural Policy)

**Deputy Director:** Thomas C. Heller (Professor of Law)

**Associate Directors:** Brigitte Carnochan, Nancy E. Okimoto

IIS was established in 1988 as a means of coordinating Stanford's numerous activities 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 of planning, financing, stimulating, and coordinating activities and programs in the international field. It is continuously and closely involved in the support of Stanford's foreign area and language programs and a variety of major research programs. 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, library development, graduate student exchanges, 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, Humanities and Sciences, Education, Law, Medicine, and scholars from the Hoover Institution. One of its goals is to develop coherent multidisciplinary, regional, and cross-regional teaching and research programs. 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 Hoover Institution on War, Revolution, and Peace, which manages native-language library collections that support the foreign language and area studies programs; the International Relations Program, and the Overseas Studies Program. The institute and Overseas Studies are jointly 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 materials for use by public school teachers and provide staff development opportunities for pre-collegiate educators wishing to strengthen the international components of their curriculum. Curriculum materials development projects on Africa, China, Japan, Latin America, the Soviet Union and Eastern Europe, and Western Europe are organized within the Stanford Program on International and Cross-Cultural Education (SPICE). The California International Studies Project (CISP), a pro-
ject initiated by the institute and supported by state legislation, works through a network of nine regional centers to improve pre-collegiate teaching in history, geography, international economics, and world cultures. The California Foreign Language Project (CFLP), one of several subject matter projects supported by SB 1882, provides staff development activities for teachers of foreign languages throughout the state. SPICE serves as the curriculum development component of each of these projects, as well as providing materials and services to other schools and international studies projects throughout the country.

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. Between them, these provide the United States' most outstanding facilities for advanced professional training in the Japanese and Chinese languages.

While IIS shares a limited number of academic faculty appointments with departments or schools, it neither offers courses nor confers degrees. These academic functions are performed by the schools, departments, and programs associated with the institute.

IIS is located at 200 Encina Hall, telephone (415) 723-4581.

PROGRAMS
RESEARCH

The institute administers six established research centers: the Americas Program, the Stanford Center for European Studies, the Center for International Security Arms Control, the Northeast Asia-United States Forum on International Policy, the Environmental Policy Forum, and the Stanford Japan Center-Research. Each of these programs brings together Stanford faculty members from several scholarly disciplines with 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.

In developing new programs, the institute places emphasis on research and teaching related to the political economy of interdependence, the quality of life in the global environment, national identity and culture, international security, and science and technology policy.

AMERICAS PROGRAM

Director: Clark Reynolds (Professor, Food Research Institute)

The Americas Program originated in 1980 as the Project on United States-Mexico Relations. With continued funding from the Hewlett Foundation, the program continues its research into bilateral economies 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 all the economies of Latin America on a broader level, to research North American interdependence and integration, and to offer policy recommendations. The program has continued ties with other organizations both within and without the Stanford and academic communities. The program co-sponsors visiting scholars, research assistants, and the development of new curricula.

The program is located at 200 Encina Hall, telephone (415) 723-3096.

STANFORD CENTER FOR EUROPEAN STUDIES

Director: Philippe Schmitter (Professor, Political Science)

The Stanford Center for European Studies was established in 1986 as the focal point for promoting and coordinating teaching and 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. Under a grant from the Mellon Foundation, 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 a visiting scholar closely associated with one of the Stanford overseas campuses in Europe. It also offers two postdoctoral 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 162K-N in Building 160 (Political Science), telephone (415) 723-9593.
THE CENTER FOR INTERNATIONAL SECURITY AND ARMS CONTROL

Co-Directors: David Holloway (Professor, Political Science), William J. Perry (Professor, Engineering-Economic Systems)

Director of Studies: Coit D. Blacker

The Center for International Security and Arms Control expanded in 1983 from its original base as the Arms Control and Disarmament Program which was established at Stanford in the early 1970s. Faculty from business, engineering, communication, history, political science, law, medicine, 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 technical aspects of arms control, regional security relationships (with emphasis on the Asian-Pacific region, the Soviet Union, and Central Europe), prevention of accidental nuclear war, and ethical issues of organized violence in the nuclear age.

The training efforts of the center include a sequence of undergraduate courses taught under the auspices of the Department of Political Science (Arms Control and Disarmament, Political Science 138A, B, and D) 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.

THE NORTHEAST ASIA-UNITED STATES FORUM ON INTERNATIONAL POLICY

Director: Daniel I. Okimoto (Associate Professor, Political Science)

Director of Research: James Raphael

The Northeast Asia-United States Forum on International Policy serves as a focal point at Stanford for research, training, and exchange activities related to international policy issues involving the U.S., China, Korea, and Japan. Some 60 faculty members throughout the University are forum members. The forum’s programs have in residence each year a group of visiting fellows and graduate research assistants. Current research projects include work on science and technology in Japan, global competition in the information industries, U.S.-Japan healthcare systems and policy, economic interdependence in the Asia-Pacific region, and Japanese capitalism in historical and comparative perspective. Forum members offer an interdisciplinary course on Asia as a region. In Japan, the forum manages the research operations of the Stanford Japan Center in Kyoto.

The forum is located at 200 Encina Hall, telephone (415) 723-9741.

ENVIRONMENTAL STUDIES POLICY FORUM

Chair: Walter P. Falcon (Professor, Food Research Institute)

Research Associate: Roz Naylor

The institute provides a campus-wide focus for the proposed inter-school honors program in Environmental Studies and the research activities of faculty interested in the multidisciplinary and policy aspects of environmental issues. Undergraduates planning to participate in the honors program will be required to pursue studies in both environmental sciences and policy, with a concentration in a single discipline. After completion of the prerequisite units, students will work with specific faculty members in the environmental field on an honors thesis that incorporates both scientific principles and policy aspects of a particular environmental issue. By 1993, 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.

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 integrated multidisciplinary research and policy agendas merge. 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.

STANFORD JAPAN CENTER-RESEARCH

Director: Ken-ichi Imai (IIS Senior Fellow and Professor of Economics; by Courtesy)

The Stanford Japan Center (SJC) in Kyoto includes a research division 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 fac-
ulty 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 system 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. Campus Contact for SJC-R activities is 415-723-9741.

AREA STUDIES

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 responsible for coordinating the University's resources in all schools and departments for teaching and research relating to each of these areas. Affiliated faculty members from the relevant schools and departments participate in the activities of the four centers. The great majority of area-related courses and seminars are offered by the school or department concerned, not directly by the centers. Undergraduate degree programs are coordinated by staff associated with each of the area programs. 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.

INTER-UNIVERSITY PROGRAM FOR CHINESE LANGUAGE STUDIES IN TAIPEI

The Inter-University Program (IUP) for Chinese Language Studies in Taipei, Taiwan, was established in September 1963. It 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 program if they have successfully completed a minimum of two academic years, or the equivalent, of Chinese language study at the college level. Applicants must also take a screening examination in the Chinese language. Partial fellowship support is available for most students.

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 post-doctoral 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 intending 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

The Center for the Study of Language and Information (CSLI) is an independent research laboratory bringing together computer scientists, linguists, logicians, philosophers, psychologists, and artificial-intelligence researchers. They collaborate to build theories about the nature of information and how it is conveyed, processed, stored, and transformed by agents through the use of natural and computer languages. CSLI theories reflect the reality that information exchange happens in particular situations, which in themselves contribute to the exchange, and that the agents, both human and computer, are resource-bounded. CSLI’s goal is to develop and apply theories of information (explicit, systematic, and at least as rich as our implicit understanding) to an analysis of language as intelligent action. Researchers are examining theories of meaning from philosophy; rational action and decision-making from philosophy and artificial intelligence; inference and reasoning from logic and psychology; grammatical structure from linguistics; detailed programs (large but less complex units of discourse than natural language) from computer science; and the application of connectionist models to information processing.

CSLI was founded in 1983 by means of a large gift from the System Development Foundation and generous support from Stanford University, SRI International, and Xerox Palo Alto Research Center (PARC). These gifts have been supplemented by sponsored projects and the center’s Industrial Affiliates Program (IAP). During its first three years of existence, the IAP has attracted as members ATR Interpreting Telephony Research Labs, Boeing Computer Services, Fujitsu Ltd., Hewlett-Packard Laboratories, Hitachi Ltd., Matsushita Electrical Industrial Co., Mitsubishi Electric Corp., NEC Corp., NTT Nippon Telegraph and Telephone Corp., Sharp Corp., Tokyo Electric Power Co. (TEPCO), WACOM Co. Ltd., 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, augmented by visiting IAP researchers, visiting scholars from other academic institutions, post-doctoral fellows, and graduate students.

CSLI has developed a model of research that joins academia and industry and the disciplines of artificial intelligence, computer science, linguistics, philosophy, and psychology. It encourages researchers to look at their theories from a variety of viewpoints and reshape them into coherent theories of information that will be far-reaching, not only for the study of natural languages but also for the analysis and design of computer languages and for further advances in the development of artificially intelligent agents.

Course work related to the research at CSLI can be found in the “Program in Symbolic Systems” section of this bulletin.

CENTER FOR MATERIALS RESEARCH (CMR)

Director: S. B. Hagstrom
Deputy Director: H. C. Andersen
Technical Director: T. M. Gür
Affiliated Faculty (currently 83 members from the following departments and laboratories): Aeronautics and Astronautics, Applied Earth Sciences, Applied Physics, Chemical Engi-
neering, 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 the MRL Program 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 10 summer programs for undergraduates; seven programs for women; four seed programs; six programs for minorities; and four multi-investigator, multi-discipline thrust programs. CMR’s professional staff also conducts research programs in crystal synthesis, vapor phase synthesis, and materials characterization.

INSTITUTE FOR MATHEMATICAL STUDIES IN THE SOCIAL SCIENCES (IMSSSS)

Director: Patrick Suppes
Assistant Director: Joyce Firstenberger

IMSSS is a research institute primarily funded by gifts, government grants, and contracts. The current major emphases are on research in computer-assisted instruction and robotic language and learning. The staff includes research associates, graduate student research assistants, programmers, and faculty.

INSTITUTE FOR RESEARCH ON WOMEN AND GENDER

Director: Iris F. Litt (Professor of 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 in 1974, the Institute for Research on Women and Gender (formerly the Center for Research on Women) 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. By bringing together faculty, graduate students, and members of the community, the institute seeks 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 education, employment, law, psychology, history, literature, art, health care, and family structures. A number of scholarly publications have resulted from these activities.

Participants in these projects include:

1. Stanford Faculty: faculty 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. 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.

3. 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.

4. Visiting Scholars: about half a dozen scholars affiliated with other universities are in resi-
The Stanford Linear Accelerator Center

**Director:** Burton Richter  
**Deputy Director:** Sidney D. Drell  
**Executive Officer of the Faculty:** Martin Perl  
**Associate Directors:** Kaye D. Lathrop (Technical Division), David W. C. S. Leith (Research Division), John Rees, Eugene B. Rickards (Business Services Division)  
**Emeriti (Professors):** Joseph Ballam, Jean V. Lebacqz, Robert F. Mozley, Joseph J. Murray, Richard B. Neal, Wolfgang K. H. Panofsky  
**Associate Professors:** David L. Burke, 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 and to the development of new techniques in high energy accelerators and elementary particle detectors. 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, which began operations for physics research in 1966, 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 with polarization of 40% at full beam intensity and energy. In 1978, one of the experiments performed using this beam established the existence of clear connections between the weak and electromagnetic interactions.

Although some fixed-target experiments continue to be carried out at SLAC, the emphasis has shifted toward experiments based on collisions between high-energy beams of electrons and positrons. This work has evolved through three stages: the SPEAR storage ring, the PEP storage ring, and the more recent SLAC Linear Collider (SLC).

SPEAR is a storage-ring facility, completed in 1972, in which beams of electrons and positrons collide at center-of-mass energies up to about 7 GeV. Experiments at SPEAR resulted in the discovery of the psi particle, for which the 1976 Nobel Prize in Physics was awarded, and in the discovery of the tau lepton, for which the 1983 Wolfe Prize was awarded. In 1990 the SPEAR ring was turned over to the Stanford Synchrotron Radiation Laboratory (SSRL) for its exclusive use as a source of intense vacuum ultraviolet and x-ray beams.

PEP is a larger electron-positron colliding-beam storage ring, built as a collaborative effort between SLAC and the Lawrence Berkeley Laboratory, and completed in 1980. Throughout the decade of the 1980’s, experiments were carried out in all six of the machine’s interaction regions, at center-of-mass energies up to 29 GeV. Modifications of the ring during this period have resulted in a significant increase in luminosity. At present, experiments continue in one of the interaction regions at PEP, at high luminosity, and with a powerful detection facility.

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 linac has resulted in the SLAC Linear Collider (SLC), which can simultaneously accelerate electrons and positrons to beam energies up to 50
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 $Z^0$ 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 1990 a powerful new detection facility was being installed at the SLC interaction region, with prospects for a continuing experimental program in the important energy region of the $Z^0$ 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.

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 1991, 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.
HOOVER INSTITUTION
ON WAR, REVOLUTION
AND PEACE

Director: John Raisian
Counselor: W. Glenn Campbell
Deputy Director: Charles G. Palm
Associate Director: Thomas H. Henriksen
Assistant Directors: Noel S. Kolak, Richard Sousa
Budget and Finance Officer: Sally J. Vanders
Public Affairs Manager: Gloria J. Walker
Personnel and Staff Affairs Officer: Helen M. Corrales

Research and Publications
Honorary Fellows: Friedrich A. Hayek, Ronald W. Reagan, Alexander Solzhenitsyn
Distinguished Fellow: George P. Shultz
Consultant: Yuan-li Wu


Research Fellows: Arnold Beichman, Fu-mei C. Chen, Keith Eiler, Gregory Fossedal, Stephen Jurika, Jr., Stephen Langlois, Ying Lin, George Marotta, Sig Mickelson, James H. Noyes, Agnes F. Peterson, Kiron Skinner, Kevin Starr, Paul Weaver

Executive Secretary of National, Peace, and Public Affairs Fellows Program: Thomas H. Henriksen

Distinguished Visiting Scholar: George Stigler

Library and Archives

Deputy Director: Charles G. Palm
Archivist: Anne Van Camp
Cataloguing Head: Paul Thomas
Readers’ Services Acting Head: Judith Fortson
Acquisitions/Serials Head: Viveca Seymour
Preservation Services Head: Judith Fortson

Africa and Middle East Collection—Stella and Ira Lillick Curator: Peter J. Duignan; Deputy Curators: Karen Fung, Lewis H. Gunn, Edward A. Jako
Central and West European Collection—Curator: Agnes F. Peterson

East Asian Collection—Curator: Ramon H. Myers; Research Fellow: Fu-mei C. Chen; Deputy Curators: Emiko Moffitt, Mark Tam

Hoover Institution Archives—Archivist: Anne Van Camp; European Field Representative: Francis de Tarr; Deputy Archivists: Robert Hessen, Dale Reed; Associate Archivist: Elena Danielson; Assistant Archivists: Martha Hill, Carol Leadenham

British Labour Collection—Honorary Curator: Peter Stansky
Hanna Education Collection—Curator: Gerald A. Dorfman

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 United States and has outstanding area collections on Africa, East Asia, Eastern Eur-
Europe, Russia and the 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 ephemeral 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. The International Studies Program, the Domestic Studies Program, and the National Security Affairs Program publish basic research, documentary studies, and current public policy analyses in their respective fields.

Notable long-term research in international studies includes the areas of world-wide democratic movements, African colonialism, post-Mao China, the international communist movement, non-Russian nationalities in the Soviet Union, Latin America, and the U.S., and the role of education in development abroad. Research on the latter has been enhanced by the establishment of the Paul and Jean Hanna Collection on the Role of Education in 20th-Century Society.

In the area of domestic affairs, scholarship is carried out on social, economic, and policy issues in the U.S. Both basic and applied research in the social sciences is conducted, bringing into focus broad policy issues in such vital areas as fiscal policy and budget reform, political economy and public choice, welfare and regulatory reform, as well as other domestic policy concerns.

Many of the scholars in the area of national security affairs combine theoretical knowledge with practical experience at high levels of government service. They have served, or are serving, in such agencies as the National Security Council, the Arms Control and Disarmament Agency, the Department of State, and the Department of Defense. Their knowledge and expertise place them in a unique position to analyze from an interdisciplinary standpoint the strategic, political, ideological, and economic challenges confronting the U.S. today.

In addition to its own research staff, the institution has been visited over the years by tens of thousands of American and foreign scholars. In recent years, increased use of the institution's resources has been encouraged by providing more funds for postdoctoral fellowships. The National Peace and Public Affairs Program, for example, provides about 14 scholars annually with 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 at the Hoover Institution and as faculty members in academic departments and schools include John Ferejohn (Political Science), Robert Hall (Economics), Alex Inkeles (Sociology), Seymour Martin Lipset (Political Science and Sociology), Thomas MacCurdy (Economics), and Henry Rowen (Graduate School of Business). Individuals who hold joint appointments as Senior Research Fellows and as faculty members include Joseph Berger (Sociology); Myron Scholes (Graduate School of Business); and Mauro Cappelletti, John Ely, and Kenneth Scott (School of Law).

Fellows of the Hoover Institution who hold professorial appointments by courtesy in academic departments and schools include John Cogan (Graduate School of Business), Larry Diamond (Sociology), Thomas Sargent (Economics and Graduate School of Business), and Barry Weingast (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 Kenneth Arrow, Michael Boskin, and Joseph Stiglitz (Economics); David Brady and James Miller (Graduate School of Business); Peter Duus, Norman Naimark, and Peter Paret (History); Heinz Eulau (Political Science); and Nancy Tuma (Sociology). In addition, George Shultz, Professor in the Graduate School of Business, is a Distinguished Fellow at the Hoover Institution, and Peter Stanley, 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 five Nobel laureates, two recipients of the National Medal of Freedom, two recipients of the National Medal of Science, 13 fellows or foreign honorary members of the American Academy of Arts and Sciences, nine members of the National Academy of Sciences, and three 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.

UNIVERSITY LIBRARIES

Emeriti: William P. Allan (Curator for English and American Literature); M. Celeste Ashley (Drama Librarian); Joseph A. Belloli (Senior Reference Librarian); Virginia Bonnici (Physics Librarian); Edward Colby (Music Librarian); Kathryn N. Cutler (Earth Sciences Librarian); Bernard Denham (Interlibrary Services Librarian); Florence Furst (Chemistry Librarian); Anna Hoen (Reference Librarian, Lane Medical Library); J. Myron Jacobstein (Law Librarian); Paul J. Kann (Curator for Romance Languages); Susan V. Lenkey (Rare Books Librarian); Clara S. Manson (Chief Librarian, Lane Medical Library); Charlotte W. Mercado (Assistant Chief for Monograph Cataloging); Jack Plotkin (Chief Circulation Librarian); Marion Smith (Director, J. Hugh Jackson Library, Graduate School of Business); Grace Stillson (Assistant Chief, Catalog Department)

University Libraries
Vice President for Library and Information Resources: Robert L. Street
Director of Technical Services: Cynthia I. Gozzi
Director of Meyer Library and Research Branch Libraries: Karen Nagy
Director of Library Collections: Michael T. Ryan
Library Development Officer: Ann W. Bender
Department Heads: Anthony M. Angiletta (Foreign Languages and Area Collections, General Reference, and Government Documents); Constance Brooks (Preservation); Diane Chilamontczyk (Catalog); Karen Kalinsky (Catalog); Margaret Kimball (Special Collections); Joan K. Krasner (Access Services); Carol Olsen (Human Resources); Jerry C. Persons (Systems); Victoria Reich (Acquisitions and Serials)
Meyer and Branch Librarians: Alan Baldridge (Miller Marine Biology); Grace Baysinger (Swain Chemistry and Chemical Engineering); Barbara Celone (Cubberley Education); Charlotte Derksen (Branham Earth Sciences); Steven Gass (Engineering); Rebecca Lasher (Mathematical and Computer Sciences); Henry Lowood (Physics); Charles C. Milford (Food Research Institute); Michael Miller (Meyer); Alexander Ross (Art and Architecture); Barbara Sawka (Music); Joseph G. Wible (Falconer Biology)

Curators—Collection Development Program: Anthony M. Angiletta (Social Science Collections); James M. Breedlove (Latin American Collections); James Knox (U.S. and British History Collections); Henry Lowood (Germanic Collections); William McPherson (English and American Literature Collections); Mary Jane Farrine (Romance Language and Humanities Collections); Alexander Ross (Art and Architecture Collections); Roberto Trujillo (Mexican American Collection); Wojciech Zalewski (Slavic and East European Collections)

Curators—Honorary: W. Conyers Herring (Physics Collection); William R. Moran (Archive of Recorded Sound); Margaret C. Sowers (Map Collections); Samuel Stark (Theater Collection); Charles J. Tannenbaum (Exhibits)

Hoover Institution
See "Hoover Institution" section in this bulletin.

J. Hugh Jackson Library, Graduate School of Business
Director: Bela Gallo
Assistant Director/Head Technical Services Librarian: Robert E. Mayer
Head Public Services Librarian/Assistant Director: Karen A. Wilson
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
Associate Head Librarian: Louise Addis

The Stanford University Libraries sponsor educational activities that promote awareness of its resources, and instruct patrons in their effective use. All the major library units provide some educational activities; the J. Henry Meyer Memorial Library places particular emphasis upon media and services in support of the curriculum of the University and of the Continuing Studies Program.

In each library unit, reference staff provide general advice on locating and using both print and online 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 online 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 Quarter, “Socrates: A User’s Guide to the Online Catalog,” and “Guide to the Engineering Library.” A general description of the libraries, their collections, and services can be found in the Stanford University bulletin Information.

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 (Bowen, Ross)

alternate years, not given 1992-93

French and Italian 397A,B. Colloquium on Research Methods in French and Italian Studies—Acquaints graduate students with general and specialized resources for French and Italian studies. Emphasis is on overall strategy for research, but provides an opportunity to explore bibliographical sources in students’ particular fields of interest.

2 units, Aut, Spr (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)

Music 200. Music Bibliography—Use of bibliographical materials in music research; introduction to methods of research.

4 units, Aut (Nagy)

Slavic Languages 200A. Introduction to Slavic Bibliography—Open to graduate and undergraduate students. Historical and evaluative analysis of Slavic bibliographic and research tools, emphasizing Russian and Soviet materials. Application of bibliographic search methodology. Final bibliographic project required. Knowledge of Russian and/or another Slavic language is helpful. Offered at beginning and advanced levels, which are taken over two consecutive years.

1-3 units, Aut (Zalewski)
Vice President for Libraries and Information Resources: Robert L. Street

Libraries and Information Resources (L&IR) is responsible for the University Libraries (see the “Libraries” section of this bulletin), for campus-wide academic and administrative computing, and for computer networking and telecommunications. L&IR facilitates the acquisition and availability of 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 information technology, and furnishes training and support for faculty, staff, and students who use this technology.


MEYER AND THE RESEARCH BRANCH LIBRARIES

Director: Kären Nagy

This division of L&IR seeks to support and enhance instruction and research by providing library and computing services and resources. It operates the campus research libraries and Meyer, Stanford’s instructional support library. It also offers academic computing services: providing information, advice, and education about using computers; offering online text and database services for use in instruction and research; and identifying appropriate computer technologies that can be applied to the production of innovative applications for use by faculty and students. For more information about Meyer and the Research Branch Libraries, call Lisa Carlson in the L&IR Director’s office at (415) 723-2018. For more information about academic computing services, call the Academic Computing Services Information Desk at (415) 725-2101.

The Academic Computing Services (ACS) group of the Meyer and Research Branch Libraries provides Stanford’s academic community with computing services to enhance instruction and research and with information and advice about using computers. Specific programs and services include: the Academic Text Service which provides access to online texts; planning and development for the Academic Data Service; exploration and negotiation of software licenses; technical and informational computing documentation, and walk-in computing consulting in Sweet Hall.

ACS also operates a consulting lab located in room 222 on the second floor of Sweet Hall. Faculty, students, and staff may experiment with a variety of both personal computers and workstations and software such as word processing programs, spreadsheets, programming languages, and graphics packages. The Consulting Lab’s hours are Monday through Friday, 9:00 a.m. to 5:00 p.m. For access, come to the Information Desk on the second floor of Sweet Hall. For more information, call (415) 725-2101, consult@sweet

COURSES

During the first few weeks of each quarter, ACS offers short, non-credit introductory classes about using L&IR’s computer systems. The Stanford Data Center offers other non-credit classes in computing. See the “Computer Science” section of this bulletin for programming classes for credit.

Schedules for the classes are found in the document racks on the second floor of Sweet Hall. Students can view class videotapes either at home, in the Math/Computer Science, Terman Engineering, and Meyer Libraries, or on SUNet cable television. Videotapes can be borrowed from Meyer Library. For the SUNet broadcast schedule, consult the flier Enjoy the View: Computer Training Videotapes on SUNet, found in the document racks in the Macintosh cluster in Tresidder, and on the second floor of Sweet Hall.

EMACS Introduction—Introduction to EMACS, the screen-oriented text editor on Land.

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 file servers. 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—Provides minimum instruction necessary to use the UNIX operating system that runs on Leland. Topics: opening an account, logging in, logging out, features of the UNIX file system, useful utilities, creating and editing files, and running programs on Leland.

0 units, Aut, Win, Spr

UNIX™ Introduction: Part II—Hands-on class on how to control and customize the UNIX environment. How to 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

X Window System Introduction—Hands-on introduction to the X Window System that runs on Sun, VAX, Macintosh II (running A/UX), and IBM PC RT systems. For beginners and others.

0 units, Aut, Win, Spr

Introduction to Elm—Introduction to Elm, the electronic mail program on L&IR’s UNIX computers. Recommended: master the basics taught in a UNIX class.

0 units, Aut, Win, Spr

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 and provides Vector processing through Networking and Communication Systems.

In Forsythe Hall, the center operates an IBM 3090 and provides machine and staff services to the Stanford community. Public terminals are available at Forsythe and other accessible campus locations. The center also maintains connections for Stanford to national networks such as Telenet.

Computer-based services include: screen text editing (WYLBUR) and formatting (SCRIPT) programs for preparing reports, letters, data, and theses; 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.

The Data Center has an extensive master library of application-specific computer routines encompassing statistical, data analysis, and other data processing functions, including SAS®,
SPSS-X®, and BMDP®. Extensive data files are available on a variety of subjects. Programming languages for use in interactive and/or batch mode include APL, 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 carry a fee; other mainframe courses are free. Complete course descriptions and schedules may be found online in the Prism file TRAINING SCHEDULE. To see the schedule:

1. Logon to the Forsythe computer.
2. At the Command prompt, type PRISM SELECT TRAINING SCHEDULE and press Return.
3. Search for and display a particular course or the complete listing for the quarter. Prism provides online help.

The schedule may also be found in the Training Opportunities for the Stanford Community course guide, which is available in all departments or may be picked up in Forsythe Hall, first floor. For further information, contact the Data Center Instructional Program at (415) 723-4391 or GA.DOC@FORSYTHE.
GRADUATE INTER-SCHOOL PROGRAM

GRADUATE DIVISION
SPECIAL PROGRAM

The Graduate Division 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

by arrangement
THE CONTINUING STUDIES PROGRAM

Dean: Marsh H. McCall, Jr.
Associate Dean and Administrative Director: Jeffery 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 1, Room 2A, 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. Sally Mahoney, Acting Vice President for Student Resources, 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. Mahoney at (415) 725-1808.

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 is 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. Normally, this statement should appear in Courses and Degrees.

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 (Old Union) and the Graduate Admissions Support Section of the Registrar's Office (Bldg 590).

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 (Old Union) and the Office of Graduate Studies (Bldg 1) will respond to requests for the appropriate publication.

Stanford University Bulletins of general interest, (Information and Summer at Stanford) are 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. Individual schools and departments may be contacted directly for more specific information.

Students from other countries may contact the appropriate Admissions Office for Information for Prospective Graduate (or Undergraduate) 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).


Guidebook for Graduate Students, an introduction to offices and people who serve graduate students, available at the Office of the Dean of Student Affairs (Bldg. 590) and at the Office of Graduate Studies (Bldg. 1).

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.

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 Daily, the student newspaper, available at many pickup sites on campus and by request to the Daily office (Storke Bldg.).

Stanford Memorial Church, a guide and history, available at the Visitors' Information Office in Memorial Court (write Guide and Visitors Service, Bldg. 170), and the Stanford Bookstore.

The Stanford Observer, a newspaper for alumni, parents of students, and the University's other friends, available from News Service (Press Bldg.).
Stanford 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).
Courses Certified for 1991-92 as Fulfiling the Undergraduate Distribution Requirements

The Distribution Requirements have been revised for Freshmen who enter 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 1991-92. 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 1991-92 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

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)

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, B, C; 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))
VTSS 1, 2, 3; Technology and Culture (entire sequence must be completed)

AREA 2: WORLD CULTURES (Non-Western Culture under the 1980 DR System)

African and Afro-American Studies 114; Africa and the Black Diaspora
African and Afro-American Studies 115; Africa and Philosophy, Philosophy and Africa
Anthropology 14; Cultures in Crisis
Anthropology 102; Native American Cultures of North America
Anthropology 103; Mesoamerican Communities, Ethnicities, and Nations
Anthropology 108; African Societies in a Changing World
†Anthropology 117; Traditional Chinese Society
Anthropology 121; Introduction to Japanese Society and Culture
Anthropology 123; Japanese Economic Organization
†Anthropology 126; The Middle East through Ethnography
Anthropology 164 (same as Human Biology 164); Ecological Anthropology
Asian Languages 91; Traditional East Asian Civilization: China
Asian Languages 92; Traditional East Asian Civilization: Japan
Asian Languages 132; Fiction and Drama in Translation
Asian Languages 138; Modern Japanese Literature in Translation
Asian Languages 152 (same as History 195); Nomad Empires of Inner Asia
Asian Languages 153 (same as History 193, History of Science 153); Science and Technology of Traditional China
Asian Languages 156 (same as History 192A); China from Earliest Times to the 9th Century Classics/History 105; History and Culture of Ancient Egypt
APPENDIX 761

History 24A; Russian Civilization, 9th to the 17th Centuries
History 148C; Africa: The 20th Century, 1870-1980
History 185; Introduction to Islamic Civilization
History 187A; The Middle East, 570-1718
History 187B; Modern Middle East, 1718-Present
†History 187C (same as Feminist Studies 120); Women in the Contemporary Middle East
History 192B; China from the 9th to the 19th Century
History 192C; Modern China: 19th and 20th Centuries
History 194B; Late Medieval and Early Modern Japan
History 194C; Rise of Modern Japan
Linguistics 162 (same as Anthropology 177); English Transplanted, English Transformed: Pidgins and Creoles
Political Science 25; Colonialism and Nationalism in the Third World
Political Science 114K; The Political Economy of Development
Political Science 115; Politics in the People’s Republic of China
Political Science 118B; Southern Africa: Race, Class, and Political Change
Religious Studies 14; Introduction to Buddhism
Religious Studies 18; Zen Buddhism
Religious Studies 116; Japanese Buddhism

AREA 3: AMERICAN CULTURES
(Non-Western Culture under the 1980 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 250); 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 Education 116X; African and Afro-American Studies 15); Anthropological Perspectives on American Culture
Anthropology 102; Native American Cultures of North America [*]
Anthropology 110; Chicano 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
Drama 155 (same as Feminist Studies 176); American Drama, 1960s to the Present
English 169B (same as Comparative Literature 169B); Asian American Novel
English 169D (same as Comparative Literature 169D); Asian American Short Fiction and Drama
History 157; Introduction to African-American History
History 159; Introduction to Asian American History
History 164 (same as American Studies 164); Race and Ethnicity in the American Experience
Linguistics 153 (same as Urban Studies 165); Inter- and Intra-ethnic Variation in Urban Vernacular English
Political Science 181; African Americans and the Political System
Religious Studies 53 (same as Sociology 151); Jews and Judaism in America

AREA 4: MATHEMATICAL SCIENCES
(Area 6 under the 1980 DR System)
Biology 141; Biostatistics
Mathematics 19; Calculus and Analytic Geometry
Mathematics 20; Calculus and Analytic Geometry
Mathematics 21; Calculus and Analytic Geometry
Mathematics 41; Calculus and Analytic Geometry
Mathematics 42; Calculus and Analytic Geometry
Mathematics 43; Calculus and Analytic Geometry
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; Introduction to Logic
Philosophy 138A and 138B or 138C (same as Classics 138A and 138B or 138C; History 138A and 138B or 138C; History of Science 138A and 138B or 138C) (138B and 138C are offered alternate years); 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 60; 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
VTSS 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 6 (same as Human Biology 106); Human Origins
Applied Physics 15; The Nature of the Universe
Applied Physics 25; Evolution of the Cosmos
Applied Physics 50; Astronomy Laboratory and Observational Astronomy
Applied Physics 100; Introduction to Observational and Laboratory Astronomy
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 in Chemistry
Chemistry 33; Structure and Reactivity
Geology 1; Interpreting the Earth
Geology 2; Earth History
Geology 150; The Oceans: An Introduction to the Marine Environment
Human Biology 1 (same as Anthropology 2); Genes, Culture, and Human Diversity (*)
Human Biology 2A, 3A, 4A; Human Biology Core (entire sequence must be completed)
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 51; Mechanics
Physics 53; Electricity and Magnetism
Physics 55; Light and Heat
Physics 57; Modern Physics
Physics 61; Advanced Freshman Physics
Physics 63; Advanced Freshman Physics
Physics 65; Advanced Freshman Physics
Psychology 102; Perception
Psychology 103A; Visual Sensing by Humans and Computers

AREA 6: TECHNOLOGY AND APPLIED SCIENCE
(Area 8 under the 1980 DR System)

Aeronautics and Astronautics 100; Introduction to Aeronautics and Astronautics
Applied Earth Sciences 1; Introduction to Earth Resources
Applied Earth Sciences 130; Environmental Earth Sciences I
Applied Earth Sciences 184; Management of Geologic Hazards
Civil Engineering 170 (same as VTSS 182); Environmental Science and Technology
Civil Engineering 176; Small Scale Energy Systems
Computer Science 75 (same as Linguistics 35); Computers and Language
Computer Science 105A; Introduction to Computers
Computer Science 106A; Programming Methodology
Computer Science 106X; Programming Methodology and Abstractions
Computer Science 109A; Introduction to Computer Science
Electrical Engineering 106; Planetary Exploration
Engineering 10; Applied Mechanics-Statics
Engineering 12; Intermediate Dynamics
Engineering 30 (same as Mechanical Engineering 30); Engineering Thermodynamics
Engineering 35; Automotive Technology
Engineering 40; Introductory Electronics
Engineering 50 (same as Materials Science and Engineering 50); Introductory Science of Materials
Engineering-Economic Systems 31; Introduction to Decision Analysis
Geophysics 4; Natural Hazards and Man
Music 120; Introduction to Music Synthesis and Programming Using MIDI Based Systems
Operations Research 50/150; Models and Applications of Operations Research in Society
Operations Research 152 (same as Engineering 62, Statistics 152); Introduction to Operations Research I
Petroleum Engineering 103; Survey of the Energy Industries
Physics 105; Intermediate Physics Laboratory: Electronics
VTSS 51; The Nature of Engineering
VTSS 165; Technology and Musical Aesthetics
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: Renaissance to Modern
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 to the Present (*)
Asian Languages 91; Traditional East Asian Civilization: China {*}
Asian Languages 92; Traditional East Asian Civilization: Japan {*}
Asian Languages 131; Chinese Poetry in Translation {*}
Asian Languages 132; Chinese Fiction and Drama in Translation {*}
Asian Languages 133; Modern Chinese Literature in Translation {*}
Asian Languages 135; Japanese Drama in Translation {*}
Asian Languages 136; Japanese Poetry in Translation {*}
Asian Languages 137; Japanese Fiction in Translation {*}
Asian Languages 138; Modern Japanese Literature in Translation {*}
Asian Languages 181; Japanese Women Writers {*}
Classics 11; Age of Heroes
Classics 12 (same as Drama 153); Greek Tragedy
Classics 21; Romantic Comedy and Popular Fiction
†Dance 160A (same as Drama 127A); 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 {*}
Drama 50; Introduction to Drama
Drama 59 (same as English 73); Shakespeare
Drama 150; Major Dramatic Texts I: Greek and Roman
Drama 151; Major Dramatic Texts II: Renaissance to Romantic
Drama 152; Major Dramatic Texts III: Early Realistic to Present
Drama 154N; American Drama: 1920s to 1960s
Drama 155 (same as Feminist Studies 176); American Drama: 1960s to Present
Drama 157; Contemporary Black Playwrights
Drama 160; Theaters and Staging: Ancient to 18th Century
Drama 161; Theaters and Staging: 18th Century to the Present
English 10/110; Masterpieces of English Literature I: Chaucer, Shakespeare, Milton, and Their Contemporaries
English 11/111; Masterpieces of English Literature II: From the Enlightenment to the Modern Period
†English 11G/111G; Masterpieces of English Literature II: From the Enlightenment to the Modern Period
English 12/112; Masterpieces of American Literature
English 30/130; The Novel
English 40/140; Drama
English 50/150; Poetry and Poetics
†English 50G/150G (same as Feminist Studies 164); Poetry and Poetics
English 60; The English Bible as Literature
English 65B/165B (same as Feminist Studies 165B); Arthurian Literature
English 68/168; American Indian Mythology
English 73 (same as Drama 59); Shakespeare
German Studies 32A/132; Culture of Modernism in Austria and Germany
German Studies 60A; Introduction to Medieval Literature
German Studies 71A; Modern German Novel
German Studies 83A; Faust in the Western Tradition
German Studies 150; Introduction to German Literature
German Studies 153; Contemporary German Drama
German Studies 154; Modern Short Prose
Music 1; Introduction to Music
Music 2A; The Symphony
Music 4A; The Music of J. S. Bach
Music 4C; The Music of Beethoven
Music 4D; The Operas of Mozart
Music 4G; The Music of Richard Wagner
Music 5A; Music in America
Music 21; Elements of Music I
Religious Studies 121; The Hebrew Bible
Slavic Languages and Literature 143 (same as Art 109); Early Russian Art and Architecture 1050-1725
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
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 100C; Ancient Art III: Roman Art
Art 107; Age of Cathedrals
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: The Age of Rubens and Rembrandt
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 120D; Alternatives to Impressionism
Art 130; American Art and Culture: 1670-1860
Art 130A; American Art and Culture in the Guided Age
Art 130B; Paris and N.Y.: Transatlantic Exchange in Early Modernism
Art 130C; Culture in Crisis: American Art in the 1930s
Art 175A; Modern Architecture I
Art 175B; Modern Architecture II
Art 176; American Architecture and Urbanism

English 101 (Same as Linguistics 71B; Linguistics and Literature
English 104; Language and Literary Theory
English 120; American Historical Novel
English 132; 19th-Century English Novel
†English 132G; 19th-Century English Novel
English 133; 20th-Century British Novel
†English 133G; 20th-Century British Novel
English 137; Development of the Short Story
English 146; Drama Since 1945
English 161A; Afro-American Writing, 1945 to 1970
English 161B; Afro-American Writing, 1970 to the Present
English 161C (same as African and Afro-American Studies 161C); 20th-Century Afro-American Fiction
English 164A; The Biblical Presence in Modern Poetry

English 165A (same as Medieval Studies 165); Introduction to Medieval Culture
English 167A; Literature of Fantasy
English 173A,B (same as Drama 159A,B); Shakespeare
†English 173G (same as Drama 159C); Shakespeare
Italian 233; Dante’s Divine Comedy
Italian 250; The Italian Renaissance
Italian 269A; Pirandello, Sartre, and Beckett

C) Courses where some foreign language preparation is necessary:

French 130; French Literature I: Middle Ages and Renaissance
French 131; French Literature II: 17th and 18th Centuries
French 132; French Literature III: 19th and 20th Centuries
Italian 227; Italian Literature I: Middle Ages and the Renaissance
Italian 228; Italian Literature II: Modern Italian Narrative
Spanish 11B, 12B, 13B; Second-Year Spanish for Bilingual Students
Spanish 130B; Spanish Cultural Perspectives
Spanish 131B; Hispanic-American Cultural Perspectives
Spanish 132B; Mexican and Chicano Cultural Perspectives
Spanish 140; Introduction to the Methods of Literary Analysis
Spanish 150; Spanish Literature I
Spanish 151; Spanish Literature II
Spanish 160; Spanish-American Literature I

Spanish 161; Spanish-American Literature II

AREA 8: PHILOSOPHICAL, SOCIAL, AND RELIGIOUS THOUGHT

(Area 3 under the 1980 DR System; Non-Western Culture under the 1980 DR system is indicated by {!})

African and Afro-American Studies 115; Africa and Philosophy, Philosophy and Africa: Introduction to a Polemic (*)
†American Studies 151 (same as History 163A); The Transformation of American Thought and Culture: 1865-Present
Anthropology 152; Symbolic Anthropology
†Anthropology 154 (same as Feminist Studies 147; Religious Studies 154); Creation and Procreation
Biological Sciences 114; Scientific Philosophy and Bioethics
Classics 3; Democracy and Imperialism
Classics 8; Political Philosophy in Classical Antiquity
Classics 18; Greek Mythology
APPENDIX 765

Classics 115; Greek Attitudes, Values, Beliefs
Classics 169; Ancient Greek Ethics
French 138 (same as Feminist Studies 137);
Female Saints
French 290; French Cultural History
German Studies 33A/133; German Literature
and Culture after Fascism
History 136A; European Thought in the 19th
Century
History 136B; European Thought in the 20th
Century
History 185A; Introduction to Islamic Civilization
History 187A; The Middle East, 570-1718 (*)
History of Science 145 (same as History 139,
Philosophy 145, VTSS 125); Scientific Revolution
History of Science 147; Science in the Enlightenment
History of Science 168 (same as Philosophy 168,
VTSS 126); History and Philosophy of Physics
Philosophy 10; Knowledge, Self, and World:
Introduction to Philosophy
Philosophy 20; Introduction to Moral Theory
Philosophy 30 (same as Political Science 51D,
Public Policy 103A); Introduction to Political Philosophy
Philosophy 46/104 (same as Asian Languages 46,
Religious Studies 55); Introduction to Chinese Thought (*
Philosophy 60 (same as History of Science 60);
The Growth of Scientific Knowledge
Philosophy 80; Mind, Matter, and Meaning
Philosophy 81; Value, Ethics, and Law
Philosophy 100 (same as Classics 65); Greek Philosophy
Philosophy 102; Modern Philosophy, Descartes
to Kant
Philosophy 138A (same as Classics 138A, History
138A, History of Science 138A); Introduction to Cosmology; Ancient Period
Philosophy 138B (same as Classics 138B, History
138B, History of Science 138B, VTSS 124); Introduction to Cosmology; Science and Technology in the Scientific Revolution
Philosophy 138C (same as Classics 138C; History
138C, History of Science 138C); Introduction to Cosmology; Newton to Einstein
Philosophy 177 (same as Feminist Studies 102B);
Feminism and Philosophy
†Political Science 153; Utopian Political Thought
†Political Science 154 (same as Feminist Studies
138); Feminist Political Theory
†Political Science 163 (same as Feminist Studies
102C); Contemporary Issues in Feminist Thought
Religious Studies 1D; Religions of the East
Religious Studies 1E; Eastern and Western Conceptions of Self (*
Religious Studies 5; Basic Issues in Religion
Religious Studies 14; Introduction to Buddhism
(*
Religious Studies 18; Zen Buddhism (*
Religious Studies 23; Judaism
Religious Studies 24A; Christianity
Religious Studies 42 (same as Philosophy 42);
Philosophy of Religion
Religious Studies 53 (same as Sociology 151);
Jews and Judaism in America
Religious Studies 65; Introduction to Christian Ethics
Religious Studies 116; Japanese Buddhism (*
Religious Studies 126 (same as History 110); Age of the Reformation
†Religious Studies 128 (same as Feminist Studies
151); Women and Judaism
Religious Studies 131; Founders in Myth and History
Religious Studies 142 (same as Classics 104);
Early Christianity
Religious Studies 164 (same as Philosophy 174);
The Morality of Peace and War
Religious Studies 166; Anthropology of Ancient Judaism
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
VTSS 110 (same as Public Policy 103B); Philosophical and Ethical Issues in Public Policy
VTSS 145; Chemistry and the Life Sciences in Historical and Philosophical Perspective

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Areas 4 and 5 under the 1980 DR system are indicated by {4} or {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 11 (same as Feminist Studies
140); Sex Roles and Society {5} (*
Anthropology 15/116 (same as Education 116X,
African and Afro-American Studies 15); Anthropological Perspectives on American Culture {5}
Anthropology 108; African Societies in a Changing World {5} (*
†Anthropology 117; Traditional Chinese Society {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 Anthropology {5}
Anthropology 150; American Indian Ways of Knowing {5}
Anthropology 155 (same as VTSS 161); Food Production, Poverty, and Famine {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 187 (same as Human Biology 183); Hunters-Gatherers in Archaeological Perspective {5} {*}
Classics 14 (same as Athletics 194); Classical Athletics {5}
Classics 20; Introduction to Classical Archaeology {5}
Communication 1; Mass Communication and Society {5}
Communication 157; Public Information Programs {5}
Communication 170; Communication and Children {4}
Drama 155; American Drama, 1960s to the Present {5}
Economics 1; Elementary Economics {5}
Economics 122, Theory of Capitalist Development {5}
English 102 (same as Linguistics 102); History of the English Language {4}
Feminist Studies 101 (same as Anthropology 12, History 173C); Introduction to Feminist Studies {5}
Feminist Studies 146 (same as Human Biology 169); Women, Sexuality, and Health {4}
German Studies 19A/119 (same as Linguistics 75); Introduction to the German Languages {4}
German Studies 31A/131; Central Europe: Geography, Institutions, and Society {5}
German Studies 118/218 (same as Linguistics 176); Introduction to German Dialects {4}
History 15S; The Medieval Church and Violence {5}
History 24A; Russian Civilization 9th to 17th Centuries {5} {*}
History 80 (same as Anthropology 100, 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 115 (same as VTSS 121; History of Science 121); Technology, Science, and European Expansion {5}
History 119A; Aristocracy and Absolutism: Early Modern Eastern Europe {5}
History 132B; France in the 19th and 20th Centuries {5}
History 145; Britain 1815-1914 {5}
History 172A; America since 1945 {5}
Feminist Studies 173B (same as Feminist Studies 122); U.S. Women's History 1820-1980 {5}
History 176; Spain in America 1492-1825 {5}
History 179; History of Mexico {5}
History 187B; Modern Middle East 1718-Present {5} {*}
Feminist Studies 187C (same as Feminist Studies 120); Women in the Contemporary Middle East {5}
Feminist Studies 230A (same as French 189A); Women and Gender in Modern France {5}
Feminist Studies 234; The Family in Early Modern Europe {5}
Latin American Studies 191; Problems in US-Mexico Relations {5}
Linguistics 1; Introduction to Linguistics {4}
Linguistics 150; Introduction to Sociolinguistics {5}
Linguistics 153 (same as Urban Studies 165); Inter- and Intra-Ethnic Variation of Urban Vernacular English {4} or {5}
Linguistics 162 (same as Anthropology 177); English Transplanted, English Transformed: Pidgins and Creoles {4} {*}
Political Science 1; Major Issues of American Public Policy {5}
Political Science 10; American National Government {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 118B; Southern Africa: Race, Class, and Political Change {5} {*}
Political Science 119A (same as History 123A); The Soviet Union: Politics and Society since 1917 {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; Cognitive Psychology {4}
†Psychology 111; Developmental Psychology
   {4}
†Psychology 116 (same as Feminist Studies 126); Psychology of Gender {4}
Psychology 120; Cognitive Development {4}
†Psychology 121; Social Psychology {4}
Psychology 146 (same as Linguistics 145); Language and Thought {4}
Sociology 1; Introduction to Sociology {5}
†Sociology 5 (same as Feminist Studies 143); Status, Friendship, and Social Pressure: An Experiential Approach {4} or {5}
Sociology 120; Interpersonal Relations {4} or {5}
†Sociology 140; Social Stratification and Inequality {5}
Sociology 141; Politics and Society {5}
Sociology 160; Formal Organizations {5}
Symbolic Systems 20 (same as Education 120X); Problems of Intelligence, Information, and Learning {4}
VTSS 101; Science, Technology, and Contemporary Society {5}
VTSS 107 (same as Economics 113); Technology and Modern Industrial Society {5}
VTSS 170; Work, Technology, and Society {5}

In addition to those courses marked with a dagger (†) in Areas 2-9, the following course will also satisfy the Gender Studies Requirement:
Anthropology 171 (same as Linguistics 154); Language and Gender

OVERSEAS STUDIES, 1991-92

Overseas Studies campus department codes are indicated in parentheses after each campus.

BERLIN (247)

AREA 6: TECHNOLOGY AND APPLIED SCIENCE
   (Area 8 under the 1980 DR system)
30 (same as Engineering 30); Engineering Thermodynamics

AREA 7: LITERATURE AND FINE ARTS
   (Area 2 under the 1980 DR system)
4; West German Literature Between the Reality of Ruins and the Student Movement
101A (same as Drama 101A); German Theater: East and West
117V (same as Art 173Y, VTSS 117T); Industrial Revolution and its Impact on Art, Architecture, and Theory
120X (same as Art 120X); New Ways of Seeing
179B (same as German Studies 179B); Split Images: German Film Culture East and West

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
   (Area 5 under the 1980 DR system)
†7X (same as Anthropology 7); Investigating Culture, Introduction to Anthropology
122X (same as Anthropology 122X); Berlin: Turkey's Third Largest City
135X (same as Political Science 135X); East-West Relations in Europe
153X (same as Economics 126X, Political Science 153X); From Socialism to Capitalism in East Germany: A Political Economy Approach
227V (same as History 227V); Introduction to German History: Politics and Culture from the Middle Ages to the Unification of Germany
230B (same as History 230B); Berlin: Its History, Politics, and Culture

FLORENCE (257)

AREA 7: LITERATURE AND FINE ARTS
   (Area 2 under the 1980 DR system)
111A (same as Art 111A); Tuscan Art from Giotto to Leonardo
111B (same as Art 111B); High Renaissance and Mannerism in Florence, Rome, and Venice
128 (same as Communication 128, Italian 276F); Cinema and Literature in Italy

AREA 8: PHILOSOPHICAL, SOCIAL, AND RELIGIOUS THOUGHT
   (Area 3 under the 1980 DR system)
190I (same as History of Science 1901, Psychology 112X); Seeing and Measuring Human Differences: 1800-1940

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
114X (same as Economics 114X, Political Science 115X, VTSS 114T); Technology, Economic Development and Knowledge Formation
121X (same as History 135V, Political Science 121X); The United States and Western Europe after World War II
125X (same as Political Science 125X); Contemporary Western European Politics
126X (same as Political Science 126X); Italian Political System
134V (same as History 134V); History of the European Community
159X (same as History 159X); The Political Economy of Industrial Change
218X (same as Political Science 218X); European Integration and 1992

KRAKOW (268)

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
   (Area 5 under the 1980 DR system)
120V (same as History 120V); History of Europe
123X (same as Economics 123X); Efficiency of Capitalist Societies and Socialist Economies and the Polish Crisis

KYOTO (271)
AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)
215X (same as Political Science 215X); The Political Economy of Modern Japan

OXFORD (267)
AREA 7: LITERATURE AND FINE ARTS
(Area 2 under the 1980 DR system)
125X (same as Art 125X); Art and Society in Britain: 1730-1914
176X (same as Art 176X); History of British Architecture
254Z (same as Drama 158D, English 254Z); Drama in Britain Today

AREA 8: PHILOSOPHICAL, SOCIAL, AND RELIGIOUS THOUGHT
(Area 3 under the 1980 DR system)
81 (same as Philosophy 81); Values, Ethics, and Law

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)
147X (same as Political Science 147X); 1992: Europe, the U.S., and the World
167X (same as Economics 167X); European Economies in a Changing World
240V (same as History 240V); History and Archaeology of the British Landscape

PARIS (244)
AREA 7: LITERATURE AND FINE ARTS
(Area 2 under the 1980 DR system)
120X (same as Art 120X); 19th Century French Painting
179P (same as French 179P); Paris and Modernity: Realism, Surrealism, Phantasmagoria
189P (same as French 189P, Urban Studies 116U); Urbanisme à la Parisienne: Utopias and Realities

AREA 8: PHILOSOPHICAL, SOCIAL, AND RELIGIOUS THOUGHT
(Area 3 under the 1980 DR system)
188P (same as French 188P); The Ideologies of French Everyday Life

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)
188P (same as French 188P); The Ideologies of French Everyday Life
189P (same as French 189P, Urban Studies 116U); Urbanisme à la Parisienne: Utopias and Realities
230V (same as History 230V); Social History of Modern France
Index

A.B. Degree, 8
Academic Advising, Undergraduate 14
Acting (Drama), 353
Administration and Policy Analysis (APA), 80
Advanced Degrees, 14
Advanced Graduate Registration (AGR), 15
Aeronautics and Astronautics, 88, 91, 99
African and Afro-American Studies, Undergraduate Program in, 221
African Languages, 512
African Studies, 225
American Chemical Society Certification, 310
American Policy and Institutions, 234
American Politics, 599, 593
American Social Organization and Behavior, 233
American Studies, 230
American Studies House, 231
American Thought and Imagination, 232
Americas Program, 741
Ancient History, 326
Anthropology, 235
Anthropology, Social Sciences, Major in, 236
Appendix, 750
Applied Earth Sciences, 22
Applied Physics, 245
Aquatic Activity and Theory, 286
Aqueous Geochemistry, Low Temperature, 29
Archeology and Biological Anthropology, 245
Architecture and Urban Design Option, 679
Art, 254
Art Education, 258
Art, History of, 255
Art, Practice of (Studio), 257
Asian Languages, 268; see also East Asian Studies Astronomy Course Program, 277
Athletics, Fitness, Individual, and Team Sport Activities, 287
Athletics, Intercollegiate, 285
Athletics, Physical Education, and Recreation, 282
Bachelor Degree, Second, 9
Bachelor of Arts Degree (A.B.), 8
Bachelor of Arts and Science Degree (B.A.S.), 8
Bachelor of Science Degree (B.S.), 8
Berlin, Stanford Program in, 546
Biochemistry, 704
Biological Sciences, 292
Biological Sciences, 292
Biological Science, Engineering in, 93
Biomechanical Engineering, 194
Biophysics Program, 306
Black Performing Arts, Committee on, 307
Bulletins, Stanford University, 2
Business, Graduate School of, 21
Calendar, University, 3
Cancer Biology Program, 706
Casa Italiana, 423
Cell Biology, 707
Center for Computer Research in Music and Acoustics (CCRMA), 536
Center for East Asian Studies (CEAS), 359
Center for Economic Policy Research (CEPR), 738
Center for Materials Research (CMR), 744
Center for Russian and East European Studies (CREAS), 623
Center for the Study of Language and Information (CSLI), 744
Center for Space Science and Astrophysics (CSSA), 650
Center for Teaching and Learning (CTL), 695
Chapell-Lougee Scholars Program, 697
Chemical Engineering, 86, 91, 112
Chemistry, 309
Chicano Fellows Program, 315
Chicano Research, Stanford Center for, 738
Children and Society Curriculum, 317
Chinese Language Studies in Taipei, Inter-University, Program for, 743,
Chinese, Programs of Study in, 270, 272
Civil Engineering, 86, 91, 116
Classics, 318
Classical Linguistics, 322
Greek, Courses in, 322
Latin, Courses in, 324
Club Sports, 282, 291
Cognitive Science, 503, 556
Combined Admissions Mode (CAM) in Biological and Biomedical Sciences, 703
Communication, 389
Communication Research, Institute for, 331
Comparative Institutional Analysis, 384
Comparative Literature, 336
Comparative Politics, 584, 591
Comparative Social and Political Institutions, 638
Computer Science, 87, 130
Computer Systems Engineering, 88
Continuing Studies Program, 756
Coterminal Bachelor’s and Master’s Degrees, 9
Courses of Instruction, 20
Creative Writing, 386
Crown Law Library, 750
Cultures, Ideas, and Values, Program in (CIV), 348
Curriculum and Teacher Education (CTE), 81
Dance Division, 281; see also African and Afro-American Studies; Drama; and Music
Data Center, Stanford, 753
Decision Analysis, 172
Degrees, Advanced, 14
Undergraduate, 8
Design, Architecture and Urban Design Option, 679
Art, 257
Product (Engineering), 89, 193, 195
Technical Production (Drama), 352
Developmental Biology, Program in, 709
Directing (Drama), 351
Distribution Requirements, 11
Credit Transfer, 12
Petition, 12
Purpose, 11
Undergraduates who entered prior to Autumn, 1991, 12
see also Appendix for course list, 760
Doctor of Education, 66,  
General Requirements for, 17 
Doctor of Jurisprudence, General Requirements for, 17 
Doctor of Medicine, General Requirements for, 17 
Doctor of Musical Arts (D.M.A.), General Requirements for, 17, 538 
Doctor of Philosophy, 17  
Candidacy, 18 
Dissertation, 18 
Doctoral Dissertation Reading Committee, 18 
Foreign Language Requirement, 18 
General Regulations, 17 
Teaching Requirements, 18 
University Oral Examination, 18 
Doctor of the Science of Law,  
General Requirements for, 17 
Drama, 350 
Drama and Humanities, Joint Ph.D. Program in, 352 
Dramatic Literature/Criticism/Theater History, 352 
Drawing, 257 
Earth Systems, 22  
Earth Sciences, School of, 22 
East Asian Studies, 359 
and Business, 362 
and Education, 362 
and Food Research, 362 
and Health Services Research, 362 
and Law, 362S East Asian Studies Theme House, 269, 360 
Econometrics, 383 
Economic Analysis, 380 
Economic Development, 380 
Economic History, 380 
Economic Perspectives and Policies, 369 
Economics, 368 
Economics, Quantitative, 369 
Economics and Law, Joint Program in, 372 
Ed. D. Degree, 17, 65 
Education, School of, 62 
Educational Specialist (Ed.S.), 16, 65 
Electrical Engineering, 87, 92, 148 
Electrical Engineering, Administration, 150 
Energy Modeling and Analysis, 170 
Engineer Degree,  
Requirements for, 16, 94 
Engineer (Management Option), 55 
Engineering-Economic Systems, 93, 166 
Engineering in Biology and Medicine, 93 
Engineering Management, 177 
Engineering, School of, 84 
Engineering, (3/2) Degree Programs, 85 
English, 385  
and American Literature, 391 
and Classics, 387 
and Comparative Literature, 391 
and French Literatures, 387, 420 
and German Literatures, 387, 437 
and Humanities, Joint Ph.D. in, 393 
and Italian Literatures, 387, 424 
and Linguistics, 391 
and Spanish or Spanish- American Literatures, 387, 653 
English for Foreign Students, 514 
Environmental and Water Studies, 117 
Environmental Earth Sciences, 25 
Environmental Programs, 25 
Environmental Studies, 35 
Environmental Studies Policy Forum, 742 
Epistemology, Metaphysics, and Philosophy of Language, 567 
Ethics, Aesthetics, and Social and Political Philosophy, 566 
Ethics in Society, Program in, 404 
European Studies, Stanford Center for, 741 
Exploration and Development, Master of Science in,  
Geophysics, 49 
Feminist Studies, Program in, 406 
Film, see Communication 
Florence, Stanford Program in, 423, 548 
Food Research Institute, 414 
Foreign Languages, 505, 512 
French and Italian, 418 
French Division, 418 
Italian Division, 422 
Literatures, 419, 423 
Genetics, 710 
Geochemistry, Petrology, and Mineralogy, 36 
Geologic Remote Sensing, 27 
Geology, 36 
Geomathematics in Process Simulation and Petroleum Resource Analysis, 27 
Geomechanics, 28 
Geophysics, 46 
Geostatistics for Natural Resources Management, 28 
German Studies, 435 
Ginzton, Edward L., Laboratory, 739 
Graduate Division Special Program, 755 
Graduate Final Requirement Registration, 15 
Graduate School of Business, 21 
Greece, Stanford in, 320 
Greek, Classical and Modern, 322 
Hansen, W.W., Experimental Physics Laboratory, 739 
Health Research and Policy, 712 
History, 447 
History and/or Philosophy of Science, Special Program in, 556, 559 
History of Art, 255, 258 
History and Humanities, Joint Ph.D. Program in, 450 
History of Philosophy, 559 
History of Science, Program in the, 466 
History of the University, 6 
Honors Cooperative Program, 91 
Hoover Institution on War, Revolution, and Peace, 748 
Hopkins Marine Station, 304 
Human Biology, Program in, 469 
Humanities and Sciences, School of, 220 
Humanities Center, Stanford, 739 
Humanities Special Programs, 478 
Hydrogeology, 28 
Immunology Program, 715 
Independent Research Laboratories, Centers and Institutes, 738 
Individually Designed Majors, (IDM), Program for, 14, 89, 692 
Industrial Engineering and Engineering Management, 87, 92, 176 
Information Systems, Electrical Engineering, 151 
Innovative Academic Courses, 693
INDEX 771

Institute for International Studies (IIS), 740
Institute for Mathematical Studies in Social Sciences (IMSSS), 745
Integrated Circuits, Electrical Engineering, 152
Intelligent Systems, 169
Intercollegiate Athletics, 282
Intercollegiate Athletic Teams, 290
International Development Education (IDE) (SIDEIC), 81
International Economics, 382
International Policy Studies (IPS), 479
International Relations, 480
International Relations, Political Science Courses in, 586, 593
International Security and Arms Control, Center for, 742
Inter-University Center for Japanese Studies, in Yokohama, 274, 743
Inter-University Program for Chinese Language Studies in Taipei, 274, 743
Intramural Sports, 282
Irvine Assistanships Award, 698
Italian Division, 422
Italian and English Literatures, 387, 424
Italian, English, and French Literatures, 420, 424
Italy, Stanford in, 423
Jackson Library, J. Hugh, 750
Japan Center-Research, Stanford, 742
Japanese, Courses, in, 274
Programs of Study in, 270
Summer Program of Intensive Language Courses, 269
Jasper Ridge Biological Preserve, 292
Jewish Studies, Program in, 493
John S. Knight Fellowship Program, 329
Journalism, see Communication
J.S.D. Degree, 17
J.S.M. Degree, 17
Krakow, Stanford Program in, 550
Korean, Courses in, 272
Land Resources Planning, 25
Lane Medical Library, 750
Language, Literacy, and Culture (LLC), 81
Language Requirement, 12
Language Programs, 512
Lasers and Quantum Electronics, Electrical Engineering, 152
Latin, see Classics
Latin American Studies, Center for, 495
Summer Field Research, 497, 498
Law, School of, 699
Libraries, 748
Linear Accelerator Center Library, 746
Linguistic Anthropology, 244
Linguistics, 502
and Cognitive Science, 503
and Literature, 503
Sociolinguistics, 503
Structure, 503
Literature in Translation, 514
Logic and Philosophy of Science, 565
Major, the Undergraduate, 13
Individually Designed, 14
Limits on Requirements for, 13
Management, M.S. Degree in, 21
Manufacturing, Programs in, 90, 93
Manufacturing Systems Engineering (MSE), 177, 194
Martial Arts, 289
Mass Media Institute, 331
Master of Arts, General Requirements for, 15
Master of Arts in Teaching (M.A.T.), 16, 65
Master of Business Administration (M.B.A.), General Requirements for, 16, 21
Master of Fine Arts (M.F.A.), General Requirements for, 16, 257
Master of Legal Studies (M.L.S.), General Requirements for, 16
Master of Science (M.S.), General Requirements for, 15
Master of the Science of Law, General Requirements for, 17
Materials Science and Engineering, 88, 92, 182
Mathematical and Computational Science, 516
Mathematical Economics, 383
Mathematical System Analysis, 170
Mathematics, 517
M.B.A. Degree, 16, 21
M.D. Degree, 17
Mechanical Engineering, 88, 92, 189
Medical Information Sciences, Program, 717
Medicine, School of, 702
Medieval Studies, 528
Mellon Minority Undergraduate Fellowship Program, 697
Meyer and Research Branch Libraries, 752
Microbiology and Immunology, 722
Microwaves, Acoustics, and Optics, Electrical Engineering, 152
Modern Thought and Literature, 530
and Humanities, Joint Ph.D. Degree in, 532
Molecular and Cellular Physiology, 725
Monetary Theory and Advanced Macroeconomics, 381
Music, 536
Music, Science, and Technology, 537
Networking and Communications Systems, 753
Neurobiology, 727
Neurosciences Program, 728
Nondiscriminatory Policy, Statement of, 756
Nonmatriculated Graduate Study, 19
Northeast Asia-United States Forum on International Policy, 742
Numerical Analysis/Scientific Computation, 132
Operations Research, 93, 211
Ore Deposits and Exploration, 29
Organizational Studies, 638
Organizational Economics, 170
Overseas Studies, Program, 543
Overseas Studies, Distribution Requirements, 767
Oxford, Stanford Program in, 546
Painting, 257
Paris, Stanford Program in, 553
Pathology, 732
Peters Seminar for Freshman and Sophomores, 694
Petroleum Engineering, 53
Petroleum Geology, 29
Pharmacology, 734
Ph.D. Degree, 17
Ph.D. Minor, 19
Philosophy, 555
    and Humanities, 561
    of Language, 559
    and Religious Studies, 557
    and/or History of Science, 557
    and Symbolic Systems, Special Track in, 561
Photography, 257
Physical Education,
    and Sports Theory, 285
    Leadership Opportunities, 286
Physics, 570
Political Science, 579
Political Theory, 588, 593
Population and Resource Studies, Morrison Institute for, 595
Portuguese Language Program, 644
Predental Requirements, 294
Premedical Requirements, 294
Preparamedical Requirements, 294
Product Design, 91, 194, 197
Prospective Principals Program, 64
Psychological Studies in Education (PSE), 82
Psychology, 597
    Cognitive Science Program, 601
Public Administration and Public Policy, 584
Public Finance, 381
Public Policy, Political Science, Emphasis in, 580
Public Policy Program, 610
Public Service Haas Center for, 695
Race and Ethnicity, 231
Radiation Oncology, 735
Radiology, 736
Registration Requirements, 15
Rehabilitation Act of 1973, 756
Religion and Mythology, 328
Religious Studies, 615
    and Humanities, Joint Ph.D. Program in, 616
    and Philosophy, Joint Major in, 616
Requirements, Undergraduate, 10
    Distribution, 11
    Language, 12
    Writing, 11
    See also Appendix
Research and Evaluation Methods (REM), 82
Rome Classical Center, 320
Russian and East European Studies, Center for, 623
Salamanca, Spain, Stanford Program in, 554
Scientific Computing and Computational
    Mathematics, Program in, 218
Science and Technology Policy, 170
Scientific Computation, Numerical Analysis, 132
Sculpture, 257
Second Bachelor's Degrees, 9
Sedimentary Geology and Paleontology, 39
Slavic Languages and Literatures, 628
    and Humanities, Joint Ph.D. Program in, 631
Sloan Program, Stanford, 21
Social and Cultural Anthropology, 242
Social Psychology and Interpersonal Processes, 638
Social Sciences, Anthropology Major in, 236
Social Sciences in Education (SSE), 82
Sociolinguistics, 503
Sociology, 637
    Joint Program with the Law School, 641
Software Theory, 132
Solid State, Electrical Engineering, 152
Space Science and Astrophysics, Center for, 650
Space Physics and Radio-science, Electrical Engineering, 152
Spanish and Portuguese, 652
Stanford Linear Accelerator Center, (SLAC), 746
Stanford Synchrotron Radiation Laboratory (SSRL), 747
Stanford Teacher Education Program (STEP), 64, 85
Statistics, 666
Structural Engineering and Geomechanics, 118
Structured Liberal Education, Program in, 674,
    Structures and Composites Laboratory, 190
Summer Session, 20
SWOPSI (Stanford Workshops on Political and Social Issues), 694
Symbolic and Heuristic Computation, 132
Symbolic Systems, Program in, 674
    Systems, Computer Science, 132
Table of Contents, 4
Tectonic, Structural, and Regional Geology, 39
Telecommunications and Space Information Systems,
    Electrical Engineering, 152
Terminal Graduate Registration (TGR), 15
Theoretical Computer Science, 132
Thermosciences Division (Mechanical Engineering), 190
Title IX of the Education Amendments of 1972, 756
Tübingen Graduate Exchange, 437
Undergraduate Academic Advising Center, 14
Undergraduate Degrees, 8
Undergraduate Research Opportunities (URO), 697
Undergraduate Scholars Program (USP), 222
Undergraduate Special Courses, 685
Undergraduate Study at Stanford, 10
University Libraries, 750
University Publications, 758
Urban Planning Option, 679
Urban Studies, Program on, 678
Values, Technology, Science, and Society, Program in (VTSS), 684
Vertebrate Animals in Teaching Activities, Policy on the Use of, 757
Vincenti Prize, Walter G., 685
Washington, Stanford in, 698
Women and Gender, Institute for Research on, 745