Accreditation

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

While every effort is made to ensure the accuracy of the information available at the time copy is prepared for this bulletin, the University reserves the right to make changes at any time without prior notice.

Stanford, California
ACADEMIC CALENDAR 1995-96

AUTUMN QUARTER, 1994

Sep 26 (Tue)  Last day to arrange payment of University fees
27 (Wed)  Instruction begins
Sep 28 (Thu)  Conferral of degrees — Summer Quarter
Nov 23-24 (Thu-Fri)  Thanksgiving recess (no classes)
Nov 26 (Sun)  Last day for filing A.B., B.S., and B.A.S. application for January (Autumn Quarter) conferral
Dec 8 (Fri)  Last day for filing candidacy applications for Educational Specialist or Engineer degree for April (Winter Quarter) conferral
8 (Fri)  Last day for filing University thesis, D.M.A. final project, Ph.D. dissertation, and Graduation Application for January (Autumn Quarter) conferral of graduate degree
11-15 (Mon-Fri)  End-Quarter examinations

WINTER QUARTER, 1995

Jan 8 (Mon)  Last day to arrange payment of University fees
9 (Tue)  Instruction begins
11 (Thu)  Conferral of degrees — Autumn Quarter
15 (Mon)  Observance of Martin Luther King Day (holiday, no classes)
Feb 19 (Mon)  Observance of Presidents' Day (holiday, no classes)
25 (Sun)  Last day for filing A.B., B.S., and B.A.S. application for April (Winter Quarter) and June (Spring Quarter) conferral
25 (Sun)  Last day for filing graduate Graduation Application for June commencement diploma
Mar 10 (Sun)  Observance of Founders' Day
15 (Fri)  Last day for filing candidacy applications for Educational Specialist or Engineer degree for June (Spring Quarter) conferral
15 (Fri)  Last day for filing University thesis, D.M.A. final project, Ph.D. dissertation, and Graduation Application for April (Winter Quarter) conferral of graduate degree
18-22 (Mon-Fri)  End-Quarter examinations

SPRING QUARTER, 1995

Apr 1 (Mon)  Last day to arrange payment of University fees
2 (Tue)  Instruction begins
4 (Thu)  Conferral of degrees — Winter Quarter
May 1 (Mon)  Filing deadline for matriculated undergraduate financial aid applications
May 27 (Mon)  Observance of Memorial Day (holiday, no classes)
June 5 (Wed)  Last day for filing candidacy applications for Educational Specialist or Engineer degree for September (Summer Quarter) conferral
5 (Wed)  Last day for filing University thesis, D.M.A. final project, Ph.D. dissertation, and Graduation Application for June (Spring Quarter) conferral of graduate degree
6 (Thu)  Day before finals, no classes
7-12 (Fri-Wed)  End-Quarter examinations
15 (Sat)  Baccalaureate Saturday and Senior Class Day
16 (Sun)  Commencement

SUMMER QUARTER, 1995

24 (Mon)  Last day to arrange payment of University fees
25 (Tue)  Instruction begins
July 4 (Thu)  Independence Day (holiday observance, no classes)
Aug 16-17 (Fri-Sat)  Eight-week term examinations
17 (Sat)  Eight-week term closes
26 (Mon)  Last day for filing candidacy applications for Educational Specialist or Engineer degree for January (Autumn Quarter) conferral
26 (Mon)  Last day for filing University thesis, D.M.A. final project, Ph.D. dissertation, and Graduation Application for October (Summer Quarter) conferral of graduate degree
Sep 3 (Tue)  Quarter closes
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HISTORY OF THE UNIVERSITY</td>
<td>6</td>
</tr>
<tr>
<td>Campus and Buildings</td>
<td>7</td>
</tr>
<tr>
<td>UNIVERSITY GOVERNANCE AND ORGANIZATION</td>
<td>8</td>
</tr>
<tr>
<td>Directory</td>
<td>8</td>
</tr>
<tr>
<td>Organization</td>
<td>9</td>
</tr>
<tr>
<td>ADMISSION AND FINANCIAL AID</td>
<td>12</td>
</tr>
<tr>
<td>Admissions</td>
<td>12</td>
</tr>
<tr>
<td>Financial Aid</td>
<td>15</td>
</tr>
<tr>
<td>TUITION, FEES, AND HOUSING</td>
<td>19</td>
</tr>
<tr>
<td>Assessments</td>
<td>19</td>
</tr>
<tr>
<td>Payments</td>
<td>22</td>
</tr>
<tr>
<td>Refunds</td>
<td>22</td>
</tr>
<tr>
<td>Housing</td>
<td>24</td>
</tr>
<tr>
<td>UNDERGRADUATE DEGREES</td>
<td>26</td>
</tr>
<tr>
<td>Degrees and Honors</td>
<td>26</td>
</tr>
<tr>
<td>Degree Requirements</td>
<td>28</td>
</tr>
<tr>
<td>GRADUATE DEGREES</td>
<td>37</td>
</tr>
<tr>
<td>General Requirements</td>
<td>37</td>
</tr>
<tr>
<td>Degree-Specific Requirements</td>
<td>43</td>
</tr>
<tr>
<td>Exchange Programs, Advising, and Credentials</td>
<td>47</td>
</tr>
<tr>
<td>ACADEMIC POLICIES AND STATEMENTS</td>
<td>49</td>
</tr>
<tr>
<td>Registration and Records</td>
<td>49</td>
</tr>
<tr>
<td>Examinations</td>
<td>52</td>
</tr>
<tr>
<td>Grading Systems</td>
<td>54</td>
</tr>
<tr>
<td>Guidelines for Student Academic Grievance Procedures</td>
<td>57</td>
</tr>
<tr>
<td>COURSES OF INSTRUCTION</td>
<td>59</td>
</tr>
<tr>
<td>GRADUATE SCHOOL OF BUSINESS</td>
<td>60</td>
</tr>
<tr>
<td>SCHOOL OF EARTH SCIENCES</td>
<td>61</td>
</tr>
<tr>
<td>Earth Systems Program</td>
<td>62</td>
</tr>
<tr>
<td>Geological and Environmental Sciences</td>
<td>67</td>
</tr>
<tr>
<td>Geophysics</td>
<td>86</td>
</tr>
<tr>
<td>Petroleum Engineering</td>
<td>93</td>
</tr>
<tr>
<td>SCHOOL OF EDUCATION</td>
<td>103</td>
</tr>
<tr>
<td>SCHOOL OF ENGINEERING</td>
<td>125</td>
</tr>
<tr>
<td>Aeronautics and Astronautics</td>
<td>140</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>151</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>156</td>
</tr>
<tr>
<td>Computer Science</td>
<td>172</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>191</td>
</tr>
<tr>
<td>Engineering-Economic Systems</td>
<td>210</td>
</tr>
<tr>
<td>Industrial Engineering and Engineering Management</td>
<td>221</td>
</tr>
<tr>
<td>Materials Science and Engineering</td>
<td>227</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>235</td>
</tr>
<tr>
<td>Operations Research</td>
<td>255</td>
</tr>
<tr>
<td>Science, Technology, and Society</td>
<td>261</td>
</tr>
<tr>
<td>Scientific Computing and Computational Mathematics Program</td>
<td>269</td>
</tr>
<tr>
<td>SCHOOL OF HUMANITIES AND SCIENCES</td>
<td>272</td>
</tr>
<tr>
<td>African and Afro-American Studies, Undergraduate Program in</td>
<td>273</td>
</tr>
<tr>
<td>African Studies</td>
<td>276</td>
</tr>
<tr>
<td>American Studies</td>
<td>278</td>
</tr>
<tr>
<td>Anthropology</td>
<td>283</td>
</tr>
<tr>
<td>Applied Physics</td>
<td>299</td>
</tr>
<tr>
<td>Art</td>
<td>304</td>
</tr>
<tr>
<td>Asian American Studies</td>
<td>319</td>
</tr>
<tr>
<td>Asian Languages</td>
<td>320</td>
</tr>
<tr>
<td>Athletics, Physical Education, and Recreation</td>
<td>331</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>342</td>
</tr>
<tr>
<td>Division of Marine Biology, Hopkins Marine Station</td>
<td>355</td>
</tr>
<tr>
<td>Biophysics Program</td>
<td>358</td>
</tr>
<tr>
<td>Black Performing Arts, Committee on</td>
<td>359</td>
</tr>
<tr>
<td>Chemistry</td>
<td>360</td>
</tr>
<tr>
<td>Chicano/a Fellows Program</td>
<td>366</td>
</tr>
<tr>
<td>Children and Society Curriculum</td>
<td>367</td>
</tr>
<tr>
<td>Classics</td>
<td>370</td>
</tr>
<tr>
<td>Communication</td>
<td>377</td>
</tr>
<tr>
<td>Comparative Literature</td>
<td>387</td>
</tr>
<tr>
<td>Cultures, Ideas, and Values, Program in (CIV)</td>
<td>398</td>
</tr>
<tr>
<td>Drama</td>
<td>401</td>
</tr>
<tr>
<td>East Asian Studies</td>
<td>409</td>
</tr>
<tr>
<td>Economics</td>
<td>417</td>
</tr>
<tr>
<td>English</td>
<td>432</td>
</tr>
<tr>
<td>Ethics in Society, Program in</td>
<td>449</td>
</tr>
<tr>
<td>Feminist Studies</td>
<td>451</td>
</tr>
<tr>
<td>Film Studies</td>
<td>457</td>
</tr>
<tr>
<td>Food Research Institute</td>
<td>457</td>
</tr>
<tr>
<td>French and Italian</td>
<td>462</td>
</tr>
<tr>
<td>German Studies</td>
<td>479</td>
</tr>
<tr>
<td>History</td>
<td>488</td>
</tr>
<tr>
<td>History and Philosophy of Science, Program in</td>
<td>513</td>
</tr>
<tr>
<td>Human Biology, Program in</td>
<td>516</td>
</tr>
<tr>
<td>Humanities Special Programs</td>
<td>526</td>
</tr>
<tr>
<td>International Policy Studies (IPS)</td>
<td>530</td>
</tr>
<tr>
<td>International Relations</td>
<td>531</td>
</tr>
<tr>
<td>Jewish Studies, Program in</td>
<td>540</td>
</tr>
<tr>
<td>Latin American Studies, Center for</td>
<td>541</td>
</tr>
<tr>
<td>Linguistics</td>
<td>550</td>
</tr>
<tr>
<td>Literature in Translation</td>
<td>559</td>
</tr>
<tr>
<td>Mathematical and Computational Science</td>
<td>561</td>
</tr>
<tr>
<td>Mathematics</td>
<td>563</td>
</tr>
<tr>
<td>Medieval Studies</td>
<td>572</td>
</tr>
<tr>
<td>Modern Thought and Literature</td>
<td>573</td>
</tr>
<tr>
<td>Music</td>
<td>578</td>
</tr>
<tr>
<td>Overseas Studies Program</td>
<td>587</td>
</tr>
<tr>
<td>CONTENTS</td>
<td>5</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---</td>
</tr>
<tr>
<td>Philosophy</td>
<td>598</td>
</tr>
<tr>
<td>Physics</td>
<td>612</td>
</tr>
<tr>
<td>Political Science</td>
<td>623</td>
</tr>
<tr>
<td>Population and Resource Studies, Morrison Institute for</td>
<td>638</td>
</tr>
<tr>
<td>Psychology</td>
<td>639</td>
</tr>
<tr>
<td>Public Policy Program</td>
<td>655</td>
</tr>
<tr>
<td>Religious Studies</td>
<td>658</td>
</tr>
<tr>
<td>Russian and Eastern European Studies, Center for</td>
<td>667</td>
</tr>
<tr>
<td>Slavic Languages and Literature</td>
<td>672</td>
</tr>
<tr>
<td>Sociology</td>
<td>683</td>
</tr>
<tr>
<td>Space Science and Astrophysics, Center for</td>
<td>694</td>
</tr>
<tr>
<td>Spanish and Portuguese</td>
<td>695</td>
</tr>
<tr>
<td>Statistics</td>
<td>708</td>
</tr>
<tr>
<td>Structured Liberal Education Program in</td>
<td>716</td>
</tr>
<tr>
<td>Symbolic Systems, Program in</td>
<td>716</td>
</tr>
<tr>
<td>Urban Studies, Program on</td>
<td>720</td>
</tr>
<tr>
<td>SPECIAL PROGRAMS</td>
<td>726</td>
</tr>
<tr>
<td>Sophomore Dialogues and Seminars</td>
<td>726</td>
</tr>
<tr>
<td>Undergraduate Research Opportunities (URO)</td>
<td>729</td>
</tr>
<tr>
<td>Washington, Stanford in</td>
<td>730</td>
</tr>
<tr>
<td>Writing Across the Curriculum</td>
<td>730</td>
</tr>
<tr>
<td>SCHOOL OF LAW</td>
<td>732</td>
</tr>
<tr>
<td>SCHOOL OF MEDICINE</td>
<td>734</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>734</td>
</tr>
<tr>
<td>Biomedical Ethics, Center for</td>
<td>737</td>
</tr>
<tr>
<td>Cancer Biology Program</td>
<td>738</td>
</tr>
<tr>
<td>Developmental Biology</td>
<td>739</td>
</tr>
<tr>
<td>Epidemiology Program</td>
<td>741</td>
</tr>
<tr>
<td>Genetics</td>
<td>742</td>
</tr>
<tr>
<td>Health Research and Policy</td>
<td>744</td>
</tr>
<tr>
<td>Health Services Research Program</td>
<td>747</td>
</tr>
<tr>
<td>Immunology Program</td>
<td>748</td>
</tr>
<tr>
<td>Medical Information</td>
<td>751</td>
</tr>
<tr>
<td>Sciences Program</td>
<td>751</td>
</tr>
<tr>
<td>Microbiology and Immunology</td>
<td>756</td>
</tr>
<tr>
<td>Molecular and Cellular Physiology</td>
<td>758</td>
</tr>
<tr>
<td>Molecular Pharmacology</td>
<td>760</td>
</tr>
<tr>
<td>Neurobiology</td>
<td>762</td>
</tr>
<tr>
<td>Neurosciences Program</td>
<td>763</td>
</tr>
<tr>
<td>Pathology</td>
<td>765</td>
</tr>
<tr>
<td>Radiation Oncology</td>
<td>767</td>
</tr>
<tr>
<td>Radiology</td>
<td>767</td>
</tr>
<tr>
<td>Structural Biology</td>
<td>768</td>
</tr>
<tr>
<td>Surgery</td>
<td>769</td>
</tr>
<tr>
<td>INDEPENDENT RESEARCH LABORATORIES, CENTERS, AND INSTITUTES</td>
<td>770</td>
</tr>
<tr>
<td>Chicano Research, Stanford Center for</td>
<td>770</td>
</tr>
<tr>
<td>Economic Policy Research, Center for</td>
<td>770</td>
</tr>
<tr>
<td>Ginzton Laboratory, Edward L.</td>
<td>771</td>
</tr>
<tr>
<td>Hansen Experimental Physics</td>
<td>771</td>
</tr>
<tr>
<td>Laboratory, W. W., (HEPL)</td>
<td>771</td>
</tr>
<tr>
<td>Humanities Center, Stanford</td>
<td>771</td>
</tr>
<tr>
<td>International Studies, The Institute for (IIS)</td>
<td>772</td>
</tr>
<tr>
<td>Language and Information, Center for the Study of (CSLI)</td>
<td>773</td>
</tr>
<tr>
<td>Materials Research, Center for (CMR)</td>
<td>773</td>
</tr>
<tr>
<td>Organizations Research, Stanford Center for (SCOR)</td>
<td>774</td>
</tr>
<tr>
<td>Research on Women and Gender, Institute for</td>
<td>774</td>
</tr>
<tr>
<td>Hoover Institution on War,</td>
<td>774</td>
</tr>
<tr>
<td>Revolution and Peace</td>
<td>774</td>
</tr>
<tr>
<td>Stanford Linear Accelerator</td>
<td>775</td>
</tr>
<tr>
<td>Center</td>
<td>775</td>
</tr>
<tr>
<td>Stanford Synchrotron Radiation Laboratory (SSRL)</td>
<td>776</td>
</tr>
<tr>
<td>LIBRARIES AND INFORMATION RESOURCES (L&amp;IR)</td>
<td>777</td>
</tr>
<tr>
<td>Information Technology Systems and Services (ITSS)</td>
<td>777</td>
</tr>
<tr>
<td>Stanford University Libraries and Academic Information Resources</td>
<td>778</td>
</tr>
<tr>
<td>LIBRARIES-COORDINATES</td>
<td>781</td>
</tr>
<tr>
<td>Hoover Institution on War,</td>
<td>781</td>
</tr>
<tr>
<td>Revolution and Peace</td>
<td>781</td>
</tr>
<tr>
<td>GRADUATE INTERSCHOOL PROGRAM</td>
<td>782</td>
</tr>
<tr>
<td>Graduate Special Program</td>
<td>782</td>
</tr>
<tr>
<td>THE CONTINUING STUDIES PROGRAM</td>
<td>783</td>
</tr>
<tr>
<td>STUDENT SERVICES AND PROGRAMS</td>
<td>784</td>
</tr>
<tr>
<td>Student Affairs</td>
<td>784</td>
</tr>
<tr>
<td>Bookstore</td>
<td>792</td>
</tr>
<tr>
<td>Ombudsperson</td>
<td>793</td>
</tr>
<tr>
<td>Police Services</td>
<td>793</td>
</tr>
<tr>
<td>Public Events</td>
<td>793</td>
</tr>
<tr>
<td>Summer Conference Services</td>
<td>794</td>
</tr>
<tr>
<td>Teaching and Learning,</td>
<td>794</td>
</tr>
<tr>
<td>Center for (CTL)</td>
<td>794</td>
</tr>
<tr>
<td>Awards and Honors</td>
<td>796</td>
</tr>
<tr>
<td>NONACADEMIC REGULATIONS</td>
<td>798</td>
</tr>
<tr>
<td>UNIVERSITY PUBLICATIONS</td>
<td>807</td>
</tr>
<tr>
<td>APPENDIX</td>
<td>809</td>
</tr>
<tr>
<td>INDEX</td>
<td>819</td>
</tr>
</tbody>
</table>
On November 14, 1885, Senator and Mrs. Leland Stanford executed the Founding Grant of The Leland Stanford Junior University. Three days later they called together the 24 prominent men who had been chosen to become the University's first trustees and presented them with this historic document, which Leland Stanford himself had dictated. The document, with various amendments, legislative acts, and court decrees, remains as the University's charter. In bold, sweeping language it stipulates that the objectives of the University are "to qualify students for personal success and direct usefulness in life; and to promote the public welfare by exercising an influence in behalf of humanity and civilization, teaching the blessings of liberty regulated by law, and inculcating love and reverence for the great principles of government as derived from the inalienable rights of man to life, liberty, and the pursuit of happiness."

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

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

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

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

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

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

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

The University does not use any racial, religious, ethnic, geographic, or sex-related quotas in admissions. It is committed to the principles of Affirmative Action in the admission of students and in the employment of faculty and staff. In 1993-94 the completion or graduation rate for students who entered Stanford University full-time in 1988 was 93 percent. Enrollment in Autumn Quarter 1994 totaled 14,031, of whom 6,561 were undergraduates and 7,470 were graduate students. Blacks, Hispanics, Puerto Ricans, and Native Americans numbered 1,329 undergraduates and 763 at the graduate level. Stanford awarded 4,565 degrees in 1993-94, of which 1,774 were baccalaureate and 2,818 were advanced degrees.

Among the 1,430 faculty are 4 Nobel laureates, 64 members of the National Academy of Sciences, 111 members of the American Academy of Arts and Sciences, 38 members of the National Academy of Engineering, 9 members of the National Academy of Education, 8 winners of the National Medal of Science, 8 members of the American Philosophical Society, 1 Pulitzer Prize winner, and 12 MacArthur Prize winners.

CAMPUS AND BUILDINGS

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

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

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

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

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

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

Frederick Law Olmsted, the designer of Central Park in New York, worked out the general concept for the University grounds and buildings. A brilliant young Boston architect, Charles Allerton Coolidge, further developed the concept in the style of his late mentor, Henry Hobson Richardson. The style, called Richardsonian Romanesque, is a blend of Romanesque and Mission Revival architecture. It is characterized by rectilinear sandstone buildings joined by covered arcades formed of successive half-circle arches, the latter being supported by short columns with decorated capitals.
UNIVERSITY GOVERNANCE
AND ORGANIZATION

DIRECTORY

THE BOARD OF TRUSTEES

Robert M. Bass, Keystone, Inc., 201 Main Street, Fort Worth, TX 76102
Douglas Minge Brown, Talbot Financial Services, 6565 Americas Parkway, N.E., Suite 840, Albuquerque, NM 87110
John E. Bryson, Southern California Edison Co., 2244 Walnut Grove Avenue, Rosemead, CA 91770
Mariann Byerwalter, America First Financial Corp., 555 California Street, Suite 4490, San Francisco, CA 94104
Gerhard Casper, President, Stanford University, Building 10, Stanford, CA 94305-2060
Winston H. Chen, Paramitas Foundation, 3945 Freedom Circle, Suite 760, Santa Clara, CA 95054
Roger A. Clay, Jr., Goldfarb & Lipman, One Montgomery Street, Telesis Tower, 23rd Floor, San Francisco, CA 94104
Elizabeth Dumanian, 113 Mercy Street, Mountain View, CA 94041
Doris F. Fisher, GAP, Inc., 1 Harrison Street, San Francisco, CA 94105
Ivan Fong, Covington & Burling, 1201 Pennsylvania Avenue, N.W., P.O. Box 7566, Washington, D.C. 20044
Bradford M. Freeman, Freeman Spogli & Co., 11100 Santa Monica Blvd., Suite 1900, Los Angeles, CA 90025-3384
John Freidenrich, Bay Partners, 10600 De Anza Boulevard North, Suite 100, Cupertino, CA 95014
Ruth L. Halperin, 80 Reservoir Road, Atherton, CA 94027
David A. Hamburg, M.D., Carnegie Corp., 437 Madison Avenue, New York, NY 10022
Mernoy E. Harrison, California State University, Sacramento, 6000 J Street, Sacramento, CA 95819-6038
George H. Hume, Basic American, Inc., 600 Montgomery Street, 28th Floor, San Francisco, CA 94111
Chien Lee, 1401C Caroline Centre, 28 Yun Ping Road, Hong Kong
John M. Lillie, American President Companies, Ltd., 1111 Broadway, Oakland, CA 94607
John B. McCoy, Banc One Corp., 100 East Broad Street, Columbus, OH 43271-0261
Rebecca Q. Morgan, Joint Venture: Silicon Valley Network, 99 Almaden Boulevard, Suite 620, San Jose, CA 95113
Henry Muller, Time Inc., 1271 Avenue of the Americas, New York, NY 10020
Luis G. Nogales, Embarcadero Media, Inc., 1925 Century Park East, Suite 830, Los Angeles, CA 90067-1703
Charles J. Ogletree, Harvard Law School, 320 Holmes Field Building, Cambridge, MA 02138
Michael J. Pérez, Office of the United States Attorney, 880 Front Street, Room 6293, San Diego, CA 92101-3893
Gregor G. Peterson, P.O. Box 4450, 904 Lakeshore Boulevard, Incline Village, NV 89450
Charles M. Pigott, PACCAR Inc., P.O. Box 1518, Bellevue, WA 98009
Susan Westberg Prager, School of Law, University of California, Los Angeles, 405 Hilgard Avenue, Los Angeles, CA 90024-1476
Beverly P. Ryder, Southern California Edison, P.O. Box 800, Rosemead, CA 91770
Pamela A. Rymer, Court of Appeals, 125 South Grand Avenue, #600, Pasadena, CA 91105
Charles R. Schwab, Charles Schwab and Co., Inc., 101 Montgomery Street, 28th Floor, San Francisco, CA 94104-4122
Isaac Stein, Waverly Associates, 525 University Avenue, #415, Palo Alto, CA 94301
James R. Ukropina, O'Melveny & Myers, 400 South Hope Street, Suite 1060, Los Angeles, CA 90071
J. Fred Weintz, Jr., The Goldman Sachs Group, L. P., 85 Broad Street, New York, NY 10004

ADMINISTRATIVE ORGANIZATION

EXECUTIVE OFFICERS, 1995-96

President: Gerhard Casper
Provost: Condoleezza Rice
Vice President for Development: John B. Ford
Vice President for Faculty and Staff Services: Barbara S. Butterfield
Vice Provost and Dean of Student Affairs: Mary M. Edmonds
President and Chief Executive Officer, Stanford Health Services: Peter W. Van Etten
President and Chief Executive Officer, Lucile Salter Packard Children's Hospital at Stanford: Lorraine Zippiroli
General Counsel: Michael Roster
Director of Stanford Linear Accelerator Center: Burton Richter
Chief Executive Officer, Stanford Management Company: Laurance R. Hoagland
Dean of Graduate School of Business: A. Michael Spence
Dean of Continuing Studies Program: Marsh McCall
Dean of School of Earth Sciences: Franklin M. Orr, Jr.
Dean of School of Education: Richard J. Shavelson
Dean of School of Engineering: James F. Gibbons
Director of Hoover Institution: John Raisian
Dean of School of Humanities and Sciences: John B. Shoven
Dean of School of Law: Paul A. Brest
Dean of School of Medicine: Eugene A. Bauer
Dean of Research and Graduate Policy: Charles H. Krueger

ORGANIZATION

BOARD OF TRUSTEES

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

Membership—Board membership is set at 34, including the President of the University who serves ex officio and with vote. Trustees serve a five-year term and are eligible for appointment to one additional five-year term. At the conclusion of that term, a Trustee is not eligible for re-election until after a lapse of one year. Eight of the Trustees are elected or appointed in accordance with the Rules Governing the Election or Appointment of Alumni Nominated Trustees. Four must be 35 years of age or under and four older than 35 when elected. They serve a five-year term.

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

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

Meetings—The Board generally meets five times each year.

THE PRESIDENT

The Founding Grant prescribes that the Board of Trustees shall appoint the President of the University and that the Board shall give to the President the following powers:

To prescribe the duties of the professors and teachers.

To prescribe and enforce the course of study and the mode and manner of teaching.

Such other powers as will enable the President to control the educational part of the University to such an extent that the President may justly be held responsible for the course of study therein and for the good conduct and capacity of the professors and teachers.

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

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

UNIVERSITY COMMITTEES

University committees are appointed by and are primarily responsible to the President. Such committees deal with matters on which the responsibility for recommendation or action is clearly diffused among different constituencies of the University. In accordance with the Report on the Committee Structure of the University, Academic Council members are appointed to University committees upon nomination of the Senate Committee on Committees and student members on nomination of the Associated Students of Stanford University (ASSU) Committee on Nominations. The President takes the initiative in the appointment of staff members to such committees. Although immediately responsible to the President, University committees may be called upon to report to the Senate of the Academic Council or the ASSU Senate. Charges to such committees are set by the President on recommendation of the Committee on Committees and others. There are nine standing University committees, as follows:

Advisory Panel on Investment Responsibility (APIR)
Committee on Athletics, Physical Education, and Recreation (C-APER)
Committee on Faculty and Staff Benefits (C-FSB)
Committee on Health and Safety (C-HS)
Committee on Land and Building Development (C-LBD)
Committee on Libraries of the University (C-LU)
Editorial Board of the Stanford University Press (EB-SUP)
Panel on Outdoor Art

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

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

THE ACADEMIC COUNCIL
According to the Articles of Organization of the Faculty, originally adopted by the Board of Trustees in 1904 and revised in 1977, the powers and authority of the faculty are vested in the Academic Council consisting of: (1) the President of the University; (2) tenure-line faculty — Assistant, Associate, and Full Professor; (3) nontenure-line faculty — Associate and Full Professor followed by the parenthetical notation (Teaching), (Performance), (Applied Research), or (Clinical); (4) nontenure research faculty — Research Assistant Professor, Associate Professor (Research), Professor (Research); (5) Senior Fellows in specified policy centers and institutes; and (6) certain specified officers of academic administration.
In the Spring of 1968, the Academic Council approved the charter for a Senate to be composed of 55 representatives elected by the Hare System of Proportional Representation and, as ex officio nonvoting members, certain major officers of academic administration.
In the allocation of representation, each school constitutes a major constituency. The Senate may create from time to time other major constituencies as conditions warrant. Approximately one-half of the representatives are allocated to constituencies on the basis of the number of students registered in those constituencies and the remainder on the basis of the number of members of the Academic Council from each constituency.

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

ASSOCIATED STUDENTS
Two weeks after the University opened in 1891, the students met to form the Associated Students of Stanford University (ASSU). All registered students are members of the Association. They are governed by the ASSU Constitution and By-Laws, which was last revised and approved by student vote in May 1969 and ratified by the Board of Trustees in September 1969.

Executive — The four members of the Council of Presidents are the chief executives and representatives for the Association. They are governed by the ASSU Constitution and By-Laws, which was last revised and approved by student vote in May 1969 and ratified by the Board of Trustees in September 1969.

Legislative — The ASSU Senate is made up of forty elected representatives, twenty each from the undergraduate and graduate communities.
Only ten undergraduate and ten graduate senators may vote at any one time. The Senate elects its own chair and meets every other week to discuss and act on issues pertinent to student life at Stanford. The Senate has the ultimate authority to determine the budget of the Association and its agencies and their budgetary, financial, investment, business, and operating policies, and to establish rules ensuring that funds derived from fees levied upon the members of the Association are expended and accounted for properly.

Judicial — See “The Legislative and Judicial Charter” section of this bulletin.
ADMISSIONS

UNDERGRADUATE MATRICULATED STUDY

In order to preserve the residential character of the University and to maintain a favorable student-faculty ratio, Stanford has a limited undergraduate enrollment. The anticipated size of the freshman class is 1,600 students. Between 100 and 150 transfer students, entering either the sophomore or junior class, are also admitted each year. For both freshman and transfer admission, the University receives many more applications from qualified students than there are places available.

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

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

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

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

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

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

NONMATRICULATED STUDY

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

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

Post High School Nonmatriculated Students — Stanford admits nonmatriculated undergraduates, who have already earned a high school degree or equivalent, only under extraordinary circumstances. Such students are required to pay full tuition if admitted.

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

GRADUATE

MATRICULATED STUDY

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

The Coterminal Degree Program — This program permits matriculated Stanford undergraduates to study for bachelor's and master's degrees simultaneously in the same or different departments. Application procedures are established by each master's department. Applications must be submitted at least four quarters in advance of the expected master's degree conferred date. Stanford undergraduate students may apply as early as the eighth quarter (or upon completion of 105 units) but no later than the eleventh quarter of undergraduate study. Students who decide to apply for admission to master's programs after these deadlines are not eligible for the coterminal program and must apply through the regular graduate admission process.

APPLICATION PROCESS

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

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

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

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

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

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

Coterminal Master's Program — Interested Stanford undergraduate students should contact directly the department in which they wish to pursue a master's degree.

UNIVERSITY DIVISION

Under exceptional circumstances, students are accepted for matriculated graduate study without having obtained the bachelor's (or equivalent foreign) degree. These exceptional admissions are classified as "University Division" students. Applicants are considered for University Division admission if (1) a normal course of study has not been followed but high professional skills in the field of interest have been demonstrated; (2) the undergraduate record is exceptional and the applicant has obtained at least senior standing at an educational institution of recognized standing; or (3) the undergraduate record at a foreign institution is exceptional and is consid-
NOMATRICULATED STUDY

Graduates of colleges and universities of recognized standing who hold a U.S. bachelor's degree or its equivalent are eligible to apply for nonmatriculated graduate student status. This status is granted to students of demonstrated ability who are not seeking an advanced degree from Stanford University but who would benefit from course work at Stanford for a variety of reasons. A 3.0 or 'B' grade average in prior studies is required. Nonmatriculated admission is valid only for a given academic year or a part thereof. Students who wish to reenroll in a subsequent academic year must reapply. Nonmatriculated students receive academic credit for courses satisfactorily completed and may obtain an official transcript. They may use University facilities and services. In classes of limited enrollment, students in degree programs have priority. Nonmatriculated students may apply for housing but will have a low priority for assignment. No fellowships, assistantships, or Stanford loans are available for nonmatriculated students.

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

Application forms for nonmatriculated status during the regular academic year are available from Graduate Admissions, Registrar's Office, Old Union, Stanford, CA 94305-3005. The closing date for applications for nonmatriculated status is one month before the start of the quarter.

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

EXCHANGE PROGRAMS

The Exchange Scholar Program is open to doctoral students in the fields of humanities, social sciences, and sciences who have completed one full year of study at one of the participating institutions. These students may study at Stanford for a maximum of one academic year to take advantage of particular educational opportunities not available on the home campus. The participating institutions are Brown University, University of Chicago, Columbia University, Cornell University, Harvard University, Massachusetts Institute of Technology, Princeton University, University of Pennsylvania, and Yale University. Further information on the program may be obtained from the Graduate Degree Progress Office, Old Union, or from the graduate dean's office at participating institutions. Some institutions may place restrictions on specific departments.

Stanford also has separate exchange programs with the University of California, Berkeley and the University of California, San Francisco. Further information may be obtained at the Registrar's Information Windows in the Old Union.

POSTDOCTORAL SCHOLARS

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

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

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

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

VISAS FOR FOREIGN STUDENTS

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

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

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

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

Information on visas for graduate students may be obtained from Graduate Admissions, Registrar’s Office. Information on visas for postdoctoral scholars may be obtained from the Bechtel International Center.

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

FINANCIAL AID

UNDERGRADUATE

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

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

In awarding Stanford financial aid funds to meet need, that is, any difference between the educational expenses and the University-determined family resources, Stanford first offers “self-help,” which includes student loans and term-time job earnings eligibility. The University normally expects that during enrollment periods, students will work and borrow up to approximately 20 percent of the expenses. The self-help expectation may be lower for certain categories of students including those from very low-income families, those who are academically in the top five to ten percent of an entering class, and those who bring diversity to the Stanford student body. If the University-determined need is greater than the self-help expectation, Stanford awards scholarship or grant funds to meet the remaining need. Scholarships or grants from outside private sources may change the University’s financial aid award. The first $500 from private scholarship sources reduces the self-help (job and then the loan) component of the aid. If the student receives more than $500 in outside awards, Stanford will reduce its offer of scholarship or grant by half of the total amount beyond the first $500. The FAO will consider the remaining half of the total towards reducing the student’s self-help. If the total in outside awards reduces the self-help calculation to the minimum expectation ($3,160 for 1995-96), the University reduces its own scholarship or grant offer dollar for dollar and notifies the student that the minimum reduction in self-help has been reached.

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

APPLICATION AND AWARD NOTIFICATION PROCESS

FILING DEADLINES

Prospective freshmen after January 1 and before February 1, 1995

Prospective transfers after January 1 and before March 15, 1995
Returning students after January 1 and before March 31, 1995

APPLICANT DOCUMENTS

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

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

1. Free Application For Student Aid (FAFSA), which must be processed by a Multiple Data Entry (MDE) processor. California residents must also submit a GPA Verification Form or SAT scores to the California Student Aid Commission (CSAC) by March 2, 1995, for Cal Grant consideration.


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


5. Financial Aid Transcripts (FAT).

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

A complete application for U.S. citizens and permanent residents applying for Stafford loan consideration only include:

1. Free Application For Federal Student Aid (FAFSA), which must be processed by a Multiple Data Entry (MDE) processor

2. Stanford Supplemental Application

3. Financial Aid Transcripts (FAT)

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

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

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

NOTIFICATION DATES

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

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

PAYMENT AND FINANCING OPTIONS

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

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

ROTC SCHOLARSHIPS AND GRANTS

Funds are received from the Army, Navy, or Air Force in exchange for future service commitments. Stanford University does not accept for transfer credit any work done as part of the ROTC programs, except the University of California, Berkeley’s Department of Naval Architecture course XB10, Ship Systems, which is required of all Navy ROTC students. Students interested in ROTC should contact:

Department of the Air Force, San Jose State University, San Jose, CA 95192-0051; phone 408-924-2961 or 2960

Department of the Army, University of Santa Clara, Santa Clara, CA 95053; phone 408-554-4781 or 1-800-227-7682

Department of the Navy, University of California, Berkeley, CA 94720-0001; phone 510-642-3551

GRADUATE

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

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

**FELLOWSHIPS AND ASSISTANTSHIPS**

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

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

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

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

**POSTDOCTORAL FELLOWSHIPS**

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

**OUTSIDE FELLOWSHIPS**

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

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

**LOANS**

Graduate students who believe they will require loan assistance can apply for Federal Stafford Student Loan, Federal Perkins Loan, and University Loan programs. Inquiries for publications outlining loan program terms can be directed to Financial Aid Office, Old Union, Room 214, Stanford, CA 94305-3021; phone 415-723-3058. International students who are not permanent residents are not eligible for long-term loans.

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

1. A fully completed Free Application For Federal Student Aid (FAFSA)
2. Stanford Graduate Student Loan Supplemental Application
3. Student Aid Report (SAR); you receive your SAR as a result of filing the FAFSA
4. Financial Aid Transcripts from all previously attended colleges and universities, whether or not aid was received at those institutions

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

Debt Management—The University encourages wise debt management. Experienced advisers are available to help students plan for future repayment.
Loan Consolidation — The government currently offers a program that allows borrowers owing more than $7,500 in federal student loans to extend repayment up to 25 years and reduce the amount of monthly payments. A consolidated loan has an interest rate based on the weighted average of the loans being consolidated but at least nine percent and not more than 12 percent. Further information is available through the FAO.

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

COTERMINAL STUDENTS

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

HONORS COOPERATIVE PROGRAM

Under a graduate cooperative program in engineering and science, employees from over 130 companies in the San Francisco Bay area are released from work, with full compensation, to attend regular classes at Stanford. Most of these companies have joined a Stanford four-channel television network that enables students to observe live lectures with talk-back privileges in their own plants. For a list of participating companies, write to the Instructional Television Network, 401 Durand, Stanford University, Stanford, CA 94305.

VETERANS' BENEFITS

Liaison between the University, its students, and the various federal, state, and local agencies concerned with veterans' benefits is provided by the Office of the Registrar, Transcripts Window, Old Union. All students eligible to receive veterans' benefits while attending the University are urged to complete arrangements with the appropriate agency well in advance of registration.
The University reserves the right to change at any time, without prior notice, tuition, room fees, board fees, or other charges.

ASSESSMENTS

TUITION

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

<table>
<thead>
<tr>
<th></th>
<th>1995-96</th>
</tr>
</thead>
<tbody>
<tr>
<td>All departments and schools (except those below)</td>
<td>6,565</td>
</tr>
<tr>
<td>Graduate Division in Engineering</td>
<td>7,015</td>
</tr>
<tr>
<td>Graduate School of Business</td>
<td>7,405</td>
</tr>
<tr>
<td>School of Medicine (M.D. Program)</td>
<td>8,125</td>
</tr>
<tr>
<td>School of Law (payable Autumn and Spring Semesters)</td>
<td>11,175</td>
</tr>
<tr>
<td>J.D./M.B.A. Program (payable Autumn and Spring Semesters)</td>
<td>11,160</td>
</tr>
</tbody>
</table>

Regular tuition fees apply to the undergraduate Overseas Studies and Stanford in Washington Programs. For Summer Quarter tuition rates and policies, see the Stanford University bulletin, Summer '96.

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

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

UNDERGRADUATE STUDENTS

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

Permit to Attend (auditing) status can be granted on a one-time basis to those for whom it is academically appropriate. The Permit to Attend rate is $1,630 per quarter in 1995-96. Undergraduates in the terminal quarter who are completing Honors theses or making up Incompletes may petition for Permit to Attend for Services Only registration. That rate is $800 per quarter in 1995-96 and does not permit any course enrollment or auditing.

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

GRADUATE STUDENTS

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

The following reduced-tuition categories are available to matriculated graduate students in the final stages of their degree programs:

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

2. Terminal Graduate Registration (TGR): doctoral students who have been admitted to candidacy, completed all required courses and degree requirements other than the University oral exam and dissertation, accrued 10.5 quarters of residency, and submitted a Doctoral Dissertation Reading Committee form may request Terminal Graduate Registration status to complete their dissertations. Students pursuing Engineer degrees may apply for TGR status after admission to candidacy, completion of all required courses, and six quarters of residency. Students enrolled in master's programs may qualify for TGR status upon completion of all required courses and three quarters of residency only if their program requires a final master's writing project. TGR status may also be granted for one quarter only to any graduate student who is returning after a leave of absence or after reinstatement. Graduate students register for one final term to take a University Oral Examination, submit a thesis or dissertation, or file an Application to Graduate. Doctoral students applying for one-quarter TGR status must also meet the doctoral criteria above except that they need only nine quarters of residency. Requirements for one-quarter TGR for master's and Engineer students are as above, but master's students need not be in a program with a final writing project requirement to qualify.

Each quarter, all TGR students enroll in the 801 (for master's and Engineer students) or 802 (for doctoral students) course in their department for zero units, in the appropriate sec-
tion for their adviser. TGR students register at a special tuition rate, $800 in 1995-96. Within certain restrictions, TGR students may enroll in additional courses, at the appropriate unit rate.

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

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

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

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

Tuition exceptions are also available for students who are faculty spouses, regular Stanford employees, or full-time educators in the Bay Area. During Summer Quarter, most matriculated graduate students may register on the unit basis for 3 or more units. Students in schools and departments affiliated with the Honors Cooperative Program may not register below the 12-unit rate (9-unit minimum in Statistics only).

Nonmatriculated international students must register for at least 8 units.

INTERNATIONAL STUDENTS

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

FEES

APPLICATION FEE

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

ASSU FEE

The Associated Students of Stanford University (ASSU) fees are established by student vote in Spring Quarter. The 1995-96 ASSU fees are:

- Autumn, $35
- Winter, $31
- Spring, $36
- Summer, $5

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

DOCUMENT FEE

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

HEALTH INSURANCE FEE

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

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

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

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

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

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

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

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

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

HOUSING

Bulletins with further information on housing rates are Summer '96 for Summer Quarter; School of Law for Law School; Overseas Studies for Overseas Centers.

Campus housing rates are generally below local area market rents. The approximate room rates for the 1995-96 academic year are as follows:

<table>
<thead>
<tr>
<th>Residences</th>
<th>Room Rates*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate dormitories and University-operated houses</td>
<td>$1,198 1,097 1,068 3,363</td>
</tr>
<tr>
<td>Graduate dormitories</td>
<td>1,090 997 971 3,058</td>
</tr>
<tr>
<td>Self-operated houses</td>
<td>1,437 1,316 1,282 4,035</td>
</tr>
<tr>
<td>Co-ops and student-cleaned houses with professional cooks</td>
<td>1,282 1,174 1,143 3,599</td>
</tr>
<tr>
<td>Mirrieles (apartments)</td>
<td>1,353 1,239 1,207 3,799</td>
</tr>
<tr>
<td>Suites</td>
<td>1,338 1,226 1,194 3,758</td>
</tr>
<tr>
<td>Liliore Green Rains Houses (single graduate student apartments)</td>
<td>1,297 1,187 1,156 3,640</td>
</tr>
<tr>
<td>Escondido Village (single graduate student apartments)</td>
<td>2,280 2,088 2,032 6,400</td>
</tr>
</tbody>
</table>

* All rates are approximate and subject to minor changes.

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

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

MEAL PLANS*

Meal plan rates are as follows for the 1995-96 academic year:

<table>
<thead>
<tr>
<th>Meal Plans</th>
<th>Aut</th>
<th>Win</th>
<th>Spr</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-You-Can-Eat Plans: for residents of Branner, Lagunita, Moore, Roble, Stern, and Wilbur</td>
<td>19 meals/week</td>
<td>$1,316 1,204 1,172 3,692</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14 meals/week</td>
<td>$1,236 1,131 1,100 3,467</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plus Plan: for residents of Branner, Lagunita, Moore, Roble, Stern, and Wilbur</td>
<td>12 meals/week plus points</td>
<td>$1,316 1,204 1,172 3,692</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A La Carte Plans: for residents of Manzanita Park and Sterling Quadrangle</td>
<td>19 meals/week</td>
<td>$1,316 1,204 1,172 3,692</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14 meals/week</td>
<td>$1,236 1,131 1,100 3,467</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Kitchen Plans: for residents of American Studies and Yost</td>
<td>12 meals/week plus points</td>
<td>$1,316 1,204 1,172 3,692</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Cardinal Dollars" may be purchased by meal plan and non-meal plan holders who wish to supplement their meals. Minimum buy-in, $10.00;
the balance carries over until end of academic year. Cardinal Dollars are not refundable.

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

## PAYMENTS

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

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

### LATE PAYMENT

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

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

### DEFERMENT LOAN PROGRAM

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

1. **$20** Deferment Loan Application Fee.
2. An annual interest rate of 10 percent assessed on the Deferment Loan principal until the date payment is received or until the due date, whichever comes first, in accord with the following schedule:
   
<table>
<thead>
<tr>
<th>Quarter</th>
<th>Deferment Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autumn</td>
<td>November 10, 1995</td>
</tr>
<tr>
<td>Winter</td>
<td>February 22, 1996</td>
</tr>
<tr>
<td>Spring</td>
<td>May 16, 1996</td>
</tr>
<tr>
<td>Summer</td>
<td>July 24, 1996</td>
</tr>
</tbody>
</table>
3. Any portion of the amount of the loan may be prepaid before the due date without prepayment penalty.
4. Amounts remaining unpaid after the due date are delinquent and subject to a late charge of $25.00, and additional interest at the maximum rate permitted by the California Financial Code §28000 (or such lesser rate as the University may determine, in its sole discretion) from the due date until paid.

### DELINQUENT ACCOUNTS

Delinquent accounts to the University are reported to the Registrar’s Office, which places a “hold” on the student’s further registration and on the release of transcripts and diplomas until the past-due accounts have been paid. In addition, delinquent accounts may be reported to one or more national credit bureaus and/or commercial collection agencies.

### REFUNDS

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

**TUITION**

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

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

CANCELLATION OF REGISTRATION FOR CAUSE

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

LEAVE OF ABSENCE

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

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

REFUND SCHEDULE

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Within first two weeks of instruction (quarter or semester):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular (full-tuition) Basis</td>
<td>$1,425 1,515 1,735 1,590 1,690 1,690</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-10 Unit Basis</td>
<td>845 890 1,010 935 1,030 1,030</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-6 Unit Basis</td>
<td>515 540 600 560 655 655</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within third or fourth week of instruction (quarter or semester):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular (full-tuition) Basis</td>
<td>2,655 2,845 3,290 3,000 3,115 3,115</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-10 Unit Basis</td>
<td>1,505 1,605 1,840 1,685 1,790 1,790</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-6 Unit Basis</td>
<td>845 890 1,010 935 1,035 1,035</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Within fifth or sixth week of instruction (semester only):

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular (full-tuition) Basis</td>
<td>4,525 4,525</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-10 Unit Basis</td>
<td>2,545 2,545</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-6 Unit Basis</td>
<td>1,410 1,410</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Tuition refunds for students withdrawing from the Summer Quarter follow a different schedule. Students should consult the Summer '96 bulletin or the Registrar's Office for more details.

Students granted leaves of absence are shown in the University records as having registered for the term and as having taken a leave of absence. Undergraduates in good standing may enroll in the University for a subsequent quarter with the privileges of a returning student. Graduate students are subject to special registration requirements (see Leave of Absence in the "Graduate Degrees" section of this bulletin). Financial aid recipients should be aware that a proportion of any refund is returned to the various sources of aid. A leave of absence does not cancel a student's health insurance coverage for the current term.

INSTITUTIONAL INTERRUPTION OF INSTRUCTION

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

ROOM AND MEAL PLAN REFUNDS

Students assigned to a University residence are subject to the conditions of the University Residence Agreement. Under this agreement, single students and couples without children are required to live somewhere in the University resi-
Housing

University housing is available to registered Stanford students. Planning of educational programs, counseling and crisis intervention by residence deans, and administration of residence offices is coordinated by the Department of Residential Education and Graduate Residences. University housing assignments, maintenance, and dining services are provided by the Department of Housing and Dining Services. Information on housing assignments may be obtained from Housing Assignment Services, 110 Old Union, Stanford University, Stanford, CA 94305-3012 or telephone 415-725-2810.

ASSIGNMENT TO GRADUATE RESIDENCES

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

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

COMMUNITY HOUSING

Community Housing Services, maintains computerized listings of private rooms, houses, and apartments in surrounding communities that are available to students desiring to live off campus. Students must make rental arrangements directly with landlords. During early September, temporary accommodations are available in a student dormitory at a modest charge for students searching for off-campus housing for Autumn Quarter. Information and publications on community housing may be obtained from Community Housing Services, 110 Old Union, Stanford University, Stanford, CA 94305-3012 or telephone 415-723-3906.
UNDERGRADUATE DEGREES

Stanford awards degrees four times each year, after the conclusion of Autumn, Winter, and Spring Quarters. All diplomas, however, are prepared and awarded in the Spring.

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

Stanford University awards no honorary degrees.

DEGREES AND HONORS

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

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

1. Minimum of 180 units of University work.
2. The Writing, Distribution, and Language Requirements (see below).
3. Curricular requirements of at least one major department or program and the recommendation of the department(s). (Descriptions of curricular and special degree requirements are included in each department’s section of this bulletin.)
4. Minimum of 45 units (including the last 15) at Stanford. In special cases, students who have earned at least 135 units in resident work and who have completed the Writing, Distribution, and Language Requirements, as well as all major requirements, may petition for a waiver of the last 15 units-in-residence requirement.
5. Minimum of three quarters of study in residence.

Stanford confers the Bachelor of Science degree on candidates who fulfill these requirements in other schools or departments receive the Bachelor of Arts degree.

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

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

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

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

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

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

1. A minimum of 225 units of University work.
2. The Writing, Distribution, and Language Requirements.
3. The curricular requirements of two majors (one of which would ordinarily have led to a Bachelor of Arts degree and the other to a Bachelor of Science).
4. A minimum of 45 units (including the last 15) at Stanford. In special cases, as described above, students may petition for waiver of the last 15 units-in-residence requirement.
5. A minimum of three full-tuition quarters at Stanford after completion of 180 units, or of 15 full-tuition quarters of registration. Students must be registered at the regular full-tuition rate for the quarter to count as a full-tuition quarter. Up to six full-tuition quarters at another institution may be applied to the 15-quarter requirement, if the units have been accepted as transfer units on the Stanford transcript.
Advanced Placement units do not count in this calculation.

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

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

SECOND BACHELOR’S DEGREE

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

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

BACCALAUREATE HONORS

With Distinction — In recognition of high scholastic attainment, the University, upon recommendation of a major department or program, awards the Bachelor’s Degree with Distinction to approximately 20 percent of the graduating class.

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

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

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

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

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

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

COTERMINAL BACHELOR’S AND MASTER’S DEGREES

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

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

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

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

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 "Graduate Degrees" section of this bulletin. These policies include continuous registration or leave of absence for quarters not enrolled (rather than the stopping out procedure for undergraduates) and minimal progress guidelines.

In the first graduate quarter, a 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. The master's degree must be conferred simultaneously with, or after, the bachelor's degree.

DEGREE REQUIREMENTS

A LIBERAL EDUCATION

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

The undergraduate curriculum at Stanford allows considerable flexibility. It permits each student to plan an individual program of study that takes into account personal educational goals consistent with particular interests, prior experience, and future aims. All programs of study should achieve some balance between depth of knowledge acquired in specialization and breadth of knowledge acquired through exploration. Guidance as to the limits within which that balance ought to be struck is provided by the University's Distribution Requirements and by the requirements set for major fields of study.

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

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

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

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

Elective courses, which are not taken to satisfy requirements, play a special role in tailoring the student's program to individual needs. For most students, such courses form a large por-
tion 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 WRITING REQUIREMENT**

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

All candidates for the bachelor’s degree, 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 in English.

3. Special writing instruction in connection with the Program in Cultures, Ideas, and Values: the Structured Liberal Education (SLE) track; the English 7-8-9 track (Literature and the Arts); or special sections in the History 1-2-3 track (Europe: from Antiquity to the Present).

4. **Approved transfer credit**.

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

Courses available to fulfill the Writing Requirement are designated DR:W in this bulletin.

**THE DISTRIBUTION REQUIREMENTS**

**PURPOSE**

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

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

The Committee on Undergraduate Studies (CUS), under the authority of the Senate of the Academic Council, certifies courses nominated by departments that fulfill the Distribution Requirements in the required areas of study. Information regarding specific courses that satisfy the Distribution Requirements and regarding individual student distribution status is available at the Office of the Registrar. Course planning and advising questions related to the Distribution Requirements should be directed to the Undergraduate Advising Center.

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

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.

**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. One of those courses must also be certified as concentrating on Gender Studies.
The eight areas are numbered 2 through 9. They are listed below with their corresponding notational symbols as found in the departmental course descriptions:

Area 1: Cultures, Ideas, and Values (one three-course sequence) — DR:1
Area 2: World Cultures — DR:2
Area 3: American Cultures — DR:3
Area 4: Mathematical Sciences — DR:4
Area 5: Natural Sciences — DR:5
Area 6: Technology and Applied Sciences — DR:6
Area 7: Literature and the Fine Arts — DR:7
Area 8: Philosophical, Social, and Religious Thought — DR:8
Area 9: Social and Behavioral Sciences — DR:9

Courses fulfilling the Gender Studies requirement are designated with a dagger (for example, DR:3t).

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 DR for a given student.

For students who entered Stanford in Autumn Quarter 1991 and thereafter, courses that have been certified as satisfying the Distribution Requirements are identified by the symbols above. A comprehensive list of courses appears as an Appendix to this bulletin.

Transfer students who entered Stanford prior to Autumn Quarter 1993-94 may elect to complete either the Distribution Requirements that went into effect Autumn Quarter 1991-92 or the set of requirements in effect before Autumn Quarter 1991-92.

Note — Changes in the DRs for 1996-97 have been approved.

CREDIT TRANSFER

For students who propose to use work taken at another college or university to satisfy a Distribution Requirement, the Office of the Registrar's Credit Evaluation staff determines, after appropriate faculty consultation, whether the work is comparable to any of the specifically certified courses or course sequences.

PETITION

Students who have reason to believe their undergraduate program objectives are served by using some course or courses other than those specifically certified as satisfying the Distribution Requirements may present petitions, endorsed by their academic advisers, to the Undergraduate Degree Coordinator, room 131, Old Union.

UNDERGRADUATES WHO ENTERED PRIOR TO AUTUMN 1991

Stanford has a long tradition of ensuring curricular breadth through some system of requirements, variously described as "distribution requirements," "general studies requirements," or "general education requirements." A student returning to Stanford to complete an interrupted degree program may satisfy either the distribution program in place at the time of matriculation or the current program of requirements. Such a student should consult the Courses and Degrees bulletin appropriate to the original entrance year or seek the advice of the Registrar’s Undergraduate Degree Coordinator, room 131, Old Union. Students completing requirements in effect 1980 or later may find the Appendix to this bulletin helpful in providing them with a list of certified courses.

THE LANGUAGE REQUIREMENT

Undergraduates who entered Stanford in Autumn Quarter 1982-83 or thereafter are required to complete at least one year of college-level study in a foreign language. Students are required to take the equivalent of a year's study in a foreign language. Students may complete this requirement by taking a department exam, by scoring well on an SAT II: (Subject) or an AP test, or by completing the third quarter of a first-year language course at Stanford. The requirement may also be met if the Registrar's Transfer Evaluation Office determines that a student has completed one full year of college study in a foreign language.

CREDIT ADVANCED PLACEMENT

Stanford University allows up to 45 units of credit toward graduation for work completed in high school as part of the College Entrance Examination Board (CEEB) Advanced Placement curriculum. The awarding of such credit is based on CEEB Advanced Placement test scores and is subject to University and department approval.

The faculty of a given department determine whether any credit toward the 180-unit requirement can be based on achievement in the CEEB Advanced Placement Program in their discipline. Stanford departments electing to accept the Advanced Placement (AP) credit are bound by these University policies:

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

2. Whether credit is to be given for an AP score of 3 is a matter for departmental discretion; up to 10 units may be awarded.

3. No credit may be authorized for an AP score lower than 3.

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

<table>
<thead>
<tr>
<th>Test Subject</th>
<th>Score</th>
<th>Placement</th>
<th>Quarter Units of Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Government and Politics</td>
<td>4, 5</td>
<td>Political Sci. 1, 20 or above*</td>
<td>5</td>
</tr>
<tr>
<td>U.S. History</td>
<td>4, 5</td>
<td>Not applicable</td>
<td>10</td>
</tr>
<tr>
<td>Art History</td>
<td>4, 5</td>
<td>Not applicable</td>
<td>10</td>
</tr>
<tr>
<td>Art (Studio)</td>
<td>4, 5</td>
<td>Not applicable</td>
<td>10</td>
</tr>
<tr>
<td>Biology</td>
<td>4, 5</td>
<td>Bio. 31 or above</td>
<td>10</td>
</tr>
<tr>
<td>Chemistry</td>
<td>4, 5</td>
<td>Chem. 31 or above</td>
<td>4</td>
</tr>
<tr>
<td>Comparative</td>
<td>4, 5</td>
<td>Political Sci.</td>
<td>5</td>
</tr>
<tr>
<td>Government and Politics</td>
<td></td>
<td>1, 20 or above*</td>
<td>5</td>
</tr>
<tr>
<td>Computer</td>
<td>5</td>
<td>CS106X**</td>
<td>5</td>
</tr>
<tr>
<td>Science AB</td>
<td>4</td>
<td>CS106X</td>
<td>5</td>
</tr>
<tr>
<td>Computer</td>
<td>4, 5</td>
<td>CS106X</td>
<td>5</td>
</tr>
<tr>
<td>Science A</td>
<td>4, 5</td>
<td>CS106X</td>
<td>5</td>
</tr>
<tr>
<td>Macro/Micro</td>
<td>8</td>
<td>Econ. 51‡‡</td>
<td>5</td>
</tr>
<tr>
<td>Economics</td>
<td>4, 5</td>
<td>English 3</td>
<td>6</td>
</tr>
<tr>
<td>European History</td>
<td>4, 5</td>
<td>Not applicable</td>
<td>10</td>
</tr>
<tr>
<td>French</td>
<td>4, 5</td>
<td>Third year and above</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Take test for placement and possible units</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1, 2</td>
<td>Take placement test</td>
<td>10</td>
</tr>
<tr>
<td>German</td>
<td>4, 5</td>
<td>Take placement test</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Take placement test</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1, 2</td>
<td>Take placement test</td>
<td>6</td>
</tr>
<tr>
<td>Latin</td>
<td>4, 5</td>
<td>100 series</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>1, 2, 3</td>
<td>Consult Classics Dept.</td>
<td>10</td>
</tr>
<tr>
<td>Math. AB</td>
<td>5</td>
<td>Math. 43</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Math. 42</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1, 2, 3</td>
<td>Math. 19 or 41</td>
<td>10</td>
</tr>
<tr>
<td>Math. BC</td>
<td>4, 5</td>
<td>Math. 43</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Math. 42</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1, 2</td>
<td>Math. 19 or 41</td>
<td>10</td>
</tr>
<tr>
<td>Music</td>
<td>4, 5</td>
<td>Not Applicable</td>
<td>10</td>
</tr>
<tr>
<td>Physics B</td>
<td>4, 5</td>
<td>Based on AP Physics and Math. results</td>
<td>10</td>
</tr>
<tr>
<td>Physics C (2 parts)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mech. only</td>
<td>4, 5</td>
<td>Based on AP Physics and Math. results</td>
<td>5</td>
</tr>
<tr>
<td>E&amp;M only</td>
<td>4, 5</td>
<td>Based on AP Physics and Math. results</td>
<td>5</td>
</tr>
<tr>
<td>Both</td>
<td>4, 5</td>
<td>Based on AP Physics and Math. results</td>
<td>10</td>
</tr>
<tr>
<td>Psychology</td>
<td>4, 5</td>
<td>Psych. 2 or above</td>
<td>4</td>
</tr>
<tr>
<td>Spanish</td>
<td>4, 5</td>
<td>Spanish 13 or third-year courses</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Take placement test</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1, 2</td>
<td>Take placement test</td>
<td></td>
</tr>
</tbody>
</table>

** Students may skip Computer Science 106A,B and complete Computer Science 107, 109A, or 193U to receive an additional 5 quarter units.

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

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

ACTIVITY COURSES

An undergraduate entering Stanford in September 1986 or thereafter may apply a maximum of 12 units in activity courses (Physical Education or Music activity) to the 180 (225 if dual degrees are being pursued) 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.

Changes in the limit for activity courses and the grading used in those courses have been approved for 1996-97.

INTERNSHIOP GUIDELINES

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

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

1. Credit is officially allowed only after the student has been unconditionally admitted to Stanford.
2. Credit is allowed on the basis of an official transcript received by the Registrar at Stanford directly from the institution where the credit was earned.
3. Credit from another institution will be transferred for courses that are substantially equivalent to those offered at Stanford University on the undergraduate level. A maximum of 6 quarter units may represent courses that do not parallel specific courses at Stanford, subject to the approval of the credit evaluator.
4. The credit allowed at Stanford for one quarter's work elsewhere may not exceed the number of units that would have been permissible for one quarter if the work had been done at Stanford; for work done under a system other than the quarter system, the permissible maximum units are calculated at an appropriate ratio of equivalence.
5. Credit is allowed at Stanford for work graded 'A,' 'B,' 'C,' or 'Satisfactory' (a "Satisfactory" must be verified as equivalent to a 'C' or higher), but not for work graded 'D' or below.
6. No more than 90 quarter units of credit for work done elsewhere may be counted toward a bachelor's degree at Stanford.
7. Credit earned at a community college is transferable to Stanford under either, but not both, of the following sets of circumstances:
   a) The credit is part of the first 90 units on the student's college record.
   b) The student has already completed 90 quarter units of work at Stanford not counting any credit elsewhere, and the community college credit involved is not part of the last 15 quarter units required for the bachelor's degree at Stanford and does not exceed 15 quarter units.
8. Credit earned in extension and correspondence courses is transferable only if the university offering the courses allows that credit toward its own bachelor's degree. Such credit is limited to a maximum of 45 quarter units for extension courses, a maximum of 15 quarter units for correspondence study, and a maximum of 45 quarter units for the combination of extension and correspondence courses.
9. Credit earned in military training and service is not transferable to Stanford, except at the discretion of the Registrar.
10. Credit earned in nonaccredited institutions in the United States is not transferable to Stanford, except at the discretion of the Registrar.
11. Study in institutions outside the United States, when validated by examination results, tutorial reports, or other official evidence of satisfactory work, is credited toward a Stanford bachelor's degree at the discretion of the Registrar. All such study must be evaluated by the appropriate departments through Transfer Credit Evaluation, room 100, Old Union.

THE MAJOR

The primary purpose of the major is to encourage each student to explore a subject area in considerable depth. This in-depth study complements the breadth of study promoted by the 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

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

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

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

MULTIPLE MAJORS

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

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

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

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

SECONDARY MAJOR

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

LIMITS OF THE MAJOR

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

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

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

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

PROGRAM FOR INDIVIDUALLY DESIGNED MAJORS

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

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

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

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

THE PROPOSAL
Detailed written procedures and advice about the preparation of the proposal are available from the Undergraduate Advising Center (Sweet Hall, first floor; telephone 415-723-2426), where the Program Coordinator is available to discuss your proposal with you.

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

These specific requirements are in addition to the general guidelines discussed under “The Major” section of this bulletin.

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

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

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

Students are required to complete at least 9 units each quarter and at least 36 units in their most recent three quarters of Stanford enrollment. Transfer work completed at other institutions is not considered in this calculation. A student earning fewer than 9 units per quarter or fewer than 36 units in three quarters is placed on probation. Students on probation or provisional registration status are required to earn a minimum of 12 units per quarter, by the end of the end-quarter exami-
nation period for three consecutive quarters, to remain in good academic standing. A Stanford Summer Session Quarter counts toward the three consecutive quarter requirement if 11 or more units are completed.

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

Units are granted for courses completed with grades ‘A,’ ‘B,’ ‘C,’ ‘D,’ “Satisfactory” (‘CR’ or ‘S’), and ‘L.’ Courses graded ‘N’ are counted provisionally as units completed, provided the student enrolls in the continuing segment of that course the following quarter. When the course is completed, the student receives the units for which he or she enrolled. No units are granted for a course in which the student receives an ‘I’ or an ‘**’ until the course is completed satisfactorily and the final grade reported. (See “Grading Systems” above.) All academic quarters (except a Summer Quarter’s registration of 11 units or more) in which the student is registered at Stanford shall be counted as a quarter of enrollment for the purpose of academic standing unless the Subcommittee on Academic Standing, acting upon a petition for fewer than 12 units, stipulates otherwise.

PROBATION

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

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

PROVISIONAL REGISTRATION

A student who fails to complete a minimum of 12 units of new course work by the end of the final examination period in any quarter of registration while on probation, in general, shall be placed on provisional registration status. Also, a student may be suspended directly from probation. Provisional registration requires that a student submit a properly endorsed request to return to Stanford.

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

PETITIONING

Specific instructions for requesting provisional registration can be obtained from the Registrar’s Academic Standing Office, Old Union, room 100. The faculty Subcommittee on Academic Standing, or those designated by the subcommittee, shall act upon all requests concerning academic standing, including requests for provisional registration.

Students applying for financial aid and/or on-campus housing should be mindful of deadlines and procedures for those offices.

Any questions concerning academic standing or the petitioning process should be referred to the Academic Standing Office, Old Union, room 100.

SUSPENSION

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

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

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

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

Appeal of Suspension — Students who have been suspended, and who believe they have a compelling reason to appeal their suspension without a break in enrollment, are required to submit a petition for provisional registration. Petitions are due no later than the first week of the desired quarter of return unless otherwise noted in the letter of suspension.

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

NOTIFICATION

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

UNDERGRADUATE ACADEMIC ADVISING

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

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

Sophomores who are undecided about their majors continue to work with the advisers they had as freshmen, and to seek out their advisers’ guidance and approval code. Sophomores whose advisers are no longer advising use the advisers at the UAC until they declare a major. All undeclared transfer students are assigned an adviser by the UAC until they declare a major. By the time they achieve junior status, undergraduates must declare a major, at which time they are assigned to an adviser from the faculty of the major department or program. Sophomores, juniors, and seniors should continue to consult their advisers for planning of programs every quarter.

The UAC, located on the first floor of Sweet Hall, provides advising on course selection, choosing a major, and planning for an academic career; graduate school and funding for graduate study; sophomore and transfer advising; individually designed majors; and preparing for business, law, medical school, or other allied health fields. A collection of graduate and undergraduate catalogs from other institutions is available, as well as reference guides to graduate and professional schools. Special programs run by the UAC are the Howard University and Spelman College Exchange Programs and the Women’s Science and Engineering Network.
GRADUATE DEGREES

GENERAL REQUIREMENTS

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

See the “Graduate Programs” section of each department’s listing for specific department degree requirements. Opportunities for individually designed, interdisciplinary study at the doctoral level are described in the “Graduate Special Program” section of this bulletin. Information on professional school programs is available in the bulletins of the Graduate School of Business, the School of Law, and the School of Medicine.

REGISTRATION REQUIREMENTS

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

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

1. In each term during which any official department or university requirement is fulfilled, including qualifying exams or the University oral exam.
2. In any term at the end of which a University dissertation/thesis is submitted or at the end of which a graduate degree is conferred, unless the student was registered the prior term.
3. Normally, in any term in which the student receives financial support from the University.
4. In any term for which the student needs to use University facilities such as on-campus housing, libraries, Cowell Health Service, etc.).

5. For international students, in any term of the academic year for which they have non-immigrant status (for example, a J1 or F1 visa).

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

LEAVES OF ABSENCE

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

Leaves of absence are granted for a maximum of one calendar year. Leaves requested for a longer period are approved only in exceptional circumstances (for example, mandatory military service).

An extension of leave (a maximum of one year) for students in master’s programs or for doctoral students not yet admitted to candidacy, is approved only in unusual circumstances. Extension requests must be made before the expiration of the original leave of absence.

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

REINSTATEMENT

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

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

**RESIDENCY**

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

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

The fundamental reason for this requirement is educational; the minimum residency fixed for each program is the shortest period that students generally need to attain the level of expertise that a particular Stanford advanced degree signifies, by completing specified course work and other degree requirements, and by immersing themselves in the intellectual life of this University. The required minimum amount of academic work carried out at Stanford is defined in terms of quarters rather than units so as to encourage students not to overload themselves and rush through their program, but rather to do full justice to each course they take and in each to do the very best work of which they are capable.

The residency requirement also ensures that a reasonable proportion of the University’s expenses for providing the requisites of a high quality education are met from tuition income, particularly the expense of small classes and the need for state-of-the-art laboratory facilities and comprehensive library collections. These expenses remain constant even if, as sometimes happens, a student satisfies his or her other degree requirements before completing the residency requirement.

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

Residency is stated in terms of full-tuition quarters. Registration at the full-tuition rate (11 or more units during the academic year and 15 units during Summer Quarter) earns one quarter of residency. Residency for partial tuition quarters during the academic year accrues as follows:

- 3 units = .24
- 4 units = .31
- 5 units = .37
- 6 units = .43
- 7 units = .50
- 8 units = .56
- 9 units = .62
- 10 units = .68

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

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

**RESIDENCY CREDIT FOR GRADUATE WORK DONE ELSEWHERE**

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

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

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

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

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

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

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

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

### RESIDENCY AND MINIMUM UNITS REQUIREMENTS

<table>
<thead>
<tr>
<th>Degree</th>
<th>Min. # of Units</th>
<th>Min. # of Full-Tuition Qtrs. (Residency)</th>
<th>Max. Allowable Transfer Residency Credit (in qtrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.M./</td>
<td>36-45</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>M.S.</td>
<td>(see note 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.A.T.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.M. in Coterminial Program</td>
<td>36-45</td>
<td>see notes 2 and 3</td>
<td>0</td>
</tr>
<tr>
<td>A.M. plus A.M.</td>
<td>36-45 unduplicated units beyond A.M./ M.S.</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>A.M. plus A.M.</td>
<td>36-45 unduplicated units beyond first A.M./ M.S.</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>M.F.A.</td>
<td>48</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Engineer</td>
<td>36-45 unduplicated units beyond first A.M./ M.S.</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Engineer plus one A.M./ M.S. from Stanford</td>
<td>36-45 unduplicated units beyond first A.M./ M.S.</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Ed.S.</td>
<td>45 unduplicated units beyond (0 if A.M./ M.S. completed at Stanford)</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Ed.S. plus one Ph.D. from Stanford</td>
<td>45 unduplicated units beyond (0 if A.M./ M.S. completed at Stanford)</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>3 years of resident course work and research beyond A.B./B.S., including at least</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>D.M.A./ Ed.D.</td>
<td>72 units of course work and research done at Stanford</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>plus one Stanford A.M./ M.S.</td>
<td>72 units (36 unduplicated for each degree)</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>plus two Stanford A.M./ M.S.</td>
<td>108 units (36 unduplicated for each degree)</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>plus Engineer Engineer requirements plus 36 unduplicated units for the doctoral degree</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>plus Ph.D. Ph.D. requirement plus 9 Ph.D. units min.7 Ph.D. degree</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>plus M.B.A. GSB units 6 GSB qtrs.</td>
<td>9</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>plus one Ph.D. Ph.D. requirement plus 100 units including M.B.A.</td>
<td>9 min., 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>plus one Ph.D. Ph.D. requirement plus 100 units for each degree M.S. completed at Stanford</td>
<td>36 unduplicated units for each degree M.S. completed at Stanford</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>A.M./ M.S.*</td>
<td>36 unduplicated units beyond the first Ph.D.</td>
<td>12/15</td>
<td>13</td>
</tr>
<tr>
<td>plus one Ph.D. plus one A.M./ M.S.†</td>
<td>36 unduplicated units beyond the first Ph.D.</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>plus one Ph.D. A.M./ M.S.†</td>
<td>36 units plus min. 3 Med. School qtrs. + 6 Med. School qtrs.</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>plus Ph.D. Ph.D. requirement plus 36 units</td>
<td>13</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>plus one A.M./ M.S.</td>
<td>72 units of course work and research done at Stanford</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>plus two A.M./ M.S.</td>
<td>108 units (36 unduplicated for each degree)</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>plus M.D. M.D. requirement plus 100 units including M.B.A.</td>
<td>9 min., 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>plus M.D. M.D. requirement plus 100 units for each degree M.S. completed at Stanford</td>
<td>36 units plus min. 3 Med. School qtrs.</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>plus Ph.D. Ph.D. requirement plus 204 units including M.B.A.</td>
<td>9 min., 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>plus Ph.D. Ph.D. requirement plus 204 units for each degree M.S. completed at Stanford</td>
<td>36 units plus min. 3 Med. School qtrs.</td>
<td>13</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: 1. If transfer student, 3 qtrs. and 54 units (first year); 6 qtrs. and 108 units (second year)

**General Notes:**
- Ed.S. and Ed.D. are only applicable to students who have completed at least 3 years of resident coursework at Stanford.
- Ph.D. and Ed.D. require 3 years of research beyond A.B./B.S., including at least 36 units for Ph.D.
- M.D. requires 72 units of course work and research done at Stanford, plus one Stanford A.M./ M.S. or A.M./ M.S. from Stanford, plus Ph.D. or Ed.D.
- Ed.D. requires 3 years of research beyond A.B./B.S., including at least 36 units for Ph.D.

The above requirements are subject to change and students are advised to consult the current Graduate Bulletin for the most up-to-date information.
### GRADUATE DEGREES

<table>
<thead>
<tr>
<th>Degree Combination</th>
<th>Required Units Explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.D. plus J.D.</td>
<td>13 Med. plus 6 Law</td>
</tr>
<tr>
<td>J.D. plus M.L.S.</td>
<td>2 Med. plus 2 Law</td>
</tr>
<tr>
<td>M.L.S.</td>
<td>30 semester units or 45 qtr. units</td>
</tr>
<tr>
<td>J.S.M.</td>
<td>26 semester units or 4-6 semesters</td>
</tr>
<tr>
<td>J.S.D.</td>
<td>J.D. requirement plus 26 units</td>
</tr>
<tr>
<td>J.D.</td>
<td>68 additional law units beyond first semester</td>
</tr>
<tr>
<td>J.D. plus A.M./M.S.</td>
<td>J.D. requirement plus 6 semesters</td>
</tr>
<tr>
<td>J.D. plus two A.M./M.S.</td>
<td>J.D. requirement plus 6 Law School</td>
</tr>
<tr>
<td>J.D. plus M.B.A.</td>
<td>57 J.D. units plus 6 M.B.A.</td>
</tr>
<tr>
<td>M.B.A. plus J.D.</td>
<td>J.D. require-ment plus 4 M.D.</td>
</tr>
<tr>
<td>M.D. plus M.B.A.</td>
<td>100 units plus 6 Med. Staff</td>
</tr>
<tr>
<td>M.D. plus A.M.</td>
<td>M.B.A. requirement plus 6 Med.</td>
</tr>
</tbody>
</table>

### Notes

1. The specific unit requirement for each master's degree program is determined by the department. The University minimum requirement is 36 unduplicated units; department requirements may be higher.

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

3. Coterminal students earning their master's degree in the School of Engineering must pay for a minimum of three full-tuition quarters at Stanford for each additional unit beyond the 180-unit milestone.
the tuition rate for graduate Engineering students to meet the residency requirement.

**UNIVERSITY MINIMUM UNITS REQUIREMENT**

Each Stanford graduate degree or combination of degrees is subject to a requirement specifying the minimum number of units that must be earned at Stanford. The minimum units requirement for most degrees and degree combinations is listed in the chart above.

The minimum units requirement measures the units completed by the student, without regard for whether the units were earned in courses required for the degree and/or in courses that are not part of the department’s course requirements. Study at another institution never counts towards the minimum units requirement, unless the courses were taken through Stanford's Exchange Scholar Program or formal exchange program with U.C.-Berkeley or U.C. San Francisco.

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

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

**MINIMAL PROGRESS REQUIREMENTS**

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

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

Department guidelines that set higher standards take precedence over the University policy.

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

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

**GUIDELINES FOR DISMISSAL OF GRADUATE STUDENTS FOR ACADEMIC REASONS**

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

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

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

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

ADDITIONAL SPECIFICS FOR DEGREES WITH CANDIDACY

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

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

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

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

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

CONFERRAL OF DEGREES

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

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

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

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

CHANGES OF DEGREE PROGRAMS

Graduate students are admitted to Stanford for a specific degree program. Students who have attended Stanford for at least one term and who
are currently enrolled or on an approved leave of absence may submit a Graduate Program Authorization Petition to make one of the following changes: (1) change to a new degree program in the same department; (2) change to a new degree program in a different department; (3) add a new degree program in the same or a different department to be pursued with the existing program.

It is important that the attempt to add or change degree programs be made while enrolled. Otherwise, a new Application for Graduate Admission must be submitted and an application fee paid. The Graduate Program Authorization Petition is submitted directly to the department in which admission is requested. If applying for a higher degree program, students may also be required to submit other application materials such as G.R.E. Subject Test scores, a statement of purpose, or new letters of recommendation.

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

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

**DEGREE-SPECIFIC REQUIREMENTS**

**MASTER OF ARTS AND MASTER OF SCIENCE**

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

**MASTER’S PROGRAM PROPOSAL**

Each student pursuing an A.M., M.F.A., M.A.T., or M.S. is required to submit an acceptable program proposal to his or her department during the first quarter of enrollment. Coterminal students must submit the proposal during the first quarter after their completion of 180 units. The program proposal establishes a student’s individual program of study to meet University and department degree requirements. The student must amend the proposal formally by filing an Academic Program Revision form if his or her plans for meeting degree requirements change.

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

**TIME LIMIT FOR COMPLETION OF THE MASTER’S DEGREE**

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

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

**MASTER OF BUSINESS ADMINISTRATION**

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

**MASTER OF ARTS IN TEACHING**

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

**MASTER OF FINE ARTS**

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

**ENGINEER**

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

**CANDIDACY**

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

**THESIS**

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

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

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

**EDUCATIONAL SPECIALIST**

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

**MASTER OF LEGAL STUDIES**

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

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

**DOCTOR OF JURISPRUDENCE**

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

**DOCTOR OF MUSICAL ARTS**

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

**DOCTOR OF EDUCATION**

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

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

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

DOCTOR OF THE SCIENCE OF LAW

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

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

DOCTOR OF MEDICINE

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

DOCTOR OF PHILOSOPHY

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

CANDIDACY

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

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

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

TIME LIMIT FOR COMPLETION OF A DEGREE WITH CANDIDACY

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

TEACHING REQUIREMENTS

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

UNIVERSITY ORAL EXAMINATION

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

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

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

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

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

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

**DISSERTATION**

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

Dissertations must be in English. Approval for writing the dissertation in another language is normally granted only for cases in which that language is the "language of the discipline" in the United States. Such approval is routinely granted for dissertations in the Division of Literatures, Cultures, and Languages, in accordance with the policy of the individual department. Dissertations written in another language must include an extended summary in English.

Directions for preparation of the dissertation and abstract are available from the Graduate Degree Progress Office in the Old Union. Four copies (three in some departments) of the signed dissertation and an abstract of less than 350 words must be submitted to the Graduate Degree Progress Office 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, one goes to the major department, and the 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 the microfilming and binding of the dissertation copies, and for publishing the abstract.

Registration is required for the term, or the immediately preceding term, in which the dissertation is submitted. The period between the last day of final exams of one term and the first day of the subsequent term is considered an extension of the earlier term. Students submitting a dissertation during this period would meet the registration requirement but would be eligible for degree conferral only in the subsequent term. At the time of submission, candidacy must be valid, all department requirements for the degree completed, and an Application to Graduate filed.
The Doctoral Dissertation Reading Committee consists of the principal dissertation adviser and two other readers. At least one member must be from the student's major department. Normally, all members are on the Stanford Academic Council, and the principal adviser must be on the Academic Council. The student's department chair may, in some cases, approve the appointment of a reader who is not on the Academic Council, if that person is particularly well-qualified to consult on the dissertation topic and holds a Ph.D. or equivalent foreign degree.

Former Stanford Academic Council members and emeritus professors may serve on a reading committee. If they are to serve as the principal dissertation adviser, however, the appointment of a co-adviser who is currently on the Academic Council is required in order to ensure department representation for the student. Non-Academic Council members may not serve as sole principal adviser, but may serve as co-advisers with a member of the Academic Council.

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

Ph.D. MINOR

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

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

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

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

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

EXCHANGE PROGRAMS, ADVISING, AND CREDENTIALS

EXCHANGE PROGRAMS

The Exchange Scholar Program is open to doctoral students in the fields of humanities, social sciences, and sciences who have completed one full year of study. These students may study at one of the participating institutions for a maximum of one academic year to take advantage of particular educational opportunities not available on the home campus. The participating institutions are Brown University, University of Chicago, Columbia University, Cornell University, Harvard University, Massachusetts Institute of Technology, Princeton University, and Yale University. Further information on the program may be obtained from the Graduate Degree Progress Office, Old Union.

Stanford also has exchange programs for matriculated graduate students with the University of California, Berkeley and the University of California, San Francisco. These programs allow students in all departments to take courses not offered at Stanford. Further information may be obtained at the Registrar's Information Windows in the Old Union.

ADVISING

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

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

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

PUBLIC SCHOOL CREDENTIALS

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

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

COMPLIANCE WITH UNIVERSITY REGULATIONS

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

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

THE UNIVERSITY YEAR

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

ACADEMIC INSTRUCTIONAL USE OF VERTEBRATE ANIMALS

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

INFORMATION TO STUDENTS

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

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

PROCEDURES FOR USE OF ANIMALS

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

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

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

REGISTRATION AND RECORDS

REGISTRATION AND STUDY LISTS

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

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

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

For full registration procedures, see the quarterly Time Schedule.

STUDY LIST CHANGES

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

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

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

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

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

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

REPEATED COURSES

Students may not enroll in courses for credit for which they received either Advanced Placement or transfer credit.

Some Stanford courses may be repeated for credit; they are specially noted in this bulletin. Most courses may not be repeated for credit. Under the general University grading system, when a course which may not be repeated for credit is retaken by a student, the following special rules apply:

1. A student may retake once any course on his or her transcript (regardless of grade or notation earned), or from which she or he withdrew, and have the original grade or notation replaced by the notation ‘RP’ (repeated course). When retaking a course, the student must enroll in it for the same number of units originally taken. Upon completion of the retake, units for the first occurrence are automatically lowered to zero, the grade is changed to an ‘RP,’ and the second occurrence is flagged on the student’s transcript to indicate that it is a repeated course.

2. The student may not retake the same course again (for a third time), unless he or she received a ‘NC’ (No Credit) or ‘NP’ (Not Passed) when it was taken the second time. Upon completion of the third attempt, the units for the second time are automatically lowered to zero. The third attempt appears on the transcript with its units, grade, and the special flag to indicate that it is a repeated course.

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

AMOUNT OF WORK

The normal amount of work for undergraduate students is 15 units per quarter; 180 units are required for graduation. Registration for fewer than 12 units is rarely permitted. The maximum is 18 units. Although 20 units are routinely approved, that number may be exceeded only for compelling reasons. A past superior academic performance is not considered to be sufficient justification for exceeding this number. Petitions for excess programs must be signed by the student’s adviser and submitted to the Office of Academic Standing.

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

During the eight-week Summer Quarter, 16 units is the maximum for all students. For details, see the Stanford University bulletin, Summer ’96.

UNIT OF CREDIT

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

**AUDITING**

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

Only under unusual circumstances and within certain conditions are persons not registered at Stanford permitted to audit courses; permission may be granted by the Registrar’s Office and payment of the Permit to Attend tuition of $1,630 per quarter is required.

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

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

A member of the University staff may audit lecture courses with a letter from his or her department head certifying that the auditing will improve the employee’s effectiveness and that time off will be approved if needed. Spouses of University faculty and staff may audit lecture courses. In both of the above cases, a courtesy card should be obtained from the Registrar’s Office. In all cases of auditing, the instructor’s consent is required.

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

Auditors are not permitted in courses that involve direct participation such as language or laboratory science courses, art courses with studio work, or other types of individualized instruction.

Auditors are expected to be observers rather than active participants in the courses they attend, unless the instructors request attendance on a different basis.

Stanford does not confer credit for auditing, nor is a permanent record kept of courses audited.

**WITHDRAWAL FOLLOWING REGISTRATION**

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

**IDENTIFICATION CARDS**

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

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

**PERSONAL IDENTIFICATION NUMBERS**

Students eligible to use on line services such as Axess obtain a PIN through the Registrar’s Office. The PIN, in combination with the assigned University identification number, uniquely identifies the student and serves in place of a signature on electronic forms. PINS must remain confidential. It is a violation of University policy to misrepresent yourself in any way. Use of another’s PIN can result in loss of student privileges or other disciplinary action.

**RECORDS TRANSCRIPTS**

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

**CERTIFICATION OF ENROLLMENT OR DEGREES**

Requests for official verification of enrollment or degrees should be addressed to the Registrar’s Office. Verbal confirmation of registration or degrees earned can often be made at the time of the phone inquiry. Requests for written certification of enrollment should be submitted by the student to the Registrar’s Office.
Degrees are conferred quarterly, but diplomas are issued and Commencement exercises are held only in June. After conferral, the degree awarded to a student can be verified by contacting the Registrar’s Office for an official transcript, a certification form, or a verbal confirmation via telephone. Requests for transcripts must be made by the student in writing or through Axess.

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

All undergraduate students validly registered at Stanford are considered to be in good standing for the purposes of enrollment certification. Only information classified by the University as directory information can be confirmed by inquirers other than the student.

PRIVACY

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

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

It is Stanford’s policy that, apart from “directory information,” no one, except individuals with a legitimate educational interest or “need-to-know” and acting on behalf of the University, is authorized to obtain personally identifiable information from a student record without written consent of the student. The only exceptions would be in response to legal compulsion by subpoena.

The University considers an individual to have a legitimate educational interest in student records when access is necessary or useful to him or her in carrying out duties and responsibilities involving the students.

Each student has the opportunity to request the University to hold private information that otherwise would be regarded as “directory information.” Requests or modifications to Privacy Requests should be made by using the on-line Axess system, as soon as privacy is desired. Once filed, the request remains in effect until it is modified or revoked. No other information (for example, specific courses of study) is available except upon release by the student or in response to subpoena.

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

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

EXAMINATIONS

MIDTERMS

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

DEAD WEEK POLICY STATEMENT

Dead Week is a period of reduced social and extracurricular activity preceding final examinations. Its purpose is to permit students to concentrate on academic work and to prepare for final examinations.

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

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

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

Major papers or projects about which the student has had reasonable notice may be called due in Dead Week.

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

End-quarter examinations may not be held during Dead Week. This policy preserves the instruction time for courses and protects students’ opportunities for extensive review and synthesis of their courses.

During Dead Week, no musical, dramatic, or athletic events involving compulsory student participation may be scheduled, unless approved as exceptions by the Committee on Academic Appraisal and Achievement, nor may routine committee meetings be scheduled (such as those of the ASSU, the Senate of the Academic Council, or the committees of the President of the University) when such meetings normally would involve student participation.

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

END-QUARTER EXAMINATIONS

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

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

When the final examination is an in-class examination, the following regulations apply:
1. A three-hour period is reserved during examination week for the final examination in each course of more than 2 units. This examination period must be available for students, but not necessarily in its entirety, if an in-class examination is given. In courses with extraordinary meeting times, such that ambiguity might exist as regards the period reserved for the final examination, the schedule should be clarified and students informed no later than the end of the second week of the quarter.
2. Examinations in 1- or 2-unit courses must be completed by the end of the last class meeting before Dead Week, except in Summer Quarter when examinations must be completed during the last regularly scheduled class session.

When the final examination or its appropriate substitute is not an in-class examination (for example, when an instructor chooses to employ a take-home examination, paper, or project in lieu of an in-class examination), the following regulations apply:
1. The schedule and format of the final examination or its appropriate substitute shall be made known not later that the end of the second week of the quarter and, if changed subsequently, may be only an option of the plan originally announced by the instructor.
2. Although the instructor may ask students to return take-home examinations early in the final examination period, the instructor may not call them due until the end of the regularly scheduled examination time for that course.

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

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

STATEMENT CONCERNING EARLY EXAMINATIONS

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

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

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

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

GRADING SYSTEMS

GENERAL UNIVERSITY

The general University grading system is applicable to all schools of Stanford University except the Graduate School of Business, the School of Law, and M.D. students in the School of Medicine. Note that the GPA (grade point average) and rank in class are not computed under the general University grading system and are not available.

DEFINITION AND EXPLANATION

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

A Excellent
B Good
C Satisfactory
D Minimal pass
Plus (+) and minus (-) may be used as modifiers with the above letter grades.
NP Not Passed
NC No Credit (unsatisfactory performance, D+ or below equivalent, in a class taken on a satisfactory/no credit basis)
CR Credit (student-elected satisfactory; A, B, or C equivalent)
S No-option/Satisfactory; A, B, or C equivalent
L Pass, letter grade to be reported
W Withdraw
N Continuing course
I Incomplete
RP Repeated Course
* No grade reported
NC The notation 'NC' represents unsatisfactory performance in courses taken on a Satisfactory/No Credit basis. Performance is equivalent to letter grade D+ or below.
NP The notation 'NP' is used by instructors in courses taken for a letter grade that are not passed.
CR In a course for which some students will receive letter grades, the 'CR' represents performance that is satisfactory or better when the student has elected the 'CR' grading option. This option is available in any course, subject to the consent of the instructor and department and to the student's observance of the time limit for electing or dropping the option (the end of the sixth week of the quarter).
S For a course in which the instructor elects to grade students only on a Satisfactory/No Credit basis, the 'S' represents performance
that is satisfactory or better. For such a course, no letter grades may be assigned for satisfactorily completed work.

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

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

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

N The 'N' indicates that the student's course has not yet reached completion. Continuation courses need not continue at the same number of units, but the grade for all quarters of such a course must be the same.

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

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

In a course taken 1994-95 or later, 'I' grades must be changed to a permanent notation or grade within one year (that is, prior to the first day of the fifth quarter which follows the course, including Summer). If the 'I' remains uncleared at that time, it is changed automatically by the Registrar's Office to an 'NP' or 'NC' as appropriate for the grading option selected. Courses taken after 1993-94 in which 'I' grades are awarded may not be dropped.

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

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

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

GENERAL

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

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

REPORTING OF GRADES

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

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

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

REVISION OF END-QUARTER GRADES

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

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

In the event that a student disputes an end-quarter grade, the established grievance procedure should be followed (see the "Guidelines for Student Academic Grievance Procedures" section of this bulletin).

**GRADUATE SCHOOL OF BUSINESS**

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

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

**SCHOOL OF LAW**

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

- A+ 4.3
- A 4.0
- A- 3.7
- B+ 3.3
- B 3.0
- B- 2.7
- C+ 2.3
- C 2.0
- C- 1.7
- D+ 1.3
- D 1.0
- F 0.0

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

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

**SCHOOL OF MEDICINE**

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

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

A "Fail" grade can be cleared by repeating and passing the particular course or by other arrangement prescribed by the department or teaching group. An “Incomplete” grade can be made up in a manner specified by the department or teaching group within a reasonable time; if the deficiency is not made up within the agreed-upon time, the "Incomplete" grade becomes a "Fail" grade. The opportunity to clear a “Fail” grade or an “Incomplete” grade cannot be extended to individuals who are not registered or eligible to register as students in the M.D. program.
A department committee may vote to dismiss a student who is clearly not making academic progress before review for admission to candidacy. The committee should meet with the student to discuss his or her academic performance and how to correct deficiencies before considering dismissal.

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

GUIDELINES FOR STUDENT ACADEMIC GRIEVANCE PROCEDURES

Any undergraduate or graduate Stanford student who believes that he or she has been treated improperly on an academic matter is entitled to an independent review of the alleged offense, followed by corrective action if appropriate.

Grievance procedures apply only in those cases involving a perceived academic impropriety arising from an action taken by (1) an individual instructor, (2) a school or department, (3) a committee charged to administer academic policies of a particular school or department, or (4) a Senate committee or subcommittee charged to administer academic policies of the Senate of the Academic Council. They do not pertain to complaints expressing dissatisfaction with a University policy of general application to all students, nor do they pertain to individual school or department academic policies as long as those policies are consistent with general University policy.

Students should be aware that the University Ombudsperson's Office is available to all members of the Stanford community to discuss and advise on any troublesome matter of University concern and frequently helps expedite resolution of such matters. Although it has no decision-making authority, the Ombudsperson's Office has wide powers of inquiry, including investigating student complaints against instructors.

Students also should be aware that in certain cases, the Stanford Judicial Council procedures may be more appropriate than grievance procedures. The Legislative and Judicial Charter Article II.A.2(b) stipulates that a student may file a complaint with the Stanford Judicial Council alleging that a faculty member has taken unilateral disciplinary action against that student without adjudication under the judicial system. A student using this method would have the burden of proving beyond a reasonable doubt that the faculty member did in fact take unilateral disciplinary action against the complainant.

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

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

The grievance procedures are as follows:

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

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

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

The grievance officer (that is, the cognizant dean or his or her designee) shall promptly initiate an independent investigation and prepare a report; this shall normally be completed within thirty days.
In undertaking the investigation, the grievance officer may request a written response to the issues raised in the grievance from any individuals believed to have information the investigator considers relevant, including faculty, staff, and students. Both parties to the grievance are given an opportunity to comment in writing on the responses.

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

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

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

3. If the grievant or the party against whom the grievance was lodged disagrees with the recommendations of the grievance officer at the decanal level, either on substantive or on procedural grounds, he or she may appeal in writing to the Provost.

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

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

4. The student or party against whom the grievance was lodged may write to the President of the University giving reasons why he or she believes the grievance result to be wrong. No more than thirty days should elapse between receipt of the appeal recommendations and the written statement to the President urging further appeal. In any case, the President may agree or decline to entertain this further appeal.
COURSES OF INSTRUCTION

1995-96

Unless otherwise specified, courses numbered from 1 through 99 are primarily for first- and second-year undergraduates; courses numbered from 100 through 199 are for third- and fourth-year undergraduates; and those from 200 through 499 are for graduate students.

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

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

Amendments to course offerings announced in the Stanford Bulletin 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 '96, issued in January.
The Graduate School of Business provides graduate education for careers in management, research, and teaching.

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

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

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

For detailed information on programs, curricula, and faculty, write to the Graduate School of Business, Stanford University, Stanford, California 94305-5015 for the current bulletin.
The School of Earth Sciences includes the Departments of Geological and Environmental Sciences, Geophysics, and Petroleum Engineering. Global and other environmental studies, including policy analysis, are offered through the interschool curriculum in Earth Systems. An honors program in Environmental Science, Technology, and Policy is also available through the Institute for International Studies.

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

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

UNDERGRADUATE PROGRAM

There are no special examinations or prerequisite course requirements for admission to the School of Earth Sciences. Any undergraduate student admitted to the University may declare a major in one of the Earth Science departments or the interschool Earth Systems Program by contacting the appropriate department office or Earth Systems advisers. The student is assigned to an academic adviser who is prepared to discuss career opportunities, courses in the earth sciences, and a program of study. Objectives in advising are (1) to help the student define a career goal, and (2) as the latter emerges, to help the student identify courses that will facilitate entry into the chosen career.

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

COTERMINAL BACHELOR'S AND MASTER'S DEGREES

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

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

GRADUATE PROGRAM

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

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

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

---

**EARTH SYSTEMS PROGRAM**

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

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

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

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

**UNDERGRADUATE PROGRAMS**

**BACHELOR OF SCIENCE**

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

**REQUIRED CORE COURSES**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESys 10. Introduction to Earth Systems</td>
<td>W</td>
<td>3</td>
</tr>
<tr>
<td>or Civ. Engr. 170. Introduction to Environmental Science and Technology</td>
<td>A</td>
<td>3</td>
</tr>
<tr>
<td>ESys 110. Geosphere</td>
<td>A</td>
<td>3</td>
</tr>
<tr>
<td>ESys 111. Biosphere</td>
<td>W</td>
<td>3</td>
</tr>
<tr>
<td>ESys 112. Anthrosphere</td>
<td>S</td>
<td>5</td>
</tr>
<tr>
<td>ESys 210. Senior Seminar</td>
<td>A,S</td>
<td>3</td>
</tr>
<tr>
<td>ESys 260. Internship</td>
<td>A,W,S</td>
<td>9</td>
</tr>
<tr>
<td>or ESys 250. Directed Research</td>
<td>A,S</td>
<td>9</td>
</tr>
</tbody>
</table>
REQUIRED COGNATE COURSES

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

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

Geological and Environmental Sciences:
- Geol. & Envir. Sci. 1. Planet Earth A,W,S 4
  or Geol. & Envir. Sci. 2. Earth History A 3

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

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

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

* Math. 43 is recommended for all tracks and required for majors in the environmental technology track.
† Students may take either Physics 55 or Chem. 33; Biosphere students must take Chem. 33.

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

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

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

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

TRACKS

GEOSPHERE
- Geol. & Envir. Sci. 80. Earth Materials A 5
- Geol. & Envir. Sci. 90. Introduction to Geophysics A 3
- Geol. & Envir. Sci. 111. Structural and Engineering Geology A 3
- Geol. & Envir. Sci. 150. The Oceans: An Introduction to the Marine Environment S 3

BIOSPHERE
- Geol. & Envir. Sci. 170. Environmental Geochemistry W 4
  or Geophys. 190. General Geophysics A 4

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

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

ENIRONMENTAL TECHNOLOGY
- Civ. Engr. 106. Water Resources W 4
- Engr. 20. Introduction to Chemical Engineering S 3

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

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

UPPER-DIVISION ELECTIVES

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

GEOSPHERE TRACK
- Geol. & Envir. Sci. 5. The Earth’s Nonrenewable Resources W 3
- Geol. & Envir. Sci. 8. Management of Geologic Hazards 3
or Sci., Tech. & Soc. 169, Development and Technology in Third World A 4

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

SUMMARY OF COURSE REQUIREMENTS AND UNITS

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth Systems Introduction and Core</td>
<td>16</td>
</tr>
<tr>
<td>Required Allied Courses</td>
<td>42-45</td>
</tr>
<tr>
<td>Tracks:</td>
<td></td>
</tr>
<tr>
<td>Geosphere</td>
<td>18</td>
</tr>
<tr>
<td>Biosphere</td>
<td>15-24</td>
</tr>
<tr>
<td>Anthrosphere</td>
<td>24-25</td>
</tr>
<tr>
<td>Land Systems Management</td>
<td>23</td>
</tr>
<tr>
<td>Environmental Technology</td>
<td>22-33</td>
</tr>
<tr>
<td>Upper-Division Electives</td>
<td>9-15</td>
</tr>
<tr>
<td>Senior Project or Internship</td>
<td>9</td>
</tr>
<tr>
<td>Senior Seminar</td>
<td>2</td>
</tr>
<tr>
<td>Total units (depending on track, electives)....</td>
<td>93-114</td>
</tr>
</tbody>
</table>

COTERMINAL B.S. AND M.S. DEGREES

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

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

Four levels of requirements must be fulfilled to receive an M.S. degree:

1. All requirements for the B.S. degree.
2. An enhanced set of cognate courses or equivalent.
3. Further coursework (and/or thesis research), all of which should be at the 100-level or above, including 18 units at the 200-level or above, leading to further focus within the student’s track.

4. Participation in the master’s seminar.

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

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

**Course No. and Subject Units**

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

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

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

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

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

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

**Geochemical Cycling:**
- Geol. & Envir. Sci. 90. Introduction to Geochemistry 4
- or Geol. & Envir. Sci. 150. The Oceans: An Introduction to the Marine Environment 3

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

The program should be developed prior to application to the master’s program and is part of the application to the Earth Systems committee. Nine units may be in the form of research, culminating in the preparation of a master’s thesis. A thesis is not required for the degree. Master’s students must take part in the Winter Quarter master’s seminar (ESys 290) and have additional responsibilities appropriate to the master’s level (thesis presentation, modeling problems, and so on), 2 units.

**TRACKS**

**GEOSPHERE**

**Course No. and Subject Qtr. and Units**

**Required Courses:**
- Geol. & Envir. Sci. 90. Introduction to Geochemistry A 3
- Geol. & Envir. Sci. 150. The Oceans: An Introduction to the Marine Environment W 3
- Geol. & Envir. Sci. 151. Sedimentary Geology and Petrography: Depositional Systems W 4
- Geol. & Envir. Sci. 170. Environmental Geochemistry A 4
- or Geol. & Envir. Sci. 230. Hydrogeology A 5
- or Civ. Engr. 261. Hydrology A 3

**Other Recommended Courses:**
- Geol. & Envir. Sci. 231. Sedimentary Petrography 2
- Geol. & Envir. Sci. 251. Sedimentary Basins A 3
- Geol. & Envir. Sci. 252. Sedimentary Petrography 2
- Geol. & Envir. Sci. 255. Introduction to Micropaleontology W 5
- Geol. & Envir. Sci. 264. Low Temperature Aqueous Geochemistry W 3
- Geophys. 150. Plate Tectonics 2-3
- Geophys. 290. Tectonophysics 3
- Pet. Engr. 103. Energy Resources A, S 3

**BIOSPHERE**

**Recommended Courses:**
- Biol. Sci. 118. Genetics A 3
- Biol. Sci. 120. General Botany A 3
- Biol. Sci. 124. Ecosystem Physiology 4
- Biol. Sci. 125. Ecosystems of California S 4
- Biol. Sci. 137. Plant Genetics 3
- Biol. Sci. 139. Biology of Birds S 3
- Biol. Sci. 156. Plant Physiology 4
- Biol. Sci. 144. Conservation Biology S 4
- Biol. Sci. 238H. Biomechanics of Intertidal Organisms Sum 6
ANTHROSPHERE

Recommended Courses:
- Anthro 265: Advanced Ecological Anthropology
- Econ 215: Industrialization, Growth, and Economic Development
- Econ 241: Public Finance and Taxation I
- Engr. Econ. Syst. 212A: Economics Analysis
- Law 224A: Environmental Law and Processes
- Law 224B: Environmental Strategy
- Pol. Sci. 255: Economics of the Environment
- Soc. Sci. 254: Essentials of Political Theory

Required Courses:
- Econ. 202: Price Allocation Theory I
- or Engr. Econ. Syst. 212A: Economics Analysis
- Econ. 243: Economics of the Environment
- Engr. Econ. Syst. 255: Economics of Natural Resources
- Pol. Sci. 254: Essentials of Political Theory

COURSES

UNDERGRADUATE

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

- 3-5 units, Win (Ernst, Roughgarden, Schneider, Goulder, Naylor, Kennedy) MWF 10

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

- 3 units, Win (Vitousek, Mooney)

112. Anthrosphere: Human Interactions with the Earth and Environment — (Same as Civil Engineering 175, Economics 155.) Analysis of economic sources of environmental problems in a market economy and evaluation of alternative policies (regulation, taxation, marketable permits) for dealing with these problems. Regional issues (local air and water pollution, traffic congestion) and global issues (climate change, stratospheric ozone depletion). Economics of natural resource management and protection, emphasizing renewable resources, e.g., wildlife populations and forests; connections between population growth and the environment. Prerequisite: Economics 51.

- 3 units, Spr (Goulder)

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

- 3 units (J. Kennedy) not given 1995-96

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

- 3 units (Schneider) not given 1995-96

GEOLOGICAL AND ENVIRONMENTAL SCIENCES 67

ence. Students lead two discussion sessions on the senior project and on an interdisciplinary topic in Earth Systems selected by consultation with the Academic Coordinator.

2 units, Aut, Spr (Kennedy)

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

9 units, quarter by arrangement (Staff)

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

9 units, quarter by arrangement (Kennedy)

290. Master’s Seminar — Required and in conjunction with the master’s degree.

2 units, Win (Kennedy)

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

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

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

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

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

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

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

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

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

**Core Course Sequence**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>GES 1. Planet Earth</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>or GES 2, 3. Earth History and Lab</td>
<td>A 5</td>
</tr>
<tr>
<td>GES 80. Earth Materials</td>
<td>A 5</td>
</tr>
<tr>
<td>GES 90. Introduction to Geochemistry</td>
<td>W 3</td>
</tr>
<tr>
<td>GES 102. Introduction to Field Geology</td>
<td>Sum 3</td>
</tr>
<tr>
<td>GES 110. Structural Geology</td>
<td>S 5</td>
</tr>
<tr>
<td>or GES 111. Structural and Engineering Geology</td>
<td>A 4</td>
</tr>
<tr>
<td>GES 151. Sedimentary Geology</td>
<td>W 4</td>
</tr>
<tr>
<td>GES 152. Stratigraphy and Applied Palaeontology</td>
<td>S 4</td>
</tr>
<tr>
<td>GES 160. Introduction to Statistical Methods for Earth and Environmental Science</td>
<td>S 4</td>
</tr>
<tr>
<td>GES 181. Igneous and Metamorphic Processes</td>
<td>S 3-5</td>
</tr>
<tr>
<td>GES 190A.B. Advanced Geological Research in the Field</td>
<td>Sum 10</td>
</tr>
<tr>
<td>Subtotal...</td>
<td>.................................................. 45-48</td>
</tr>
</tbody>
</table>

**Required Supporting Sciences and Mathematics**

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

Choose one of the following groups of Mathematics courses:

- Math. 20. Calculus | W,S 3 |
- Math. 21. Calculus | S 4 |
- Math. 43. Calculus | A,W,S 5 |

Choose one of the following groups of Physics courses:

- Physics 22. Mechanics and Heat Lab | A,Sum 1 |
- Physics 23. Electricity and Optics | W,Sum 3 |
- Physics 24. Electricity and Optics Lab | W,Sum 1 |
- or Physics 51. Mechanics† | W 4 |
- Physics 53. Electricity and Magnetism† | S 4 |
- Physics 55. Light and Heat† | A 4 |

Subtotal................................................. 30-34

* Math. 41, 42, 43 recommended for students planning graduate study in the sciences or engineering.
† Physics 51, 53, 55 recommended for students planning graduate study in the sciences or engineering.

**Electives**

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

Biol. Sci. 117. Biology and Global Change | W 3 |
Chem. 33. Structure and Reactivity | W,S 4 |
Comp. Sci. 106A. Programming Methodology | A,W,S 5 |
GES 2, 3. Earth History and Lab | A 5 |
GES 132. Environmental Earth Sciences III | S 3 |
GES 150. Oceans | W 3 |
ENVIRONMENTAL SCIENCES

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

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

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

CORE COURSE SEQUENCE

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civ. Engr. 106. Water Resources</td>
<td>W 4</td>
</tr>
<tr>
<td>Civ. Engr. 170. Environmental Science and Technology</td>
<td>A 3</td>
</tr>
<tr>
<td>GES 1. Planet Earth</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>GES 180. Earth Materials</td>
<td>A 5</td>
</tr>
<tr>
<td>GES 185. Volcanology</td>
<td>S 4</td>
</tr>
<tr>
<td>GES 187. Hydrothermal Cycling and Concentration of Elements in the Earth's Crust</td>
<td>S 4</td>
</tr>
<tr>
<td>Geophys. 4. Natural Hazards and Human Survival</td>
<td>A,W 3</td>
</tr>
<tr>
<td>Geophys. 150. Plate Tectonics</td>
<td>S 3</td>
</tr>
<tr>
<td>Geophys. 182. Reflection Seismology</td>
<td>A 3</td>
</tr>
<tr>
<td>Geophys. 190. General Geophysics</td>
<td>A 4</td>
</tr>
<tr>
<td>Physics 27. Evolution of the Cosmos</td>
<td>A 3</td>
</tr>
<tr>
<td>Subtotal</td>
<td>12-18</td>
</tr>
<tr>
<td>Total</td>
<td>87-100</td>
</tr>
</tbody>
</table>

REQUIRED SCIENCES AND MATHEMATICS

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

Choose one of the following groups of mathematics courses:

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

Choose one of the following groups of physics courses:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 22. Mechanics and Heat Lab</td>
<td>A 1</td>
</tr>
<tr>
<td>Physics 23. Electricity and Optics</td>
<td>W 3</td>
</tr>
<tr>
<td>Physics 24. Electricity and Optics Lab</td>
<td>W 1</td>
</tr>
<tr>
<td>or Physics 51. Mechanics*</td>
<td>W 4</td>
</tr>
<tr>
<td>Physics 53. Electricity and Magnetism†</td>
<td>S 4</td>
</tr>
<tr>
<td>Physics 55. Light and Heat†</td>
<td>A 4</td>
</tr>
<tr>
<td>Subtotal</td>
<td>34-38</td>
</tr>
</tbody>
</table>

* Math. 41, 42, 43 recommended for students planning graduate study in the sciences or engineering.
† Physics 51, 53, 55 recommended for students planning graduate study in the sciences or engineering.

ELECTIVES

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

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biol. Sci. 117. Biology and Global Change</td>
<td>W 3</td>
</tr>
<tr>
<td>Civ. Engr. 266. Environmental Policy Design and Implementation</td>
<td>S 4</td>
</tr>
<tr>
<td>Comp. Sci. 106A. Programming Methodology</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>Engr. 60. Engineering Economy</td>
<td>A,W 3</td>
</tr>
<tr>
<td>GES 2.3. Earth History and Lab</td>
<td>A 5</td>
</tr>
<tr>
<td>GES 6. Management of Earth Resources</td>
<td>S 3</td>
</tr>
<tr>
<td>GES 115. Engineering Geology Practice</td>
<td>S 3</td>
</tr>
<tr>
<td>GES 132. Environmental Earth Sciences III</td>
<td>S 3</td>
</tr>
<tr>
<td>GES 150. Oceans</td>
<td>W 3</td>
</tr>
<tr>
<td>GES 171. Geochemical Thermodynamics</td>
<td>A 3</td>
</tr>
</tbody>
</table>
SCHOOL OF EARTH SCIENCES

GES 185. Volcanology S 4
Geophys. 170. Environmental and Geotechnical Geophysics S 3
Hum. Biol. 148. Environmental Policy S 3
Pet. Engr. 103. Energy Resources A,S 3
Subtotal ......................................................... 12-19
Total .......................................................... 92-104

ENGINEERING GEOLOGY AND HYDROGEOLOGY

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

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

CORE COURSES

Course No. and Subject Qtr. and Units
GES 1. Planet Earth A,W,S 5
GES 80. Earth Materials A 5
GES 112. Mapping the Geologic Environment S 3
GES 111. Structural and Engineering Geology A 4
GES 115. Engineering Geology Practice S 3
GES 160. Introduction to Statistical Methods for Earth and Environmental Sciences S 4
GES 230. Physical Hydrogeology A 5
Geophys. 170. Environmental and Geotechnical Geophysics S 3
Earth Science Subtotal ........................................ 35
Civ. Engr. 101A. Introduction to Structural and Geotechnical Engineering W 4
Civ. Engr. 101B. Mechanics of Fluids S 4
Civ. Engr. 101C. Geotechnical Engineering A 4
Comp. Sci. 106A. Programming Methodology A,W,S 5
Engineering Subtotal ........................................ 32

REQUIRED SUPPORTING SCIENCES AND MATHEMATICS

Chem. 31. Chemistry Principles A,W 4
Math. 41. Calculus A 5
Math. 42. Calculus A,W 5
Math. 43. Calculus A,W,S 5
Math. 44. Calculus A,W,S 3
Math. 130. Ordinary and Differential Equations A,W,S 3
or Mech. Engr. 100. Differential Equations in Engineering S 3
Physics 51. Mechanics W 4
Subtotal ....................................................... 29

SUGGESTED ELECTIVES

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

Civ. Engr. 170. Environmental Science and Technology A 3
Civ. Engr. 180A. Introduction to Structural Analysis A 3
Civ. Engr. 180B. Structural Analysis S 4
Civ. Engr. 190. Geotechnical Engineering A 4
Civ. Engr. 270. Movement, Fate, and Effects of Contaminants in Surface Waters and Groundwater A 3
Civ. Engr. 291. Foundation Engineering W 3
Civ. Engr. 293. Experimental Soil Mechanics W 2
Engr. 30. Engineering Thermodynamics A,W 3
Engr. 50. Introductory Science of Materials W,S 3
GES 130. Environmental Earth Sciences I A 4
GES 131. Environmental Earth Sciences II W 4
GES 132. Environmental Earth Sciences III S 3
GES 215. Advanced Structural Geology and Rock Mechanics S 3-4
GES 216. Rock Fracture Mechanics S 3-4
GES 217. Characterization and Hydraulics of Rock Fracture W 3
GES 231. Contaminant Hydrogeology S 4
GES 235. Role of Fluids in Geologic Processes S 3
GES 237. Surface and Near-Surface Hydrologic Response W 4
Geophys. 190. General Geophysics A 4
Mech. Engr. 111. Stress, Strain, and Strength A 3
Subtotal ......................................................... 11-16
Total .......................................................... 107-112

LAND RESOURCES PLANNING

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

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

**CORE COURSES**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civ. Engr. 170. Environmental Science and Technology</td>
<td>A 3</td>
</tr>
<tr>
<td>Comp. Sci. 105A. Introduction to Computers</td>
<td>A,S 5</td>
</tr>
<tr>
<td>or Comp. Sci. 106A. Programming Methodology</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>Econ. 1. Elementary Economics</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>GES 1. Planet Earth</td>
<td>A,W,S 5</td>
</tr>
<tr>
<td>GES 2. 3. Earth History and Lab</td>
<td>A 5</td>
</tr>
<tr>
<td>GES 5. The Earth's Nonrenewable Resources</td>
<td>W 3</td>
</tr>
<tr>
<td>GES 80. Earth Materials</td>
<td>A 5</td>
</tr>
<tr>
<td>GES 102. Introduction to Field Geology</td>
<td>Sum 3</td>
</tr>
<tr>
<td>or GES 112. Mapping the Geologic Environment</td>
<td>S 3</td>
</tr>
<tr>
<td>GES 130. Environmental Earth Sciences I</td>
<td>A 4</td>
</tr>
<tr>
<td>GES 131. Environmental Earth Sciences II</td>
<td>W 4</td>
</tr>
<tr>
<td>GES 132. Environmental Earth Sciences III</td>
<td>S 3</td>
</tr>
<tr>
<td>GES 133. Introduction to Assessment of Environmental Risk</td>
<td>W 3</td>
</tr>
<tr>
<td>GES 150. Oceans</td>
<td>W 3</td>
</tr>
<tr>
<td>GES 160. Introduction to Statistical Methods for Earth and Environmental Sciences</td>
<td>S 4</td>
</tr>
<tr>
<td>Urban Studies 110. Introduction to Urban Studies</td>
<td>A 4</td>
</tr>
<tr>
<td>Urban Studies 170. Introduction to Urban Design</td>
<td>W 5</td>
</tr>
</tbody>
</table>

Subtotal: 64

**REQUIRED ENGINEERING, SUPPORTING SCIENCES, AND MATHEMATICS**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 31. Chemical Principles</td>
<td>A,W 4</td>
</tr>
<tr>
<td>Math. 20. Calculus</td>
<td>W,S 3</td>
</tr>
<tr>
<td>or Math. 41. Calculus</td>
<td>A 5</td>
</tr>
</tbody>
</table>

Subtotal: 15

**ELECTIVES**

Choose one course from each of the following groups:

**Group A**

- Civ. Engr. 171. Environmental Planning Methods
- Engr. 60. Engineering Economy
- Geophys. 4. Natural Hazards and Human Survival
- GES 133. Introduction to Assessment of Environmental Risk
- Pet. Engr. 103. Energy Resources

**Group B**

- Food Research 103. The World Food Economy
- Food Research 121. Development and Population Interactions in the Third World

**Group C**

- Art 13. Introduction to the History of Architecture
- Art 175A. Modern Architecture I
- Art 175B. Modern Architecture II
- Art 176. American Architecture and Urbanism

**Group D**

- Urban Studies 110. Introduction to Urban Studies
- Urban Studies 133. The Politics of Development
- Urban Studies 138. Managing Local Government
- Urban Studies 174. Architectural Design Process

Subtotal: 15-17

Total: 94-96

**HONORS PROGRAM**

The Department of Geological and Environmental Sciences offers a program leading to the Bachelor of Science in Geological and Environmental Sciences with Honors. The program provides an opportunity for independent study and research on a topic of special interest culminating in a written report. The honors program is open to all seniors with a letter grade indicator (LGI) of at least 3.5 in earth and environmental science courses and a minimum of 3.0 in all University course work. Modest financial support is available to help defray laboratory and field expenses incurred in conjunction with honors research. Students intending to pursue the honors program must submit an application to the department before the beginning of their senior year. Applying to the honors program involves a formal review of the student's academic record and submitting a research proposal to the department's Undergraduate Activities Committee. Normally, a student selects a research topic and prepares a research proposal in consultation with a faculty adviser of his or her choosing. Research undertaken for the honors program can be of a theoretical, field, or experimental nature, or a combination of these approaches.

Upon approval of the research proposal and formal entrance to the program, course credit for the honors research project and report preparation is assigned by the student's faculty adviser within the framework of GES 199; 3 units each quarter are assigned to the project for three quarters of the student's senior year for a total of 9 units. Note that research undertaken for the honors program cannot be used as a substitute for regularly required courses. Both a written and an oral presentation of research results are required of hon-
ors students. A formal written report must be submitted to the student’s research adviser no later than the fourth week of the student’s final senior quarter. To graduate with honors, the report must be read, approved, and signed by the student’s faculty adviser and a second member of the faculty. Before the end of the senior year, each honors candidate gives a public seminar on his or her research results.

COTERMINAL B.S./M.S. PROGRAM

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

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

GRADUATE PROGRAMS

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

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

The nine broad areas of faculty teaching and research are divided into fields, which have diploma designation, and area specializations.

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

FIELDS

Geostatistics in the Earth Sciences — The Geostatistics program, which leads to an M.S. or Ph.D. degree in GES, is under the direction of Professor Jarvenpaa. It focuses on the use of mathematics in simulating geologic processes in petroleum-bearing sedimentary basins. Stress is placed on representing the physics of geologic processes, including the flow of currents in rivers and the sea, the transport and deposition of sediment by currents and waves, and the motions of pore water and hydrocarbons as compaction and structural deformation take place. These processes are represented in terms of their underlying physical principles by differential equations that have been placed in finite-difference form for numerical solution by computer. The numerical solutions are linked with graphics workstations to create dynamic three-dimensional displays, and the individual geologic processes are then linked to form integrated three-dimensional dynamic systems used for experiments in which actual sedimentary basins are simulated.

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

Geostatistics in the Earth Sciences — The Geostatistics program, which leads to an M.S. or Ph.D. degree in GES, is under the direction of Professor Harbaugh. It focuses on the use of mathematics in simulating geologic processes in petroleum-bearing sedimentary basins. Stress is placed on representing the physics of geologic processes, including the flow of currents in rivers and the sea, the transport and deposition of sediment by currents and waves, and the motions of pore water and hydrocarbons as compaction and structural deformation take place. These processes are represented in terms of their underlying physical principles by differential equations that have been placed in finite-difference form for numerical solution by computer. The numerical solutions are linked with graphics workstations to create dynamic three-dimensional displays, and the individual geologic processes are then linked to form integrated three-dimensional dynamic systems used for experiments in which actual sedimentary basins are simulated.

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

Geostatistics in the Earth Sciences — The Geostatistics program, which leads to an M.S. or Ph.D. degree in GES, is under the direction of Professor Harbaugh. It focuses on the use of mathematics in simulating geologic processes in petroleum-bearing sedimentary basins. Stress is placed on representing the physics of geologic processes, including the flow of currents in rivers and the sea, the transport and deposition of sediment by currents and waves, and the motions of pore water and hydrocarbons as compaction and structural deformation take place. These processes are represented in terms of their underlying physical principles by differential equations that have been placed in finite-difference form for numerical solution by computer. The numerical solutions are linked with graphics workstations to create dynamic three-dimensional displays, and the individual geologic processes are then linked to form integrated three-dimensional dynamic systems used for experiments in which actual sedimentary basins are simulated.

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

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

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

SPECIALIZATIONS

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

Quantitative Structural Geology, Geomechanics, and Active Tectonics — Research oppor-
tunities in this specialization leading to the M.S. or Ph.D. degree are available in quantitative structural geology, active and neotectonics, engineering geology, rock fracture mechanics, aquifer and reservoir visualization and characterization, and geomechanics. Program advisers are Professors Aydin and Pollard. Other faculty members with related research interests who participate in the program are Professors Gorelick and Loague (hydrogeology); Professors Mavko and Nur (rock physics), Segall (crustal deformation and fault mechanics), and Zoback (tectonophysics) from the Department of Geophysics; and Professors Aziz, Hewett, Journel, and Orr (reservoir characterization, simulation, and geostatistics) from the Department of Petroleum Engineering.

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

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

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

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

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

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

Students who choose this area design individual programs or curricula with the help of one or more advisers and the approval of the GES Graduate Committee. SAAG students are expected to accumulate a sound background in physical and inorganic chemistry as well as geochemistry, and at least one field of application such as environmental engineering, environmental geosciences, or hydrogeology. Preference is given to applicants who have a strong quantitative background in chemistry and physical chemistry and experience with computers and laboratory methods.

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

MASTER OF SCIENCE

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

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

Requirements — The University's requirements for M.S. degrees are outlined in the "Graduate Degrees" section of this bulletin. Additional department requirements include the following:

1. A minimum of 36 units of course work at the 100 level or above.
   a. Half of the courses used to satisfy the 36-unit requirement must be intended as being primarily for graduate students, usually at the 200 level or above.
   b. No more than 15 units of thesis research may be used to satisfy the 36-unit requirement.
   c. Some students may be required to make up background deficiencies in addition to these basic requirements.

2. Each student must have a research adviser who is a faculty member in the department and is within the student's thesis topic area or specialized area of study.

3. Each student must complete a thesis or master's report describing his or her research. Thesis research should begin during the first year of study at Stanford and should be completed before the end of the second year of residence.

4. Early during the thesis research period, and after consultation with the student, the thesis adviser appoints a second reader for the thesis, who must be approved by the Graduate Committee of the department; the thesis adviser is the first reader. The two readers jointly determine whether the thesis is acceptable for the M.S. degree in the department.

ENGINEER DEGREE

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

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

Requirements — The University's requirements for the Ph.D. degree are outlined in the "Graduate Degrees" section of this bulletin. A summary of additional department requirements is presented below.

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

1. Ph.D. students must pass the required courses in their individual program or in their specialized area of study with a letter grade indicator of 'B' or higher, or demonstrate that they have completed the equivalents elsewhere. Ph.D. students must complete a minimum of four letter-grade courses of at least 3 units each from four different faculty members on the Academic Council in the University.

2. Each student must qualify for candidacy for the Ph.D. by the end of the sixth quarter in residence, excluding summers. Department procedures require selection of a faculty research adviser, preparation of a written research proposal, approval of this proposal by the research adviser, selection of a committee for the research examination, and approval of the membership by the Graduate Committee of the department. The research examination consists of three parts: oral presentation of a research proposal, examination on the research proposal, and examination on subject matter relevant to the proposed research.

3. Upon qualifying for Ph.D. candidacy, the student and adviser, who must be a department faculty member, choose a Research Advisory Committee that includes a minimum of two faculty members in the University in addition to the adviser. Annually, in the month of March or April, the candidate must organize a meeting of the research committee to present a brief progress report covering the past year.

Doctoral Dissertation — Under the supervision of the Research Advisory Committee, the candidate must prepare a doctoral dissertation that is a contribution to knowledge and is the result of independent research. The format of the dissertation must meet University guidelines. The student is strongly urged to prepare dissertation chapters that, in scientific content and format, are readily publishable.

In accordance with University procedure, the department shall appoint the research adviser and two other members of the Research Advisory Committee to be readers of the draft dissertation. The readers are charged to read the draft and to certify in writing to the department that it is adequate to serve as a basis for the University oral examination. Until such written and signed certification has been received by the department, the student is not permitted to schedule the University oral examination.

COURSES
UNDERGRADUATE

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

1. Planet Earth — For non-majors or Earth Systems and prospective Geological and Environmental Sciences majors. Introduction to and survey of the physical and chemical processes, past and present, that shape the earth's land forms, produce the minerals and rocks that comprise the earth, create soils, deform the earth's crust, and move continents. Ways in which man interacts with the earth, constructively and destructively. Surficial processes involving water, water's role in erosion and in the production of sediment. Processes acting within the earth's interior, emphasizing global tectonics. Geologic hazards: earthquakes, volcanic eruptions, flooding, and landslides, and their mitigation. Non-renewable resources, energy, and environmental problems. Lectures, homework assignments, one all-day field trip, and one weekly three-hour lab. Recommended: high school chemistry and physics. DR: 5(7) 5 units, Aut, Win, Spr (Mahood, Bird, McWilliams, 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 evolution of organisms, from self-replicating molecules to man, that have interacted with and strongly modified surrounding environments. The evolution of the earth and its biosphere, hydrosphere, and atmosphere represent active areas of current research and discussion. Topics: the formation of the earth, origin of life, evolution of the continents, oxygenation of the atmosphere, development of metazoa, history of glaciations and climate, the role of extraterrestrial events in geological and biological evolution. Lab in GES 3 examines the
materials and organisms discussed. Majors in geology must take 3 concurrently or in a subsequent year. 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 GES 2; required for Geology majors who took Geology 2 in 1985-86 or later. Pre- or corequisite: 2.

2 units, Aut (Lowe) by arrangement

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

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

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

DR:6(8)

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

7A, B, C. An Introduction to Wilderness Skills — Introduction to living, traveling, and working in the wilderness for those planning fieldwork in the backcountry. In-class topics: animal tracking, environmental ethics, first aid, geological processes, global dynamics, land management, and plant ecology. Four weekend outings focus on minimum impact backcountry skills including basic camping, hiking, and climbing techniques. Students research the geological history of trip locations and make short presentations on their findings. 7A and 7B emphasize navigation and night camping skills, and 7B emphasizes winter camping skills in the backcountry. Fee.

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

9. Field Trip to Death Valley — Priority given to prospective and new majors in the GES, Geophysics, and Earth Systems and to students who have taken GES 1, 2, or 4. Introductory lectures, five-day field trip to study the geology and desert environment of Death Valley during Spring break. Observations of recent motion on faults and volcanic eruptions, the way mountains are built and eroded away, and a billion years of earth history displayed in the walls of rugged cliffs and canyons. The desert ecosystem, salt lakes, and sand dune fields are the direct result of the climatic effects of Death Valley's geologic setting. Limited enrollment.

2 units, Win (Staff) by arrangement

50. The Coastal Zone Environment — Open to sophomores only. Seminar on the oceanographic, geological, and biological character of coastal zone environments, including continental shelves, estuaries, and coastal wetlands, with emphasis on urbanized estuaries in San Francisco Bay. Five required field trips examine estuarine and coastal environments of the San Francisco Bay region, and agencies and facilities concerned with monitoring. Original research on a selected aspect of the coastal zone results in a written and oral report. Enrollment limited to 10. Prerequisites: beginning course in the earth or biological sciences (e.g., 1, 2, 130, 150, Biology 1, or Earth Systems 10); no concurrent registration in GES 150.

3 units, Win (Ingles) TTh 1:15-3

four afternoon Tu or Th, and one all day field trip by arrangement

52. Petrotectonic Evolution of Mesozoic California — Open to sophomores only. Crustal evolution of California in post-Paleozoic time covering the geotectonic development of most of the state. Field seminar, trips by arrangement to: the Diablo Range (two days); the central Klamath Mountains (three days); the White-Inyo Range, Owens Valley, and the eastern Sierra (three days). Weekends utilized, camping, hiking required. Term paper. Enrollment limited to 10. Prerequisites: 1, 2, 80.

5 units, Spr (Ernst) Th 10-12

53. Environmental Problems — Open to sophomores only. Focuses on environmental issues: groundwater contamination from point (e.g., love canal) and non-point (agricultural) sources, cumulative watershed effects (CWEs) related to timber and mining practices, acid rain, subsurface disposal of nuclear waste, the Alaska pipeline, slope stability (e.g., Devil's Slide), and oil tanker spills (e.g., 13.99 Valdez). Enrollment limited to four.

2 units, Win (Loague) by arrangement

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

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

81. Petrography Tutorial — Practice and instruction in identifying minerals and rocks using a petro-
graphic microscope. One three-hour lab per week. Prerequisite: 80 or equivalent.

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

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

3 units, Win (Stebbins) MWF 11

102. Introduction to Field Geology — Instruction and practice in the basic methods of geologic investigation in the field. Emphasis on techniques of systematic observations and the construction of geologic maps and sections from the data obtained with a written geologic report on one of the study areas. Field area sites display a variety of rock types and landforms related to clearly defined geologic structures and events. Conducted from White Mountains Research Station in Bishop, CA for the two weeks preceding the beginning of Autumn Quarter. See Summer '96 schedule. Prerequisites: 1, 80.

3 units, Sum (Ruetz)

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

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

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

5 units, Spr (Miller) TTh 9-10:30, lab Th 1:15-4:05 part-day and weekend field trips by arrangement

111. Structural and Engineering Geology — Observational techniques, analysis methods, and theoretical foundations of structural and engineering geology. Interactive computer exercises are integrated with field data acquisition and textbook descriptions to understand the role of geologic structures in the evolution of earth's crust (folding, faulting, flow, and fracturing of rock), natural resource recovery (oil, gas, groundwater, and minerals), and geologic hazards (earthquakes, landslides, and volcanoes). Topics: structural quantities, measurement of deformation, use of descriptive geometry for analyzing field data, computer models for the evolution of geologic structures. Prerequisites: 1, calculus, Macintosh skills.

4 units, Aut (Pollard) MWF 9, computer labs and two field trips by arrangement

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

3 units, Spr (Einaudi, Pollard) T 1:15-5:15 plus field trips by arrangement

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

3 units (Holzer) alternate years, given 1996-97

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

3 units, Aut (Stebbins, McWilliams) MWF 9
130. Environmental Earth Sciences I — First of a three-part sequence on the relationship of environmental earth sciences to land use planning. Major project throughout sequence involves preparation of a land-use plan for a selected Bay Area location. Topics: introduction to city and regional planning, legal basis for land use planning and regulation, determinants of land use, land capability systems, geologic hazards, hydrology, use of topographic and geologic maps. Students individually or in groups prepare a reconnaissance report on a selected topic for the project area and present results to class. Field trips to project area and San Mateo county coast. DR:6(8)
4 units, Aut (Loague, Mader) MWF 11
  labs, seminars, and field trips by arrangement

131. Environmental Earth Sciences II — Topics: earthquake, landslide, and volcanic hazards and approaches to mitigation, weather and climate, environmental optimization, environmental transport, environmental impact analysis. Groups prepare and present computer generated land capability maps for the project area. Field trips to observe examples of land use projects adapted to environmental constraints.
4 units, Win (Loague, Mader) MWF 11
  labs, seminars, and field trips by arrangement

132. Environmental Earth Sciences III — Topics: procedure for preparation of general plans, urban design, new town concepts, and site planning. Groups prepare and present a general plan diagram and text along with a proposed implementation program for the project area. Formal presentation to guest critics/city planners from project area. Field trip to examples of good design on the San Francisco Peninsula.
3 units, Spr (Mader) MWF 11
  labs, seminars, and field trips by arrangement

133. Introduction to Assessment of Environmental Risk — Interdisciplinary approach to evaluate environmental and natural hazard risks; combines quantitative methods used in economics with earth-science information. The earth sciences, applied statistics, and microeconomics are integrated in a decision framework (cost-benefit analysis) to address site-specific issues such as locating a waste-disposal facility and regional issues such as reducing earthquake-related damage. Techniques developed are applied in a class exercise to evaluate a current land-use issue using a geographic information system (GIS). Recommended: Economics 155.
3 units, Win (Bernknopf) TTh 11-12:15

150. The Oceans: An Introduction to the Marine Environment — For non-majors and prospective geology, earth science, and environmental majors. Topics: topography and geology of the sea floor, evolution of ocean basins, the circulation of the ocean and atmosphere, the nature of sea water, waves, tides, and the history of the major ocean basins. The interface between continents and ocean basins, emphasizing estuaries, beaches, and continental shelves with California margin examples. The relationships between the distribution of inorganic constituents, ocean circulation, biologic productivity, and marine environments from deep sea to the coast. Lectures, demonstrations, and required one-day field trip to measure and analyze waves and currents. Enrollment limited to 130. 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, tecotones 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 (Ingle, Luagen) MWF 9
  lab T 1:15-4, field trips by arrangement

4 units. Spr (Ingle) MWF 10
  lab T 1:15-4:05, three required field trips, research conferences by arrangement

160. Introduction to Statistical Methods for Earth and Environmental Sciences — Data summaries, graphical display of information, measures of association, time trends, sampling, quantification of uncertainty, statistical models, statistical testing and prediction, statistical computing. Examples primarily from environmental monitoring case studies.
4 units. Spr (Switzer) TTh 11-12:15
  plus section

165. Geochronology — (Same as Geophysics 165.) Introduction to the principles of geochronology and thermochronology and the application of modern tools to geological and geophysical problems. Topics: nuclear structure, isotope systematics, decay schemes for the principal nuclides used in earth sciences, equilibrium and disequilibrium, diffusion
and transport phenomena, blocking (closure) of isotopic and magnetic systems, creation and annealing of fission tracks, neutron activation, a review of geologic timescales, chronostratigraphy, magnetostratigraphy, and cosmogenic exposure ages. Alpha counting, mass spectrometry by gas source, solid source and ion probe methods. Fundamentals of K-Ar, Ar-Ar, Rb-Sr, and U-Pb and fission track methods. Recommended: undergraduate training in calculus, chemistry, geology, and physics.

3 units, Spr (McWilliams) MWF 11
plas lab

170. Environmental Geochemistry — Introductory study of the solid, aqueous, and gaseous phases comprising the environment, their natural compositional variations, and their chemical interactions, emphasizing the contrast between natural sources of hazardous elements and compounds and the types and sources of anthropogenic contaminants and pollutants. Identification of chemical and physical processes that result in weathering and soil formation. Chemical factors that affect the stability of solids and aqueous species under earth surface conditions. Emphasis on processes that control the release, mobility, and fate of contaminants in natural waters and the roles that water and dissolved substances play in the physical behavior of rocks and soils. The scientific basis for evaluation of the impact of contaminants and design of remediation strategies. Case studies include mercury on the San Francisco Peninsula, radioactivity in the Sierra Nevada and Central Valley of California, and high-level radioactive waste disposal sites in the U.S. Prerequisite: 90 or consent of instructor.

4 units, Win (Brown) MWF 10

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

3 units (Bird) given 1996-97

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

3 or 5 units, Spr (Liou) MW 1:15-4:05
alternate years, not given 1996-97

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

4 units (Mahood)
alternate years, given 1996-97

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

1 unit (Mahood)
alternate years, given 1996-97

187. Hydrothermal Cycling and Concentration of Elements in the Earth's Crust — The geology of hydrothermal systems, their products and processes, including: chemical, fluid inclusion, and isotopic characterization of fractures/veins and altered rocks, mineralogical, structural; distribution, geologic settings, and temporal evolution; and general models and interpretation of metasomatic processes. Focus is on understanding active hydrothermal systems in continental and oceanic settings and applications to ancient analogues, including: hot springs and mercury deposits, geothermal reservoirs and gold-silver deposits, volcanic fumaroles and magmatic-hydrothermal systems, mid-ocean-ridge hot springs and submarine massive sulfide deposits, and sedimentary basin brines and strata-bound sulfide deposits. Lab: methods of study and description of veins and altered rocks; introduction to fluid inclusion microthermometry. Field trips required. Prerequisites: 80, 90.

4 units (Einaudi) given 1996-97

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

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

195. Measurement and Evaluation of Environment: Integrating Remote Sensing and Geographic Information Systems (GIS) — Entry-level survey of Remote Sensing and GIS; weekly computer-based lab session involving both subjects, stressing the inter-relationships of the information from remotely sensed environmental data with the techniques and methodology of GIS. Lab enrollment limited to 20.

3 units, Aut (Lyon) TTh 1:15-2:30
lab T 2:30-4:05 and by arrangement

196. Introduction to ARC/INFO — Basic use of ARC/INFO. Topics: setting up geographic databases and manipulating spatial data, including database query and analysis. Class project using a sample ARC/INFO dataset.

2 units, Win (Klemperer) T 2:15-4:05
plus labs by arrangement

197. Research in the Application of Geographic Information Systems (GIS)
1-5 units, Aut, Win, Spr (Lyon, Klemperer) by arrangement

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

199. Honors Program — Research on a topic of special interest. See “Undergraduate Honors Program” above.
3 units, Aut, Win, Spr, Sum (Staff) by arrangement

GRADUATE

200. Fluids in the Earth’s Crust — (Same as Geophysics 200, Petroleum Engineering 200.) Interdisciplinary problems involving the state and movement of fluids in the earth’s crust: basics of the coupling in porous rocks between chemical transport, fluid flow, deformation and stress, and waves; and applications to gas hydrates under the oceans; reservoir geophysics; geophysical recovery monitoring; aquifer geophysics; pore pressure in faulting and aftershocks and in the earth’s crust; permeability from seismic; viscoelastic rebound; pore fluids and subduction; from sediment transport to seismic reflection; Pressure solution and stylolites. Prerequisite: consent of instructor.

3 units, Spr (Nur)

210. Geologic Evolution of the Western U.S. Cordillera — For undergraduates and graduates. Overview of the geology of the western states. The evolution of the mountain belt from its inception in the Precambrian to its contemporary history of extension and strike-slip faulting, based on the description, analysis, and interpretation of the rock record through time. Characteristic structural styles developed during crustal shortening, extension, and strike-slip tectonic regimes; tectonic controls on sedimentary basin formation; plate margin magmatism and metamorphism; and the relation of plate motions to the land geologic record provide insight into the crustal-scale processes and driving mechanisms common to mountain chains.

2-3 units, Win (Miller)
alternate years, not given 1996-97

211. Topics in Regional Geology and Tectonics — Seminar.
2 units, Win (Miller)

215. Advanced Structural Geology and Rock Mechanics — (Same as Geophysics 215.) Concepts and theories of rock deformation with application to structural geology, engineering geology, rock mechanics, and tectonophysics. Methods for analyzing stress, strain, and displacement fields in the earth. Governing equations of elastic plate theory are derived and applied to crustal flexure and multilayer bending. The governing equations of two-dimensional elastic theory are derived and applied to tectonic loading and mechanisms of stress concentration. Introduction to the fundamentals of fracture mechanics. Prerequisites: elementary calculus, mechanics, and structural geology.
3-4 units (Pollard)
an alternate years, given 1996-97

3-4 units, Spr (Pollard) MWF 9
alternate years, not given 1996-97

217. Characterization and Hydraulics of Rock Fractures — Interdisciplinary survey of natural fractures (faults, joints, veins, and solution seams) and their geological, geophysical, geomaterial, sto-
chastic, and hydraulic properties. Case studies of fracture characterization experiments and problems related to fluid flow in aquifers, oil and gas reservoirs, and waste repository sites in fractured rock. Invited lecturers from various disciplines and one weekend field trip. Prerequisite: equivalent of first-year graduate student in Geological and Environmental Sciences, Geophysics, or Petroleum Engineering.

3 units (Aydin)
alternate years, given 1996-97

230. Physical Hydrogeology — (Same as Civil Engineering 260A.) Theory of underground water, analysis of field data and pumping tests, geologic groundwater environments, solution of field problems, groundwater modeling. Unsaturated soil-water characteristics and fluid flow, streamflow generation mechanisms, and evapotranspiration. Prerequisite: elementary calculus.

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


4 units, Spr (Gorelick) TTh 10-11:15

233. Aquifer Management Modeling — Introduction to the combined use of aquifer simulation models and optimization techniques. Reviews recent literature. Topics: introduction to selected methods in operations research, water quantity and quality simulation-optimization modeling methods, policy evaluation and allocation models, and conjunctive water use management models. Prerequisites: 230, 231 or equivalent, introductory computer programming.

3 units (Gorelick)

235. Role of Fluids in Geologic Processes — Principles governing geologic processes in which fluids (groundwater) play an important role. Regional flow of groundwater, movement and entrainment 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, Spr (Hsieh) TTh 4:15-5:30
alternate years, not given 1996-97

236. Hydraulic and Tracer Tests for Groundwater Resource Evaluation — Theory and application of hydraulic and tracer tests to determine flow and transport properties of aquifers. Analysis of well test in single-layer aquifers and multiple aquifer-aquitard systems; water table conditions; anisotropy; double-porosity; effects due to wellbore storage, wellbore skin, aquifer boundaries, and heterogeneities such as faults and fracture zones; natural and forced gradient tracer tests. Prerequisite: 230.

3 units (Hsieh)
alternate years, given 1996-97

237. Surface and Near-Surface Hydrologic Response — (Same as Civil Engineering 260B.) Quantitative introduction to process-based hydrology and geomorphology. Topics: biometeorology, unsaturated and saturated fluid flow, overland and open channel flow, erosion and mass wasting, and physically-based numerical simulation of coupled surface and near-surface hydrologic response and landscape evolution. Links hydrogeology, soil physics, and surface water hydrology. Applications of geostatistics, geographic information systems (GIS), and digital terrain models (DTMs).

4 units, Win (Loague) TTh 10-11:20 lab W 2:15-4:05

240. Geostatistics for Spatial Phenomena — (Same as Petroleum Engineering 240.) Probabilistic modeling of spatial and/or time-dependent phenomena. Kriging and cokriging for gridding and spatial interpolation. Integration of heterogeneous sources of information. Stochastic imaging of reservoir/field heterogeneities. Case studies from the oil industry and environmental sciences. Prerequisites: introductory calculus and linear algebra, Statistics 116 or equivalent.

4-5 units, Win (Journal) TTh 1:15-3:05

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

3-4 units, Spr (Journal) TTh 1:15-3:05

242A. Topics in Advanced Geostatistics — (Same as Petroleum Engineering 242.) Topics from conditional expectation theory and projections in Hilbert spaces; parametric vs. non-parametric geostatistics; Boolean, Gaussian, fractal, indicator, annealing approaches to stochastic imaging; Bayesian methods for data integration; techniques for upscaling hydrodynamic properties. May be re-
245. Computer Simulation in Geology — (Students may also participate in 345.) Procedures for developing dynamic geologic process simulation models in geology, stressing numerical solutions of differential equations to represent the processes. Initial applications include simple two- and three-dimensional flow models. Stochastic procedures introduced. Emphasis on graphic display, with use of three-dimensional graphics computers. Prerequisite: elementary computer programming.

3 units, Spr (Harbaugh)

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

3 units, Spr (Kourt, Harbaugh) W 2:15-5:05 alternate years, not given 1996-97

248. Risk Analysis in Petroleum Exploration — (Same as Petroleum Engineering 248.) Use of formal procedures to make optimum financial decisions in petroleum exploration and exploitation. Estimation of probabilities attached to exploration actions and their utilization in financial forecasts. Extensive use of PC-based problem sets that include a computerized exploration exercise with competing teams. Concepts are applicable to resource exploration and development in general.

3 units, Win (Harbaugh) TTh 10-12 alternate years, not given 1996-97

250. Sedimentation Mechanics — The mechanics of sediment transport and deposition and the origins of sedimentary structures and textures as applied to interpreting ancient rock sequences. Dimensional analysis, fluid flow, drag, boundary layers, open channel flow, particle settling, erosion, sediment transport, sediment gravity flows, soft sediment deformation, and fluid escape. Field trip required.

3 units, Aut (Lowe) TTh 9 lab W 1:15-4 alternate years, not given 1996-97

251. Sedimentary Basins — Analysis of the depositional framework and tectonic evolution of sedimentary basins. Topics: tectonic and environmental controls on facies relations, synthesis of basin development through time in terms of depositional systems and tectonic settings. Weekend field trip required. Prerequisites: 110, 151.

3 units (Graham) alternate years, given 1996-97

252. Sedimentary Petrography — Examination/interpretation of siliciclastic sediments and sedimentary rocks. Lectures/readings stress research in modern sedimentary mineralogy and petrography and the relationship between the composition and texture of sediments and their provenance, tectonic settings, and diagenetic histories. Class is topical and varies yearly. Prerequisite: 151 or equivalent.

4 units (Lowe) alternate years, given 1996-97


3 units, Spr (Graham) TTh 1:15-3:05 alternate years, not given 1996-97

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

5 units, Aut (Ingle) MWF 11 alternate years, not given 1996-97

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

3 units, Win (Ingle) TTh 11 alternate years, not given 1996-97

257. Introduction to Organic Geochemistry — Organic geochemistry, the study of the fate of organic materials in the geologic record, finds application in environmental science, historical geology and archeology, paleo-environmental reconstruction, and petroleum exploration and exploitation. Current methods in organic geochemistry including bulk methods for source rock evaluation, isotopic interpretation applied to oil and gas analysis, microscopic methods, and petroleum composi-
tion. Emphasis is on biomarkers (molecular fossils) and their interpretations.
3 units (Moldowan)
alternate years, given 1996-97

258. Introduction to Depositional Systems — Characteristics of the major sedimentary environments and their deposits in the geologic record, including alluvial fans, braided and meandering rivers, aeolian systems, deltas, open coasts, barred coasts, marine shelves, carbonate banks and ramps, and deep-water systems. Emphasis is on subdivisions, morphology, the dynamics of modern systems, and the architectural organization and sedimentary structures, textures, compositions, and biological components of ancient deposits.
3 units, Win (Lowe) by arrangement

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

261. Physics and Chemistry of Minerals and Mineral Surfaces — Discussion of the concepts of symmetry and periodicity in crystals; physical properties of crystals and their relationship to atomic-level structure; basic structure types; crystal chemistry and bonding in solids and their relative stability; interaction of x-rays with solids and liquids (scattering and spectroscopy); structural variations in silicate glasses and liquids; UV-visible spectroscopy and the color of minerals; review of the mineralogy, crystal chemistry and structures of selected rock-forming silicates and oxides; mineral surface and interface geochemistry.
4 units, Spr (Brown) MWF 10 alternate years, not given 1996-97

262. Thermodynamics and Disorder in Minerals and Melts — Thermodynamic properties of crystalline, glassy, and molten silicates and oxides in light of microscopic information about short range structure and ordering. Measurements of bulk properties, e.g., enthalpy, density, and their pressure and temperature derivatives, and structural determination by spectroscopies such as Nuclear Magnetic Resonance and Mössbauer. Basic formulations for configurational entropy, heats of mixing in solid solutions, activities, and the energetics of exsolution, phase transitions, and nucleation. Quantitative models of silicate melt thermodynamics are related to atomic-scale views of structure. A general view of geothermometry and geobarometry. Prerequisites: introductory mineralogy and thermodynamics.
4 units, Spr (Steeb) alternate years, given 1996-97

264. Low Temperature Aqueous Geochemistry — (Same as Civil Engineering 273.) Systematic study of principles needed for solving quantitative problems in aqueous geochemistry. The use of thermodynamics in predicting extent of chemical processes, e.g., dissolution and precipitation, hydrolysis and complexation, oxidation and reduction. Emphasis on resolution of general questions into tractable problems and on problem solving and graphic representation of results. Prerequisite: 171 or equivalent experience with thermodynamics.
3 units, Aut (Leckie) MWF 9

3 units (Bird) alternate years, given 1996-97

268. Geochemistry of Mineral Deposits — Lectures integrating observational, theoretical, and experimental data on the origin of mineral deposits and application to exploration concepts. Individual projects. Prerequisites: 120, 170.
4 units (Einaudi) alternate years, given 1996-97

270. Petrologic Phase Equilibria — Principles of phase equilibrium determined by lab experimentation and thermochemical calculation, as applied to igneous and metamorphic petrology. Focuses on the underlying principles of classical thermodynamics which govern mineral equilibria. Introduction to phase relations, element partitioning, chemical kinetics, and order-disorder phenomena in geologic systems.
4 units, Win (Ernst) TTh 9-11

3 units, Aut (Tingle, Jones) MW 10 labs Th 8-12 or 1-5, F 8-12 or 1-5

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

3 units (Mahood) alternate years, given 1996-97

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

3 units (Einaudi) given 1996-97


296. Introduction to ARC/INFO — For graduate students; see 196.

297. Research in the Application of Geographic Information Systems (GIS) — For graduate students; see 197.

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

any quarter (Staff) by arrangement

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

3 units, any quarter (Miller) by arrangement

312. Seminar in Structural Geology

1 unit, Aut, Win, Spr (Staff)

by arrangement

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

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

by arrangement


1-2 units, Aut, Win, Spr (Loague)

by arrangement

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

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

by arrangement

332. Seminar in Hydrogeology

1 unit, Spring Quarter (Gorelick, Loague)

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

1-2 units, Win, Spr (Journel)

by arrangement


1 unit (Harbaugh)

350. Seminar in Sedimentary Geology

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

360. Topics in Low Temperature Surface and Aqueous Geochemistry — Guided independent study, analysis, and critical oral and written reports on selected topics in environmental, surface, and/or aqueous geochemistry under earth-surface conditions. Prerequisites: 80, 264, and 265; consent of instructor.

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

370. Seminar in Mineralogy

1-3 units, Aut, Win, Spr (Staff)

by arrangement

371. Seminar in Geochemistry

1-3 units, Aut, Win, Spr (Staff)

by arrangement

372. Seminar in Igneous Petrology-Volcanology

1-3 units, Aut, Win, Spr (Mahood)

by arrangement

373. Seminar in Metamorphic Petrology — Selected topics in metamorphic and tectonic processes, research problems and methods of study of metamorphic rocks and their tectonometamorphic evolutions. Prerequisite: consent of instructor.

1-2 units, Win (Liou, Ernst)

by arrangement

375A,B. Seminar and Field Trip: Ore Genesis — Research aimed at understanding the features and processes related to a particular class of mineral deposits. Topics are selected on basis of participant interest and timeliness. Field trip (1-2 wks.) and
2 units (Einaitdi) given 1996-97

Problems in Various Fields of Geological and Environmental Sciences
(Staff) units, quarter, time by arrangement
313. Problems in Quantitative Structural Geology, Neotectonics, and Geomechanics
319. Problems in Structural Geology
339. Problems in Hydrogeology
349. Problems in Geomathematics
355. Problems in Oceanography
358. Problems in Paleontology, Palynology, and Palaeoecology
359. Problems in Sedimentary Geology
369. Problems in Hydrology
378. Problems in Mineralogy
379. Problems in Petrology and Volcanology
399. Problems in General Geology

Research in Various Fields of Geological and Environmental Sciences
(Staff) units, quarter, time by arrangement
413. Research in Quantitative Structural Geology, Active Tectonics, and Geomechanics
419. Research in Structural Geology
438. Research Methods in Hydrology
439. Research in Hydrogeology
448. Research in Geomathematics in Process Simulation and Petroleum Resource Analysis
449. Research in Geostatistics for Natural Resources Management
452. Research in Basin Analysis Petroleum Geology
457. Research in Sedimentary Geology
458. Research in Oceanography
459. Research in Paleontology, Palynology, and Palaeoecology
463. Research in Organic Geochemistry
466. Research in Low Temperature Aquous Geochemistry
469. Research in Geochemistry
477. Research in Ore Deposits and Exploration
478. Research in Petrology and Volcanology
479. Research in Mineralogy
499. Research in General Geology

**GEOPHYSICS**

Emeritus: George A. Thompson, Jr. (on active duty)
Chair: Mark D. Zoback
Professors: Jon F. Claerbout, Robert L. Kovach, Amos M. Nur, Jonathan Roughgarden*, Norman H. Sleep, Mark D. Zoback
Associate Professors: Gregory C. Beroza, Steven Gorslick†, Jerry M. Harris, Simon L. Klemperer, Michael O. McWilliams†, Paul Segall, Howard Zebker
Professor (Research): Antony Fraser-Smith**
Associate Professor (Research): Gerald M. Mavko
Research Associates: Ginger A. Barth, Colleen A. Barton, Jack Dvorkin, Daniel Moos, Mark H. Murray, Pavel Peska, Lev Vernik
Courtesy Professors: Stephan A. Graham, David D. Pollard
Lecturer: Phillip Farrell
Acting Associate Professor: Biondo Biondi
Consulting Professors: James Berryman, William Ellsworth, Rosemary Knight, Walter Mooney, Francis Muir, David Scholl, Paul Spudich, Uri tenBrink, Brian Tucker, John Vidale, George Zandt
Visiting Professors: Zvi Ben-Avraham, James Rice
Visiting Assistant Professors: Susan Agar, Carolyn Ruppel

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

Geophysics is the branch of earth science concerned with exploring and analyzing active processes of the earth by physical measurement. The undergraduate and graduate programs are designed to provide (1) a background of fundamentals in science, and (2) courses in geophysics to coordinate the fundamentals with principles of geophysics. The program leading to the Bachelor of Science (B.S.) in Geophysics permits many electives and a high degree of flexibility for each individual student. Graduate programs give specialized training for professional work in exploration, research, and education.

The Department of Geophysics is housed in the Ruth Wattis Mitchell Earth Sciences Building. It has a number of research facilities among which are a state-of-the-art broadband seismic recording station, a rock-magnetism laboratory, a geochronology laboratory, several large scale microcomputers, a high pressure and temperature rock deformation laboratory, various instruments for field measurements including 200 seismic group recorders, four dual frequency GPS receivers, and field equipment for measuring in situ stress at great depth. Current research ac-
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,J,K,L,M,S,T,V) during the senior year. Seniors in Geophysics who expect to do graduate work are urged to take the Graduate Record Examination as early as is convenient in their final undergraduate year.

CURRICULUM

Course No. and Subject

Chem. 31. Chemical Principles
Chem. 135. Physical Chemical Principles
or Physics 170, 171. Thermodynamics
Elect. Engr. 141. Electromagnetic Fundamentals
or Physics 120. Electricity and Magnetism
Geol. & Envir. Sci. 1. Planet Earth
Geol. & Envir. Sci. 80. Earth Materials
Geol. & Envir. Sci. 102. Introduction to Field Geology
Geol. & Envir. Sci. 111, 112. Structural Geology
Math. 19, 20, 21, and 44, or 41, 42, 43, and 44.
Analytical Geometry and Calculus
Math. 130. Ordinary Differential Equations
Physics 57, 58, 64A, 64B, 120, 121, 122, 210, 211, or Elect. Engr. 142; Math. 103, 106, 113, 114, 131, 132; and Chem. Engr. 140, 150.

RECOMMENDED ELECTIVES

Recommended elective courses that do not fill the 9-unit requirement are Comp. Sci. 105 or 106; Geol. and Envir. Sci. 190A and B, and 181; Physics 57, 58, 64A, 64B; 120, 121, 122, 210, 211; or Elect. Engr. 142; Math. 103, 106, 113, 114, 131, 132; and Chem. Engr. 140, 150.

HONORS PROGRAM

The department offers a program leading to the B.S. degree in Geophysics with Honors. The guidelines are:

1. Select a research project, either theoretical, field, or experimental, that has the approval of an adviser.
2. Submit a proposal to the department, which will decide on its suitability as an honors project. Necessary forms are in the department office.
3. Course credit for the project is assigned by the adviser within the framework of Geophysics 205.
4. The decision as to whether a given independent study project does or does not merit an award of honors shall be made jointly by the department and the student's adviser. This decision shall be based on the quality of both the honors work and the student's other work in earth sciences.
5. The work done on the honors program should not be used as a substitute for regularly required courses.

GRADUATE PROGRAMS

MASTER OF SCIENCE

Objectives — To 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,V,Y). Make up deficiencies in previous training. Not more than 10 units of such work may be counted as part of the minimum total of 45 units. A background in field geology should be at the level of Geological and Environmental Sciences 190A and B.
4. Submit a Program Proposal for the Master’s Degree in the first quarter of enrollment.

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

M.S. IN EXPLORATION AND DEVELOPMENT

Objectives — To provide the theoretical and practical background needed for a career in petroleum exploration or development geophysics. The program takes four quarters, beginning and ending in the Autumn Quarter. A summer internship working in industry or in a government lab is an integral part of the program. A written report based on the summer internship is completed in the final Autumn Quarter.

Prerequisites — B.S. degree in geophysics, geology, physics, engineering, or mathematics; a sequence of courses in mathematics at least through ordinary differential equations; and at least one course in introductory geology. The following additional undergraduate courses are recommended: computer science, complex variables, linear algebra, petrography, and structural geology.

Requirements for the Degree — Geophysics 170 or 190, 174, 182, 183, 184, 262, 284, 380A, 380B, 397; Geological and Environmental Sciences 110 or 111 and 112, 240, 247 or 248, 251, 253; Petroleum Engineering 120, 130, 131; and Electrical Engineering 104 or 261 or 363; and elective courses in earth sciences, mathematics, physics, and engineering. Recommended electives include Geophysics 111, 150, 285, 397; and Geological and Environmental Sciences 151, 254. If appropriate, based on previous experience, requirements may be waived and additional electives substituted with consent of the program adviser. At least 45 units are normally required for the completion of this degree.

DOCTOR OF PHILOSOPHY

Objectives — The Ph.D. degree is conferred upon evidence of high attainment in Geophysics and ability to conduct an independent investigation and present the results of such research.

Requirements for the Degree — A minimum of three years and the completion of 108 units of graduate study at Stanford must be satisfactorily completed. At least two of these years, ordinarily the first, must be spent as a registered student at Stanford. During the first year, candidates take three quarters of Research Seminar (Geophysics 385A, D, E, G, H, J, K, L, M, S, T, V, Y). Ph.D. candidates in Geophysics are required to complete Physics 121 or Electrical Engineering 142, 261; Engineering 102W, and Physics 210, 211, or Math. 220A, 220B, and five courses from the following groups, no more than one course per group: 102; 142, 242; 174; 183; 200; 251; 262; 276, 287; 283; 284, 285, 286; 288, 290. Additional advanced courses are selected from the following topics: applied physics, astrophysics, atomic and nuclear physics, communications theory, computer sciences, civil engineering, chemical engineering, electromagnetic theory, engineering mechanics, geology, geophysics, materials science, physics of solids, and thermodynamics.

Students who wish to waive any of the required courses must petition the department in writing before their admission to candidacy. Petitions must state a well-reasoned plan for the substitute requirements. Petitions submitted after admission to candidacy are approved only in extraordinary circumstances. Students without practical electronics experience are strongly encouraged to take a lab course such as Engineering 41A, 42A, or 44.

The candidate’s record must indicate outstanding scholarship, and deficiencies in previous training must be improved. Experience as a teaching assistant (quarter-time for at least two academic quarters) is required for the Ph.D. degree. The student must pass the departmental written qualifying examination (given annually in September) by the second year; pass the departmental oral examination by presenting and defending a written research paper or proposal by the end of the second year; submit an Application for Candidacy; fulfill the requirements of the minor department, if a minor is elected; prepare under faculty supervision a dissertation that is a contribution to knowledge and the result of independent work expressed in satisfactory form; and pass the University oral examination, which is essentially a defense of the dissertation.

The Ph.D. dissertation must be submitted in its final form within five calendar years from the date of admission to candidacy. Candidates who fail to meet this deadline are required to reapply for admission to candidacy and retake the department and University oral examinations. They are given one additional year in which to submit dissertations.

University requirements for the M.S. and Ph.D. are described in the “Graduate Degrees” section of this bulletin.

COURSES

4. Natural Hazards and Human Survival — For non-majors and potential earth scientists. Introduction to understanding natural and other hazards, earthquakes, volcanic eruptions, tsunamis, toxic waste disposal, nuclear power plant siting,
their risk assessment, possible mitigation, and protective measures. DR:6(8)
3 units, Aut (Beroza, Segall) MWF 11
Win (Kovach) MWF 10

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

3 units, Spr (Zebker)

102. Geomagnetism and Paleomagnetism — The application of paleomagnetic methods to problems in tectonics and stratigraphy. Origin and analysis of the geomagnetic field, origin of magnetization in geological materials, techniques of measurement, data analysis, apparent polar wandering and plate motion, and analysis of terrane displacement. Students conduct a small-scale paleomagnetic study as a research project. Prerequisite: Geological and Environmental Sciences 1 or 2. Recommended: 150, Geological and Environmental Sciences 110, Physics 53.
3 units, Spr (Zebker)

105. Geochronology — (Same as Geological and Environmental Sciences 165.) Introduction to principles of geochronology, thermochronology, the application of modern tools to geological and geophysical problems. Topics: nuclear structure, isotope systematics, decay schemes for the principal nuclides used in earth sciences, equilibrium and disequilibrium, diffusion and transport phenomena, annealing of fission tracks, neutron activation, a magnetostratigraphy, and cosmogenic exposure ages. Alpha counting, mass spectrometry by gas source, solid source, and ion probe methods. Fundamentals of K-Ar, Ar-Ar, Rb-Sr and U-Pb, and fission track methods. Recommended: undergraduate training in calculus, chemistry, geology, and physics.
3 units, Spr (McWilliams) MWF 11
plus lab
170. Environmental and Geotechnical Geophysics — Utilization of geophysical techniques, seismic reflection and refraction, gravity, magnetics, electromagnetics, resistivity and ground penetrating radar for problems related to environmental clean-up, civil engineering and siting of critical facilities. Surface-based and well-logging methods are reviewed. DR:6(8)

3 units (Zoback) alternate years, given 1996-97


3 units, Aut (Beroza) MWF 9

182. Reflection Seismology — Principles of seismic reflection profiling, focusing on methods of seismic data acquisition and seismic data processing for hydrocarbon exploration.

3 units, Aut (Klemperer) MWF 10

183. Interpretation of Seismic Reflection Profiles — Lectures and workshops on structural and stratigraphic interpretation of seismic reflection data emphasizing hydrocarbon traps in two and three dimensions on industry data, including workstation-based interpretation. Prerequisite: 182, or consent of instructor.

3 units, Win (Klemperer, Graham) MWF 10

184. Seismic Data Processing — Workshop experience in computer processing of seismic reflection data. Students individually process a commercial seismic reflection profile from field tapes to migrated stack, using interactive software on a workstation. Prerequisite: consent of instructor.

3 units, Spr (Klemperer) MWF 9

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

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

1-2 units, Aut, Win, Spr (Claerbout)

185D. Research Seminar: Topics in Crustal Fluids — Research in interdisciplinary problems involving the state and movement of fluids in the earth’s crust. Content varies each quarter.

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

185E. Research Seminar: Tectonics — Research topics on the origin, major structures, and tectonic processes of the earth’s crust. Emphasis on use of deep seismic reflection and refraction data.

1-2 units, Aut, Win, Spr (Klemperer, Sleep, Thompson) MW 3-4:15


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


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


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

185L. Research Seminar: Seismotectonics — Research using seismic reflection and other geophysical data to understand structure and processes in seismically active areas.

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

185M. Research Seminar: Earthquake Seismology — Research on earthquake source processes and seismotectonics.

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

185S. Research Seminar: Seismic Tomography — Current research in transmission and reflection tomography including topics on forward modeling, inversion, and data acquisition.

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

185T. Research Seminar: Crustal Deformation and Fault Mechanics — Current research in crustal deformation with application to active tectonic and volcanic processes. The mechanics of faulting, fracture mechanics, friction, models of strain accumulation and post-seismic deformation, pore fluids, and induced seismicity.

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

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

1-2 units, Aut, Win, Spr (Mavko)

by arrangement

190. General Geophysics — Elementary study of gravitational magnetic, seismic, and thermal properties of the earth. Measurements, interpretation, applications to earth structure and exploration. Lab on field measurements of gravity anomalies, magnetic anomalies, and seismic velocity. Prerequisites: calculus, first-year college physics. Recommended: Geological and Environmental Sciences 110.

3-4 units, Aut (Sleep) MWF 11

lab by arrangement

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

2-3 units (Sleep) MWF 11

200. Fluids in the Earth's Crust — (Same as Geological and Environmental Sciences 200, Petroleum Engineering 200.) Interdisciplinary problems involving the state and movement of fluids in the earth’s crust: basics of the coupling in porous rocks between chemical transport, fluid flow, deformation and stress, and waves; applications to gas hydrates under the oceans; reservoir geophysics; geophysical recovery monitoring; aquifer geophysics; pore pressure in faulting and aftershocks and in the earth’s crust; permeability from seismic; viscoelastic rebound; pore fluids and subduction; from sediment transport to seismic reflection; pressure solution and styolites. Prerequisite: consent of instructor.

3 units, Spr (Nur)

205. Honors Program — Experimental, observational, or theoretical honors project and thesis in geophysics under supervision of a faculty member. Students who elect to do an honors thesis should begin planning it no later than Winter Quarter of the junior year. Prerequisites: superior work in the earth sciences and approval of the department.

1-3 units, Aut, Win, Spr, Sum (Staff)

by arrangement

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

3-4 units (Pollard)

alternate years, given 1996-97


3-4 units, Spr (Pollard) MWF 9

alternate years, not given 1996-97

242. Theoretical Ecology — (Same as Biology 242.) Mathematical models in ecology for upper-division undergraduates and graduate students. Topics from behavioral ecology, population dynamics and genetics, and community ecology. Theme varies each year. 1995: develop a computer-based primer on ecological theory. Prerequisites: differential equations, linear algebra, and computer programming.

3 units, Aut (Roughgarden) TTh 10

alternate years, not given 1996-97

251. Fundamentals of Linear Wave Phenomena — Topics on wave propagation and scattering for acoustics and electromagnetics. Emphasis is on developing a basic understanding of scalar wave phenomena in homogeneous media and practical applications of waves in heterogeneous Earth media. Topics: derivations of the fundamental wave equations for homogeneous and inhomogeneous media, solutions in one, two, and three dimensions, dispersive and nondispersive waves, group and phase velocity, attenuation, invariant embedding for layered media, the Bremmer, Born, and Rytov series, and waves in random media. Prerequisites: differential/ integral calculus and complex functions.

3 units, Spr (Harris)

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)
276. Theoretical Seismology — Survey of modern methods in seismic wave propagation. Topics: anelastic attenuation, plane-wave propagation, anisotropy, propagator matrix techniques, generalized ray, reflectivity and full-wave theory, geometric ray theory, and related asymptotic techniques. Provides a rigorous introduction to these methods and a context for them in current research on earthquakes and earth structure. Prerequisite: 174.
3 units, Win (Beroza) 
alternate years, not given 1996-97

283. Geophysical Inverse Problems — Fundamental concepts of inverse theory with application to geophysics. Inverses with discrete and continuous models, generalized matrix inverses, resolving kernels, regularization, use of prior information, singular value decomposition, nonlinear inverse problems, back-projection techniques, and linear programming. Application to seismic tomography, earthquake location, migration, and fault slip estimation. Prerequisite: Math. 103.
3 units (Beroza, Segall) 
alternate years, given 1996-97

3 units, Spr (Biondi, Claerbout) MWF 10

285. Earth Soundings Analysis — Convolution, spectra, discrete Fourier transform, Z-plane, feedback, adjoint operators, model fitting by least squares, time series analysis, missing data restoration, phase, resolution and random signals, signal entropy.
3 units, Aut (Claerbout) MWF 10 
alternate years, not given 1996-97

3 units (Claerbout) 
alternate years, given 1996-97

3 units (Beroza) 
alternate years, given 1996-97

288. Crustal Deformation — Collection, reduction, and analysis of crustal deformation measurements for the study of plate motion, earthquakes, and volcanoes. Data types include terrestrial geodetic methods (leveling, triangulation, laser distance measurements), and space methods (GPS, VLBI, SLR, and continuous strain instruments). Inverse methods for analyzing data. Prerequisite: 283 or equivalent.
3 units, Win (Segall) 
alternate years, not given 1996-97

289. Global Positioning System in Earth Sciences — Basics of GPS, emphasizing monitoring crustal deformation with a precision of millimeters over baselines tens to thousands of kilometers long. Applications: mapping with GIS systems, airborne gravity and magnetic surveys, marine seismic and geophysical studies, mapping atmospheric temperature and water content, measuring contemporary plate motions, and deformation associated with active faulting and volcanism.
3 units (Segall) 
alternate years, given 1996-97

3 units (Zoback) 
alternate years, not given 1996-97

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

385A,D,E,G,H,J,K,L,M,S,T,V,Y. Research Seminars — Opportunity for advanced graduate students to frame and pursue research or thesis research within the context of one of the ongoing research projects in the department, and present thesis research progress reports before a critical audience on a regular basis. Prerequisite: consent of the instructor.

385A. Research Seminar: Reflection Seismology — See 185A.
1-2 units, Aut, Win, Spr (Claerbout)
385D. Research Seminar: Topics in Crustal Fluids — See 185D.
1-2 units, Aut, Win, Spr (Mavko, Nur)
by arrangement
385E. Research Seminar: Tectonics — See 185E.
1-2 units, Aut, Win, Spr (Klemperer, Sleep, Thompson) MW 3:45
385G,H. Research Seminar: Earthquake Seismology and Global Tectonics — See 185G,H.
1-2 units, Aut, Win, Spr (Sleep)
by arrangement
385J. Research Seminar: Paleomagnetism, Geochronology, and Tectonics — See 185J.
1-2 units, Aut, Win, Spr (McWilliams)
by arrangement
385K. Research Seminar: Borehole Geophysics — See 185K.
1-2 units, Aut, Win, Spr (Zoback)
by arrangement
385L. Research Seminar: Seismotectonics — See 185L.
1-2 units, Aut, Win, Spr (Zoback)
by arrangement
385M. Research Seminar: Earthquake Seismology — See 185M.
1-2 units, Aut, Win, Spr (Beroza)
by arrangement
385S. Research Seminar: Seismic Tomography — See 185S.
1-2 units, Aut, Win, Spr (Harris)
by arrangement
385T. Research Seminar: Crustal Deformation and Fault Mechanics — See 185T.
1-2 units, Aut, Win, Spr (Segall)
by arrangement
385V. Research Seminar: Poroelasticity — See 185V.
1-2 units, Aut, Win, Spr (Mavko)
by arrangement
387. Introduction to Contemporary Geophysics — Required of all first-year graduate students. Seminar on current topics of interest in geophysics emphasizing active research within the department and at other institutions.
1 unit, Aut, Win, Spr (Staff) F 3:15
399. Teaching Experience in Geophysics — On-the-job training in the teaching of geophysics. An opportunity to develop problem sets and lab exercises, grade papers, and give occasional lectures under the supervision of the regular instructor of a geophysics course. Regular conferences with instructor and with students in the class provide the student teacher with feedback about effectiveness in teaching.
2-4 units, any quarter (Staff) by arrangement
400. Research in Geophysics
any quarter (Staff) by arrangement

PETROLEUM ENGINEERING

Emeriti: (Professors) William E. Brigham (on active duty), Sullivan S. Marsden, Jr., Frank G. Miller; (Consulting Professors) Alvah J. Horn, Marshall B. Standing
Chair: Roland N. Horne
Associate Chair: Thomas A. Hewett
Assistant Professor: Martin J. Blunt
Courtesy Professors: Stephan A. Graham, George M. Homsy
Acting Assistant Professors: Shaun Fitzgerald, Marco Thiele
Consulting Associate Professor: Clayton Deutsch
Consulting Assistant Professor: Jane Woodward

Petroleum engineers are concerned with the design of processes for hydrocarbon recovery from oil and gas reservoirs. Included in the design process are characterizing the spatial distribution of reservoir properties, drilling wells, designing and operating production facilities, selecting and implementing methods for enhancing fluid recovery, predicting recovery process performance, monitoring reservoirs, and examining environmental aspects of petroleum exploration and production. Given the complex and changing nature of the problems involved, the Department of Petroleum Engineering curriculum provides a sound background in basic sciences and their application to practical problems. Course work includes fundamentals of chemistry, computer science, engineering, geology, geophysics, mathematics, and physics. Applied courses cover most aspects of petroleum engineering and some related fields like geothermal engineering and geostatistics. The curriculum emphasizes the fundamental aspects of fluid flow in the subsurface. These principles apply equally well to optimizing oil recovery from petroleum reservoirs and remediating contaminated groundwater systems.
Faculty and graduate students in the department conduct research in a variety of areas including: enhanced oil recovery by thermal means, gas injection, and the use of chemicals; reservoir simulation using computer models; reservoir characterization and mathematical modeling; well test analysis; flow of fluids in pipes; natural gas engineering; optimization; properties of petroleum fluids; and geothermal engineering. Undergraduate students are encouraged to participate in research projects. Graduate programs lead to the degrees of Master of Science (M.S.), Engineer, Engineer with Management Option, and Doctor of Philosophy (Ph.D.) in Petroleum Engineering.

The department occupies portions of the Green Earth Sciences Research Building and the Ruth Wattis Mitchell Earth Sciences Building, and it operates laboratories for research in various enhanced oil recovery processes and geothermal engineering. Students have access to a variety of computers for research and course work. Computers available for instruction and research include 13 UNIX workstations within the department as well as extensive campus-wide computer clusters. Each student office has at least one X-terminal.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

The four-year program leading to the B.S. degree provides a foundation for careers in many facets of the energy industry. The curriculum includes basic science and engineering courses that provide depth sufficient for a wide spectrum of careers in the energy and environmental industries.

One of the goals of the program is to provide experience integrating the skills developed in individual courses to address a significant design problem. In Petroleum Engineering 180, taken in the senior year, student teams design facilities for a real petroleum reservoir to meet specific management objectives.

In brief, the credit and subject requirements are:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Minimum Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering fundamentals</td>
<td>20-22</td>
</tr>
<tr>
<td>Mathematics</td>
<td>21</td>
</tr>
<tr>
<td>Science</td>
<td>24-25</td>
</tr>
<tr>
<td>Petroleum engineering depth</td>
<td>39-40</td>
</tr>
<tr>
<td>Distribution, writing, language, and electives</td>
<td>71-76</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
</tr>
</tbody>
</table>

The following courses constitute the normal program leading to a B.S. in Petroleum Engineering. The program may be modified to meet a particular student's needs and interests with the adviser's approval.

MATHEMATICS

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 41. Calculus and Analytical Geometry</td>
<td>5</td>
</tr>
<tr>
<td>or Math. 19. Calculus and Analytical Geometry</td>
<td>3</td>
</tr>
<tr>
<td>Math. 42. Calculus and Analytical Geometry</td>
<td>5</td>
</tr>
<tr>
<td>Math. 20. Calculus and Analytical Geometry</td>
<td>3</td>
</tr>
<tr>
<td>Math. 21. Calculus and Analytical Geometry</td>
<td>4</td>
</tr>
<tr>
<td>Math. 43. Calculus and Analytical Geometry</td>
<td>5</td>
</tr>
<tr>
<td>Math. 44. Calculus</td>
<td>3</td>
</tr>
<tr>
<td>Math. 130. Ordinary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>or Mech. Engr. 100. Differential Equations in Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
</tr>
</tbody>
</table>

SCIENCE

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 31. Chemical Principles</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 33. Structure and Reactivity</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 171. Physical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 1. Planet Earth</td>
<td>4-5</td>
</tr>
<tr>
<td>Physics 51. Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>Physics 53. Electricity and Magnetism</td>
<td>4</td>
</tr>
<tr>
<td>Physics 54. Electricity and Magnetism Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>24-25</td>
</tr>
</tbody>
</table>

ENGINEERING FUNDAMENTALS

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp. Sci. 106A. Programming Methodology</td>
<td>5</td>
</tr>
<tr>
<td>or Comp. Sci. 106X. Programming Methodology and Abstractions</td>
<td>5</td>
</tr>
<tr>
<td>Engr. 10A. Applied Mechanics</td>
<td>5</td>
</tr>
<tr>
<td>or Engr. 10. Applied Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>and Engr. 11. Mechanics of Materials</td>
<td>4</td>
</tr>
<tr>
<td>Engr. 30. Engineering Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Engr. 33. Introductory Fluids Engineering</td>
<td>4</td>
</tr>
<tr>
<td>Pet. Engr. 167. Engineering Valuation of Oil and Gas Wells</td>
<td>3</td>
</tr>
<tr>
<td>or Engr. 60. Engineering Economics</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>20-22</td>
</tr>
</tbody>
</table>

Students in junior- and senior-level petroleum engineering courses are assumed to have competence in a high-level language such as FORTRAN or C.

ENGINEERING DEPTH

The following courses constitute the core program in Petroleum Engineering:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A list of suggested electives and sample course programs are available in the Department of Petroleum Engineering, room 65, Green Earth Sciences Research Building. It is important to start mathematics courses in the first year and engineering and geology early in the second year. Computers are used extensively in most petroleum engineering courses. Students must develop programming skills through appropriate coursework and self-study and are expected to achieve fluency in the use of FORTRAN, C, or C++ by their junior year.

HONORS PROGRAM

A limited number of undergraduates may be admitted to the honors program at the beginning of their senior year. To be admitted, the student must have a letter grade indicator (LGI) of at least 3.0 in all course work in the University. In addition to the minimum requirements for the B.S. degree, the student must complete 6 units of advanced petroleum engineering courses and at least 3 units of research (Pet. Engr. 193).

Students who wish to be admitted to the honors program should consult with their adviser before the start of their senior year. Those who do not meet all of the formal requirements may petition the department for admission. Those completing the program receive the B.S. degree in Petroleum Engineering with Honors. An overall 3.5 LGI is required in all petroleum engineering courses for graduation with honors.

COTERMINAL B.S. AND M.S. PROGRAM

A Stanford undergraduate majoring in engineering or earth sciences may apply to work simultaneously toward bachelor’s and master’s coterminous degrees under terms indicated in the introductory material for the School of Earth Sciences.

The applicant’s petition must provide evidence of strong academic performance. The petition is evaluated by the graduate admissions committee of the department. Applicants must take the Graduate Record Examination (GRE). Typically, at least a 3.25 LGI in engineering, science, and mathematics, and a 3.0 LGI overall, is expected. Students seeking a B.S. in an engineering field other than petroleum engineering, and an M.S. in Petroleum Engineering should plan to take petroleum engineering and geology undergraduate requirements as a portion of the engineering breadth requirement for the undergraduate degree.

GRADUATE PROGRAMS

The energy industry provides a variety of employment opportunities for petroleum engineers with advanced training. A balanced master’s degree curriculum including both engineering coursework and research requires a minimum of one academic year beyond the baccalaureate. An alternative master’s degree program based only on coursework is available. Students who anticipate continuing in the Ph.D. program should follow the research option.

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

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

The Ph.D. degree is awarded primarily on the basis of completion of significant, original research. Extensive coursework and a minimum of two years of graduate work beyond the master’s degree is required. Doctoral candidates planning theoretical work are encouraged to gain experimental research experience in the M.S. program.

MASTER OF SCIENCE

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

Students entering the graduate program are expected to have an undergraduate level petroleum engineering background. Competence in programming in a high level language (Computer Science 106X or the equivalent) and knowledge of petroleum engineering fundamentals and geological fundamentals (Pet. Engr. 120, 130, 140...
and Geol. & Envir. Sci. 151) are prerequisites for taking most graduate courses.

The candidate must fulfill the following requirements:

1. Register as a graduate student for at least three quarters at full tuition or the equivalent of partial-tuition quarters.
2. Submit a Program Proposal for the Master's Degree in the first quarter of enrollment.
3. Complete 45 units with at least an average LGI of 3.0. This requirement is satisfied by taking the core sequence, selecting two of the four additional sequences, and an appropriate number of additional courses from the list of Technical Electives. Students interested in continuing for a Ph.D. are expected to choose the Research Option and enroll in 6 units of Pet. Engr. 360.
4. Students entering without an undergraduate degree in Petroleum Engineering must make up deficiencies in previous training; not more than 10 units of such work may be counted as part of the minimum total of 45 units.

Research subjects include oil and gas recovery, reservoir engineering, reservoir characterization and modeling, production optimization, reservoir simulation, transient well test analysis, flow of non-Newtonian fluids, geothermal energy, natural gas engineering, energy industry management, pipeline transportation, and certain groundwater hydrology and environmental problems.

RECOMMENDED COURSES AND SEQUENCES

The following list is recommended for most students. With the consent of the student's adviser, courses listed under technical electives may be substituted based on interest or background.

**CORE SEQUENCE**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mech. Engr. 201A. Mathematical &amp; Computational Methods in Mechanical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Engr. 201B. Mathematical &amp; Computational Methods in Mechanical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Engr. 201C. Mathematical &amp; Computational Methods in Mechanical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 175. Well Test Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 222. Reservoir Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 251. Thermodynamics of Phase Equilibrium*</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
</tr>
</tbody>
</table>

* Optional for students taking the Geostatistics and Reservoir Modeling sequence.

**ELECTIVE SEQUENCES**

Choose two of the following:

**Enhanced Recovery:**

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

**Geostatistics and Reservoir Modeling:**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geophys. 180. Geologic Interpretation of Reflection Seisograms</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 241. Practice of Geostatistics</td>
<td>3-4</td>
</tr>
<tr>
<td>Total</td>
<td>10-11</td>
</tr>
</tbody>
</table>

**Geothermal:**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. Engr. 150. Energy and Mass Transport</td>
<td>4</td>
</tr>
<tr>
<td>Pet. Engr. 269. Geothermal Reservoir Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
</tr>
</tbody>
</table>

**Petroleum Geology:**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geol. &amp; Envir. Sci. 251. Sedimentary Basins</td>
<td>3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 253. Petroleum Geology and Exploration</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 247. Oil Field Exploration and Development</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
</tr>
</tbody>
</table>

**Reservoir Performance:**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pet. Engr. 160. Field Development Design</td>
<td>3-4</td>
</tr>
<tr>
<td>Pet. Engr. 223. Reservoir Simulation</td>
<td>3-4</td>
</tr>
<tr>
<td>Total</td>
<td>10-13</td>
</tr>
</tbody>
</table>

**Simulation and Optimization:**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pet. Engr. 223. Reservoir Simulation</td>
<td>3-4</td>
</tr>
<tr>
<td>Total</td>
<td>9-10</td>
</tr>
</tbody>
</table>

**Research:**

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

**TECHNICAL ELECTIVES**

With the consent of the adviser, technical electives from the following list of advanced-level courses may be substituted for courses listed above.

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geophys. 190. General Geophysics</td>
<td>4</td>
</tr>
<tr>
<td>Pet. Engr. 131. Well Log Analysis I</td>
<td>2</td>
</tr>
<tr>
<td>Pet. Engr. 211. Computer Applications for Engineers</td>
<td>1</td>
</tr>
<tr>
<td>Pet. Engr. 269. Geothermal Reservoir Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Pet. Engr. 281. Applied Mathematics in 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 15 units of research (Pet. Engr. 360), and including all course requirements of the department’s master’s degree (39 units, excluding research). If the candidate has received credit for research in the M.S. degree, this credit ordinarily would be transferable to the Engineer degree, in which case a total of 9 additional research units would be required. No more than 10 of the 90 required units can be applied to overcoming deficiencies in undergraduate training.

At least 30 units in engineering and closely allied fields must be taken in advanced work, that is, work beyond the master’s degree requirements and in addition to research (Pet. Engr. 360). These may include courses from the Ph.D. degree list below or advanced-level courses from other departments with consent of the adviser. The student must have an average LGI of 3.0 in courses taken in the School of Earth Sciences. A thesis based on 15 units of research must be submitted and approved by the adviser, another faculty member, and the University Committee on Graduate Studies.

MANAGEMENT OPTION

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

A minimum of two years (six full quarters) of graduate study is required. The candidate must complete 90 units of course work, including 15 units of research (Pet. Engr. 360), and including all course requirements of the department’s master’s degree (39 units, excluding research). If the candidate has received credit for research in the M.S. degree, this credit ordinarily would be transferable to the Engineer degree, in which case a total of 9 additional research units would be required. No more than 10 of the 90 required units may be applied to overcoming deficiencies in undergraduate training.

At least 30 units in engineering and closely allied fields must be taken in advanced work, that is, work beyond the master’s degree requirements and in addition to research (Pet. Engr. 360). These may include courses from the Ph.D. degree list below or advanced-level courses from other departments with consent of the adviser. The student must have an average LGI of 3.0 in courses taken in the School of Earth Sciences. A thesis based on 15 units of research must be submitted and approved by the adviser, another faculty member, and the University Committee on Graduate Studies.

DOCTOR OF PHILOSOPHY

The Ph.D. degree is conferred upon demonstration of high achievement in independent research and by presentation of the research results in a written dissertation and oral defense.

A minimum of three years (nine full quarters) of graduate study must be completed satisfactorily. The student is expected to take at least 72 units beyond the 45 units required for the master’s degree. The 72 units are composed of 36 units of research and 36 units of course work, including teaching experience (Pet. Engr. 359), which is a requirement for the Ph.D. degree. The 36 units of course work may include graduate courses in petroleum engineering and courses selected from the following list. Other courses may be approved by the adviser.

MATH AND APPLIED MATH

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aero. &amp; Astro. 210A. Fundamentals of Compressible Flow</td>
<td>3</td>
</tr>
<tr>
<td>Aero. &amp; Astro. 214A. Numerical Methods in Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>Aero. &amp; Astro. 214B. Numerical Computation of Compressible Flow</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 220. Applied Mathematics in Chemical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Civil Engr. 268. Mathematical Methods in Groundwater Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>Comp. Sci. 106X. Programming Methodology and Abstractions</td>
<td>5</td>
</tr>
<tr>
<td>Comp. Sci. 137. Numerical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Comp. Sci. 193D. C++ and Object Oriented Programming</td>
<td>4</td>
</tr>
<tr>
<td>Comp. Sci. 193U. Software Engineering in C</td>
<td>3</td>
</tr>
<tr>
<td>Engr. Econ. Sys. 241A. Introduction to Optimization</td>
<td>4</td>
</tr>
<tr>
<td>Engr. Econ. Sys. 241B. System Theory: Optimization</td>
<td>3</td>
</tr>
<tr>
<td>Math. 106. Introduction to Theory of Functions of a Complex Variable</td>
<td>3</td>
</tr>
<tr>
<td>Math. 113. Linear Algebra and its Applications</td>
<td>3</td>
</tr>
<tr>
<td>Math. 114. Linear Algebra and Matrix Theory</td>
<td>3</td>
</tr>
<tr>
<td>Math. 115. Fundamental Concepts of Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Math. 131. Partial Differential Equations I</td>
<td>3</td>
</tr>
<tr>
<td>Math. 132. Partial Differential Equations II</td>
<td>3</td>
</tr>
<tr>
<td>Stat. 110. Statistical Methods in Engineering and Physical Sciences</td>
<td>4</td>
</tr>
</tbody>
</table>
The dissertation must be submitted in its final form within five calendar years from the date of admission to candidacy by the University Committee on Graduate Studies. Candidates who fail to meet this deadline must submit an "Application for Extension of Candidacy" for approval by the department chair if they wish to continue in the program.

**Ph. D. MINOR**

To be recommended for a Ph.D. degree with Petroleum Engineering as a minor subject, a student must take 20 units of selected graduate-level lecture courses in the department. These courses must include 221 and 222. The remaining courses should be selected from 175, 180, 223, 224, 225, 226, 275, 281, 282, and 284.

**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 an understanding for each resource of supply, distribution, history of development, means of mining/conversion to useful forms, and evaluation of economic, environmental, technical, and political factors that affect consumption patterns. DR:6(8) 3 units, Spr (Woodward) MWF 9

104. Seminar: The Coming Energy Revolution — Views of the three forces that are driving an energy revolution: environmental pressures, economic and social revolution, and technological change. Emphasis is on an efficient, decentralized energy economy that relies on advanced technologies and renewable sources. 3 units, Aut (Woodward) Th 7-9:50 p.m.

120. Fundamentals of Petroleum Engineering — (Same as Engineering 120.) Lectures, problems. Basic engineering topics involved in petroleum recovery. Chemical, physical, and thermodynamic properties of oil and natural gas. Material balance equations and reserve estimates using volumetric calculations. Gas laws. Single phase and multiphase flow through porous media. 3 units, Aut (Blunt) MWF 9


<table>
<thead>
<tr>
<th>COURSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stat. 201. Statistical Methods 3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 231. Introduction to Groundwater Solute Transport 4</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 247. Oil Field Exploration and Development 3</td>
</tr>
<tr>
<td>Geol. &amp; Envir. Sci. 265. Surfaces and Interfaces 3</td>
</tr>
<tr>
<td>Geophys. 180. Geologic Interpretation of Reflection Seismograms 3</td>
</tr>
<tr>
<td>Geophys. 190. General Geophysics 4</td>
</tr>
<tr>
<td>Geophys. 262. Rock Physics 3</td>
</tr>
<tr>
<td>Pet. Engr. 242. Topics in Advanced Geostatistics 4</td>
</tr>
</tbody>
</table>

**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

Ph.D. students are required to take the doctoral qualifying examination at the beginning of the second year of study. Students receiving a master’s degree from the Department of Petroleum Engineering and continuing on for a Ph.D. are required to take the qualifying examination at the first opportunity after the completion of the requirements for the master’s degree.

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

Within a year of passing the qualifying examination, the student must prepare a short written report that contains a literature review and a research proposal. This proposal must be approved after oral examination by a committee made up of the student’s adviser and two other faculty, one of whom must be from the department.

The student’s record must indicate outstanding scholarship. The student must pass the department’s qualifying examination, submit an approved research proposal, fulfill the requirements of the minor department if a minor is elected, and pass the University oral examination, which is a defense of the dissertation. The student must prepare a dissertation based on independent research and that makes a significant contribution to the field.
multiphase flow, adsorption, three phase relative permeabilities.

3 units, Win (Hewett, Blunt) MWF 10

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

3 units, Aut (Lindblom) TTh 1:15-3:05

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

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

140. Drilling and Completion Technology — Principles applied to the drilling and completion of oil, gas, and geothermal wells for off- and onshore operations. Rig mechanics, drilling fluid technology (drilling hydraulics, clay chemistry, and pressure control), cementing technology, bit mechanics, casing design, and directional drilling.

3 units (Staff) not given 1995-96

150. Interdisciplinary Aspects of Reservoir Management — (Same as Geophysics 155.) Survey of reservoir characterization steps needed for optimal reservoir management: problem areas and avenues of development. Lectures set the problem from an industry perspective and present tools, mainly geostatistics, for data integration and solution.

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


1 unit, any quarter (Staff) by arrangement

167. Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities, and Properties — Seminar, problems. Appraisal of development and remedial work on oil and gas wells; appraisal of producing properties; estimation of productive capacity, reserves; operating costs, depletion, and depreciation; value of future profits, taxation, fair market value. Prerequisite: consent of instructor.

3 units, Win (Kourt) M 2:15-5:05 alternate years, not given 1996-97


3 units (Aziz) not given 1995-96


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

180. Field Development Design — All phases of the development of oil and gas fields, emphasizing design criteria. Inflow performance, analysis of reservoir and production systems, well design and simulation, artificial lift, surface facilities, and multidisciplinary approaches to field development. Project and assignments emphasize integrated production and reservoir aspects of major project design and evaluation. Prerequisites: 120, 130, 172 or 272.

3-4 units, Aut (Meehan) M 12-3:05

192. Undergraduate Teaching Experience — Leading field trips, preparing lecture notes, quizzes under supervision of the instructor.

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

193. Undergraduate Research Problems — Original and guided research problems with comprehensive report.

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


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

200. Fluids in the Earth's Crust — (Same as Geological Sciences 200, Geophysics 200.) Interdisciplinary problems involving the state and movement of fluids in the earth's crust: basics of the coupling in porous rocks between chemical transport, fluid flow, deformation and stress, and waves; applications to gas hydrates under the oceans; reservoir geophysics; geophysical recovery monitoring; aquifer geophysics; pore pressure in faulting and aftershocks and in the earth's crust; permeability from seismic; viscoelastic rebound; pore fluids and subduction; from sediment transport to seismic reflection; pressure solution and stromatolites. Prerequisite: consent of instructor.

3 units, Spr (Nur)

204. Seminar: The Coming Energy Revolution — The three forces driving an energy revolution: environmental pressures, economic and social revolution, and technological change. Emphasis is on an efficient, decentralized energy economy that relies on advanced technologies and renewable sources.

3 units, Aut (Woodward) Th 7-9:50 p.m.

211. Computer Applications for Petroleum Engineers — Lectures, seminars, and class projects. Provides "seed" knowledge of the software and hardware available to petroleum engineering students, effective use of computer resources, and some software tools. Focuses on X-Windows, use of graphics, interlanguage communication, and user interfaces.

1 unit (Horne) not given 1995-96

3 units, Win (Hewett, Blunt) MWF 10


3 units, Spr (Hewett) MWF 10


3-4 units, Win (Thiele) TTh 10:30-11:50


3 units, Aut (Hewett) MWF 10


3 units, Spr (Orr) MWF 1:15


3 units (Castanier) not given 1995-96

240. Geostatistics for Spatial Phenomena — (Same as Geological and Environmental Sciences 240.) Probabilistic modeling of spatial and/or time dependent phenomena. Kriging and cokriging for gridding and spatial interpolation. Integration of heterogeneous sources of information. Stochastic imaging of reservoir heterogeneities. Case studies from the oil industry and environmental sciences. Prerequisites: introductory calculus and linear algebra, Statistics 116 or equivalent.

4-5 units, Win (Journel) TTh 1:15-3:05

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

3-4 units, Spr (Journel) TTh 1:15-3:05

242A,C. Topics in Advanced Geostatistics — (Same as Geological and Environmental Sciences 242A,C.) Topics from conditional expectation theory and projections in Hilbert spaces; parametric vs. non-parametric geostatistics; Boolean, Gaussian, fractal, indicator, annealing approaches to stochastic imaging; Bayesian methods for data integration. Prerequisites: 240, advanced calculus, Fortran/Unix.

242A. 3 units, Aut (Journel) TTh 1:15-3:05

242C. 3 units (Journel) not given 1995-96

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

3 units, Spr (Kourt, Harbaugh) W 2:15-5:05 alternate years, not given 1996-97
248. Risk Analysis in Petroleum Exploration — (Same as Geological and Environmental Sciences 248.) Use of formal procedures to make optimum financial decisions in petroleum exploration and exploitation. Estimation of probabilities attached to exploration actions and their utilization in financial forecasts. Extensive use of PC-based problem sets that include a computerized exploration exercise with competing teams. Concepts are applicable to resource exploration and development in general. 
3 units, Win (Harbaugh) TTh 10-12

3 units, Aut (Orr) MWF 1-3

255. Report on Energy Industry Training — Provides on-the-job training under the guidance of experienced, on-site supervisors. Students must submit a concise report detailing work activities, problems, assignments, and key results. Prerequisite: written consent of adviser. 
1 unit (Staff) by arrangement

3 units, Win (Blunt) MWF 1:15

267. Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities, and Properties — Seminar, problems. Appraisal of development and remedial work on oil and gas wells; appraisal of producing properties; estimation of productive capacity, reserves; operating costs, depletion and depreciation; value of future profits, taxation, fair market value; original or guided research problems on economic topics with report. Prerequisite: consent of instructor. 
3 units, Win (Kourt) M 2:15-5:05 alternate years, not given 1996-97

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

3 units, Spr (Fitzgerald) MWF 8

3 units (Aziz) not given 1995-96

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

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

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

3 units, Win (Zhou, Orr) TTh 9-10:20

zation, pollution minimization, nonlinear model matching and parameter estimation. Prerequisite: Mechanical Engineering 201A or consent of instructor.

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

285A,B,C,D,E. Research Seminars — Focused study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Prerequisite: consent of instructor.

285A. Research Seminar — Special drilling, production, or reservoir engineering subjects.
1 unit, Aut, Win, Spr (Staff)
by arrangement

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

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

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

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

359. Teaching Experience in Petroleum Engineering—On-the-job training in teaching petroleum engineering. Student prepares and presents several lectures, problem sets, grades problems, and prepares lab experiments under the supervision of regular instructor. Performance is evaluated by students and the regular instructor.
1-3 units, any quarter (Staff) by arrangement

any quarter (Staff) by arrangement
SCHOOL OF EDUCATION


Dean: Richard J. Shavelson
Associate Dean for Academic Affairs: Denis C. Phillips
Associate Dean for External Relations: Maureen McNulty
Associate Dean for Administration: Vicki Oldberg


Associate Professors: Patricia J. Gumport, Jane Hannaway, Teresa D. LaFromboise, David Rogosa
Assistant Professors: Clea Fernandez, Melanie Sperling

Consulting Assistant Professors: Douglas Rait, Jeremy Roschelle, Jerry L. Talley

* Recalled to active duty.

The School of Education is organized into four Program Area Committees:
Curriculum and Teacher Education (CTE)
Language, Literacy, and Culture (LLC)
Psychological Studies in Education (PSE)
Social Sciences and Educational Practice (SSEP)

These committees function as administrative units that act on admissions, plan course offerings, assign advisers, and set program requirements within their areas. Various subspecialties are offered in most program areas. Faculty members are primarily affiliated with one program, but often participate in more than one area committee. While there is a great deal of overlap and interdisciplinary emphasis across program areas, students are affiliated with one area committee and must meet the degree requirements set by that committee.

Detailed information about admission and degree requirements, faculty members, and specializations related to these area committees can be found in the publication School of Education Information Bulletin.

OFFERINGS

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

The school provides appropriate course work and programs in teaching and administration to recommend candidates to the California Commission on Teacher Credentialing for the Single Subject (secondary) Teaching Credential and the Preliminary Administrative Services Credential. California credential requirements frequently satisfy all or part of the requirements in other states.

Students who have qualified for a preliminary teaching credential in California and need a fifth
year of study and a university recommendation for the Professional Clear California teaching credential may satisfy this requirement in one of the University's degree programs. The Stanford Teacher Education Program (STEP) offers a master's degree along with the credential.

Persons who are interested in becoming principals, central office administrators, or superintendents, and who are seeking the Preliminary Administrative Services credential, must be admitted to the Prospective Principals Program.

Requirements for credentials and degree program requirements do not necessarily coincide, and students seeking a credential along with a degree must make certain that they satisfy both sets of requirements.

The School of Education offers an eight-week summer session. Those who pursue a full program of study (15 units) for eight weeks may earn a full quarter of residence toward the requirement for a degree. Course offerings are covered in the Stanford University bulletin Summer '96 issued in January. The school offers no correspondence or extension courses.

**UNDERGRADUATE PROGRAMS**

The school focuses on graduate education and research training and does not offer an undergraduate major. However, undergraduate education is receiving increased attention in the school, and programs are available to those interested in the field of education. Several courses at the 100 level are especially designed for undergraduates. An honors program is available to undergraduates and, in conjunction with the Haas Center, offers a variety of tutoring opportunities for undergraduates interested in developing educationally oriented skills.

**CHILDREN AND SOCIETY CURRICULUM**

The Children and Society Curriculum is an undergraduate concentration sponsored jointly by the Department of Sociology and the School of Education for undergraduates who wish to build a concentration on education and children into their studies. See the "Children and Society Curriculum" section of this bulletin for course requirements.

**HONORS PROGRAM**

This program permits interested and able undergraduates at Stanford to build on the training received in their major field of study by pursuing additional courses and a research or practicum project in a related area of education.

Students apply for entry during the junior year. At least one course must be taken from each of the following:

3. Foundational disciplines: courses include Introduction to Philosophy of Social Science, Social Sciences and Educational Analysis, Problems in Sociology of Education, Problems of Intelligence, Information and Learning.

A directed reading course as well as directed research courses with a faculty member in Education are also required. Students in the program should enroll in the Undergraduate Honors Seminar, 199A,B,C during their senior year.

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

**COTERMINAL DEGREE PROGRAM**

The School of Education admits 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 master's degree in Education. Approval of the student's undergraduate department and of the School of Education is required. Undergraduates may apply when they complete 105 units, but no later than the end of the 11th quarter of undergraduate work. Students study for both the bachelor's and master's degrees simultaneously and must complete a total of 15 full-tuition quarters or three full-tuition quarters after completing 180 units toward the undergraduate degree. The number of units required for the A.M. degree depends on the program requirements within the School of Education; the minimum is 36 units.

Applicants may obtain coterminal degree application materials from the School of Education. Coterminal applicants may also consult with Graduate Admissions regarding eligibility.

**GRADUATE PROGRAMS**

Several advanced degree programs are offered by the School of Education and are described below. Requirements vary somewhat across programs. Both University and School of Education
requirements must be met for each degree. The University requirements are detailed in the "Graduate Degrees" section of this bulletin. Students are urged to 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 Graduation Admissions, Registrar's Office, Stanford University, Stanford, CA 94305-3005. The admissions packet includes the publication School of Education Information Bulletin, which outlines degrees, programs, admission and graduation requirements, and research interests of the faculty; a reprint of the School of Education section of the Stanford Bulletin, which describes courses and degrees offered; and application materials. All applicants must submit scores from the Graduate Record Examination General Test (verbal, quantitative, and analytical areas); TOEFL scores are also required from those whose first language is not English.

Masters of Arts

The A.M. degree is conferred by the University upon recommendation of the faculty of the School of Education and the University Committee on Graduate Studies. The University residency requirement is three full-tuition quarters of registration as a graduate student at Stanford. The minimum unit requirement is 36 quarter units earned at Stanford as a graduate student. At least 12 units must be taken for a letter grade indicator (LGI) of 'B' or better, and a minimum of 18 units must be taken in the School of Education. Master's students should obtain detailed program requirements from their area committees, and University degree requirements and forms from the Degree Programs office in the School of Education during their first quarter of residence. Some master's degree programs require more than the minimum 36 quarter units. No thesis is required to earn a master's degree; however some programs require a final project, paper, or monograph. Additional detailed information regarding entrance and degree requirements is available in the School of Education Information Bulletin. Upon admission, each student is assigned an advisor from the appropriate area committee to begin early planning of a coherent program.

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

- Social Sciences and Educational Practice
- International Comparative Education
- International Educational Administration and Policy Analysis
- Joint Program with Graduate School of Business
- Policy Analysis
- Prospective Principal's Program Social Sciences in Education (Gender Studies)
- Social Sciences in Education (Interdisciplinary)
- Curriculum Studies and Teacher Education
- Curriculum Areas (Art, English, Social Studies, Education, Science)
- General Curriculum Studies
- Teacher Education
- Language, Literacy, and Culture
- Bilingual Education
- Language Policy
- Second Language Education
- Writing, Reading, and Language – English
- Psychological Studies in Education
- Health Psychology Education
- Stanford Teacher Education Program (STEP)

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 Information Bulletin.

Stanford Teacher Education Program (STEP)

STEP offers a Master of Arts program to prepare humanities and sciences college graduates for careers as secondary teachers of English, languages (French, German, Japanese, Latin, Spanish), mathematics, science (life science, physical science), and social studies. To be successful in classrooms with diverse student populations, STEP helps prospective teachers become more aware of their values, more flexible in their teaching and learning styles, and more knowledgeable in their subject matter. Prospective teachers must make educational choices based on an improved understanding of themselves, their students, their goals, and their educational context. STEP provides the cognitive tools for making those decisions.
The 12-month STEP year begins in June with a summer quarter of intensive academic preparation and experience in summer school programs based at Stanford and nearby schools. During the academic year, students take courses in professional education and academic subjects; they also teach part-time in middle or high schools for the entire public school year. The master's degree and Single Subject (secondary) Teaching Credential require 45 quarter units, taken during four quarters of continuous residency.

STEP also includes the California Cross-Cultural Language and Academic Development (CLAD) emphasis program. CLAD provides enhanced opportunities for candidates to learn about and work with linguistically and ethnically diverse students. The program, which is optional, focuses on theories of language acquisition, English as a second language methodologies, and development of cross-cultural understanding and appreciation of multicultural diversity. Further information regarding admission requirements, course work, and credential requirements is available in the School of Education Information Bulletin.

MASTER OF ARTS, TEACHING (SUBJECT)

The degree of Master of Arts, Teaching (M.A.T.) is reserved for experienced teachers or for individuals who have previously completed a program of teacher preparation. In 1995-96, it is offered jointly by the School of Education and academic departments such as Art, Biology, French and Italian, German Studies, History, Latin American Studies, Mathematics, Physics, and Slavic Languages and Literatures. In addition to these fields, it is possible for candidates to work out special programs in other areas. For information on available M.A.T. programs, contact the School of Education's Admissions Office.

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

General requirements for the degree are:
1. Three quarters of full-tuition registration (or equivalent in partial tuition quarters). Only one quarter of nonmatriculated study may be counted toward the residency requirement for this degree.
2. A minimum of 45 quarter units of graduate study, at least 36 of which must be completed at Stanford.
3. A minimum of 25 units of the courses must be taken for the M.A.T. degree in the teaching field of concentration.
4. At least 12 units of the graduate course M.A.T. degree requirements must be taken in the Stanford School of Education. Certain courses cross-listed in two departments may be used to satisfy requirements in either the academic department or the School of Education, but the same course may not be used to meet requirements in both departments. Requirements for the School of Education consist of courses in the following areas that supplement the candidate's preparation:
   a) Methods in the candidate's teaching field.
   b) A course in curriculum.
   c) Recent work in psychological or social foundations. (If both have been completed elsewhere, other work in the foundation fields — history, philosophy, comparative education, and so on — must be selected in consultation with the adviser in the School of Education.)
5. Requirements in the major teaching field are determined by the major department and the program of professional courses by the School of Education. The program proposal for the degree must be signed by representatives of both the academic department and the School of Education.
6. The candidate must achieve an LGI of at least 'B' in approved Stanford courses in the teaching subject and in professional education, or grades in these courses equivalent to those required for the academic department's Master of Arts degree.
7. Approved general background courses outside of the teaching field and professional education must be used to satisfy some of the unit requirements for the degree.
8. A program proposal for the degree must be 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

The degree of Educational Specialist (Ed.S.) is offered occasionally. The Ed.S. degree requires 45 quarter units beyond the master's degree (or its equivalent) and includes field-based project work. The University requirement of three full-tuition quarters in residence at Stanford also applies. Additional information about admission
SCHOOL OF EDUCATION 107

and program requirements is available in the School of Education Information Bulletin.

DOCTORAL DEGREES

Two types of doctoral degrees are offered by the School of Education. The Doctor of Philosophy (Ph.D.) degree is offered by all program area committees. The Doctor of Education (Ed.D.) degree is offered only in the concentrations of Policy Analysis and Higher Education Administration within the area of SSEP. Both degrees are conferred by the University upon recommendation by the faculty of the School of Education and the University Committee on Graduate Studies. University residency requirements (nine full-time quarters or the equivalent), amount of transfer credit applicable (no more than three full quarters), and the timetable for the stages of progress are the same for both degrees. Additionally, the School of Education unit requirement for both degrees is a minimum of 72 units of course work and research completed at Stanford beyond the baccalaureate degree. (If more than 72 are needed to meet particular Program Area requirements, students may transfer up to 36 units of course work taken within the past seven years.)

Students should note carefully that admission to graduate standing by the University to work toward a doctoral degree does not in itself constitute admission to candidacy for the degree. Students must qualify and apply for candidacy by the end of their second year of study and should obtain information about procedures and requirements during their first year.

The two doctoral degrees offered in the School of Education differ in emphasis, purpose, and the intended careers of those who pursue them. They are equivalent with respect to the amount of time required and the rigor and quality of work demanded. In the Ph.D. degree program, there is greater emphasis on theory and research; the emphasis in the Ed.D. program is on informed and critical applications of existing knowledge to educational practice.

The Ph.D. degree is designed for students who are preparing for (1) research work in public school systems or specialized institutions; (2) teaching roles in education in colleges or universities and research connected with such teaching; or (3) other careers in educational scholarship and research.

The Ed.D. degree is a professional educational degree intended to meet the needs of (1) those who wish a thorough and comprehensive professional understanding of and competence in dealing with educational problems met by administrators, supervisors, and curriculum specialists; and (2) those who wish a scholarly preparation for teaching education in colleges or universities.

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

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

Upon admission, an adviser assigned from the admitting area committee works with the student to establish an appropriate course of study and project research plans. Other faculty members may also be consulted to aid in this process. Details about the varying administrative and academic requirements for each area committee and the School of Education, along with general time frame expectations, are given in the School of Education Information Bulletin. Complete guidelines may be obtained from the specific area committees.

The program concentrations for doctoral study are as follows:

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

Ph.D. MINOR

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

COURSES

OTHER DIVISIONS OF THE UNIVERSITY

Teachers, administrators, and specialists in other areas of education are expected to have substantial knowledge of a variety of academic fields outside the areas encompassed by professional education. Students are therefore urged to consider the courses offered in other divisions of the University in planning their programs.

EDUCATION

The numbering of courses in the School of Education identifies the course level and the audience to which a given course is offered:

100-level — Primarily for undergraduates (graduates may enroll)
200- and 300-level — For A.M. and first- and second-year doctoral students
400-level — Research seminars or similar courses primarily for third-year doctoral students and beyond

Course descriptions are in numerical order and indexed by professional program areas.

An "X" suffix denotes a new experimental course. With faculty approval, after being offered twice, it can be offered as a regular course in the School of Education.

An "S" suffix denotes a special course, given only once and usually taught by visiting faculty.

95S. Issues in Leadership — Priority given to undergraduates and master's students. For students currently in leadership positions in student organizations or residences or those who have jobs or volunteer roles where they are working in groups. Basic theories and concepts of leadership and group process using cross-cultural perspectives to identify one’s own leadership style and skills and to use them effectively: to develop and improve skills in one’s own leadership style and skills and to use them effectively: to develop and improve skills in one's own leadership style and skills and to use them.

100C. Issues and Methodologies in Education: An Introduction for Elementary and Secondary Tutors in Culturally Diverse Settings — Introduces theoretical and methodological issues in and approaches to education. Readings, assignments, and in-class exercises prepare students for tutoring socioeconomically and ethnically diverse populations in a variety of subjects. Required concurrent tutoring placements. (SSEP)

- 3 units, Aut (Wolfe) Th 2:15-4:05
- Win (Wolfe) W 3:15-5:05

100X. The State of Public Education in Urban Communities — Introduction to the current issues and problems in public education in urban communities and the efforts to revitalize schools and communities. Guest presentations by faculty and community members. Community service placement as a tutor or classroom aid required. (SSEP)

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

102. Culture, Class, and Educational Opportunity — Upward Bound and EPASSA counselors work with students from educationally disadvantaged backgrounds. Topics: language education, culture and family, class management, school finance, and community-school relations. Mandatory school visits and classroom observations. (LLC)

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

105. American Education and Public Policy — (Same as 215, History 158B.) Treats policy issues in education, drawing on history and political science. Who influences schooling and how? How have American schools responded to human diversity? What consequences does schooling have? What are the prospects for reform in public education? Lectures and small group discussions. (SSE/APA)

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

106X. Interactive Media in Education — Introduction to use of interactive media in formal education. Workshop views/uses titles of commercial interactive media for education and analyzes/criticizes them. Ideas are used to interpret/understand the experience of learning with interactive media. (CTE)

- 3-5 units, Sum (Walker, Kerns) TTh 3:15-5:05

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. Examples for contemporary social science research literature. (SSE)

- 3 units (Phillips) given 1997-98

114X. History of Liberal Education from Greece to Renaissance — (Enroll in Classics 114.)

- 3-4 units, Win (Bloomer) TTh 1:15

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,
130. Introduction to Counseling — Theories and techniques of counseling. Emphasizes client’s individual and cultural differences and construction of one’s own theory of the counseling process and outcome. Two psychotherapeutic theories, cognitive-behavioral and existential-humanistic, are supplemented with a third theory of each student’s choice. Experiential, problem-based course focuses on how to develop self-awareness and conceptual understandings of counseling processes in culturally diverse contexts. (PSE)

3 units, Win (Greeno) MTWTh 2:15-3:05

131. The Economics of Gender — Economic and policy issues concerning the role of gender. Topics: labor force participation and attachment, earnings, discrimination, occupational segregation, housework, child care, affirmative action, comparable worth, and an introduction to the new feminist economics. (SSEP)

4 units (Strober) given 1996-97

141. Children, Civil Rights, and Public Policy in the U.S. — (Same as 241.) Overview of the critical issues and policies that impact children and civil rights in our society. Lectures, readings, and discussions on challenges facing America in the 1990s. National policy and legal concerns pertaining to children and civil rights in a historical and practical perspective. The people and institutions that play central roles in the policy making and judicial process. (APA)

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

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

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

149. Theory and Issues in the Study of Bilingualism — (Same as 249, Spanish 207.) Key issues in the study of bilingualism from a sociolinguistic perspective. Emphasis on typologies of bilingualism, the acquisition of bilingual ability, the description and measurement of bilingualism, and the nature of societal bilingualism. Prepares students to work with bilingual students and their families and to carry out research in bilingual settings. (LLC)

3 units, Aut (Valdés) T 3:15-6:05

155. Development of Measuring Instruments — For students planning to develop written or performance tests or questionnaires for research and evaluation, and for teachers wishing to improve classroom examinations. Planning tests, writing items, item tryout and criticism, qualities desired in tests, and interview techniques. Lectures, case studies, and practical exercises. (PSE)

3 units (Haertel) given 1996-97

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 the role played by American culture in shaping one’s own attitudes, values, and behavior. Prerequisite: consent of instructor. (ICE)

3 units, Spr (Herring) by arrangement

163X. Technology Policy, Knowledge Formation, and Economic Development — The nature of national policies toward economic development and technology. The impact this technology, set in the context of those policies, has on the kinds of skills demanded in the labor force and the production of knowledge. (ICE, SSE)

2-5 units (Carnoy)

165X. History of Higher Education in the U.S. — (Same as 265X, History 166/366.) From the founding of Harvard in 1636 to the present, with emphasis on institutional development, governance, and evolving purposes and clientele. (APA)

3-5 units (Lyman) not given 1995-96

170. Gender and Education — (Same as Feminist Studies 130.) The impact of organizational and larger societal forces on the experience of men and women in educational institutions. Effects on educational outcomes and on the way boys and girls relate to each other in educational settings. The evidence for bias against girls within schools, focusing on making arguments and forming policies based on research evidence. (SSEP)

4 units, Spr (E. Cohen) MW 3:15-5:05

171X. Peer Health Education — Preference given to students who make a commitment to serving as a Peer Health Educator. Instruction in peer health education leading to a Stanford University Peer Health Education certificate. Topics: health promotion program planning, theory and practice of behavior change, and an exploration of contemporary college health issues. Seminars and problem-based learning. Enrollment limited. Prerequisite: consent of instructor. (PSE)

3 units, Spr (Thoreson, Pertofsky) MW 3:15-5:05
173X. Peace Studies—(Same as History 154, Political Science 133, Psychology 142.) Interdisciplinary, dealing with the challenges of pursuing peace in a world where the sources of conflict are many and regional, ethnic, and religious antagonisms are rising. The art of creating and maintaining peace is analyzed from historical, social, psychological, and moral perspectives. Goals: to illustrate the current and potential contributions of various academic disciplines and critical analyses to the study of peace; and to prepare students to think critically and to act responsibly and effectively on behalf of peace. Eight sections: challenges, enemies, theoretical understandings, justice, security, non-violence, public peace processes, peace and you. (All Areas) 5 units, Spr (Bland, Dreikmeier, Holloway, Moses, Noddings, Ross) MTW 1:15 and by arrangement

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

175A. The Case of Wilderness Education—The use of experiential education in elementary and secondary school curricula. Through a study of wilderness education, investigates the benefits and weaknesses of experiential teaching and learning including: group cohesion in the classroom, changes in student-teacher and student-student relationships, collateral learning, and contagion. Discussion of varied conceptual frameworks for alternative education from Dewey, Bereiter, and Illich. Enrollment limited. Fee: $95. (CTE) 2-4 units (Westheimer) alternate years, given 1996-97

175B. Issues in Implementation—The moral, ethical, and practical issues raised by experiential philosophies and techniques. Relationship between emotional and ethical boundaries of experiential curricula and student-teacher affirmation in the classroom. Bridges research and practice through curricula designed and implemented for local high school students. Fee: $95. (CTE) 2-4 units (Westheimer) alternate years, given 1996-97

177X. Education of Immigrants in Cities—(Same as 277X.) Historical and contemporary approaches to educating immigrant students. Case study approach focuses on urban centers to demonstrate how stressed urban educational agencies serve immigrants and native-born U.S. students when confronted with overcrowded classrooms, controversy over curriculum, current school reform movements and government policies regarding equal educational opportunity. (LLC) 4 units, Aut (Padilla) TH 2:15-4:05

179X. Urban Youth and Their Institutions: Research and Practice—(Same as 279X.) Determinants and consequences of urban life for youth, emphasizing disciplinary and methodological approaches to the study of policies and practices and the growing gap between the perspectives of state and local organizations and those of youth and their communities. The diversity of urban youth experiences with respect to ethnicity, gender, and immigration histories: case studies illustrate civic-level and grassroots institutions, their structures, networks, and philosophies; historical and contemporary examination of diverse realities of urban youth for policymakers, educators, and researchers. Focuses on U.S. cities, with comparative materials from international research. Macro and case-study approaches. (APA) 3 units, Aut (McLaughlin) T 2:15-5:05

180. Directed Reading in Education—For undergraduates and master’s degree students. (All Areas) any quarter (Staff) by arrangement

181X. Mind, Body, and Spirit: Spiritual Health Through the Life Span—(Same as 281X.) The spiritual components of daily living and optimal health are commonly neglected in prevailing educational, medical, and psychological paradigms. Introduction to spiritual features of everyday life, primarily from a psychosocial perspective with a focus on health. Readings and problem-based learning approach to solving spiritually-related problems in elementary spiritual practice. Educational tools and guided practice are applicable in one’s personal and professional life. Limited enrollment. Prerequisite: consent of instructor. (PSE) 3 units, Aut (Thoresen, Luskin) W 1:15-3:05 and by arrangement

190. Directed Research in Education—For undergraduates and master’s degree students. (All Areas) any quarter (Staff) by arrangement

191. Introduction to Educational Statistics in Research—Introduction to data analysis and statistical principles for educational research. URL: http://www-leland.stanford.edu/class/ed19 Corequisite: Statistics 190. (PSE) 2 units, Aut (Rogosa) Th 11-12:30 and by arrangement

197. Education and the Status of Women: Comparative Perspective—(Same as Sociology 134, Feminist Studies 139A.) Theories and perspectives from the social sciences relevant to an understanding of the role of education in changing, modifying, or reproducing structures of gender differentiation and hierarchy. Cross-national research on the status of women and its uses to evaluate knowledge claims from varying perspectives. (SSEP) DR:9f(4 or 5) 4-5 units (Ramirez) given 1996-97

199A,B,C. Undergraduate Honors Seminar—Required for all juniors and seniors in the honors program in the School of Education. Supports students’ actual involvement and apprenticeships in
educational research. Participants are expected to share ongoing work on their honors theses. Prerequisite: consent of instructor. (All Areas)
1 unit, Aut, Win, Spr (Sperling) Th 4:15-6:05

201. History of Education in the United States — (Same as History 158.) Analysis of selected turning points in education in relation to religion, political socialization, race relations, gender, immigration, and urbanization. (SSEP)
3 units, Win (Tyack) MW 11
and by arrangement

202X. Introduction to the Study of International Comparative Education — Required for all A.M. students in ICE, others by consent of instructor. Orientation to the A.M. program and research project, exploration of resources for study and research at Stanford. (ICE)
1-3 units, Aut (Honig)
W 1:15-3:05 bi-weekly

204. Introduction to Philosophy of Education — Introduces current approaches and techniques in the philosophy of education; material has been selected for its general relevance to students of education. Attention to feminist and radical theories of education. Introductory philosophical material is presented in the context of educational issues. (SSE)
4 units, Aut (Noddings) MW 10:11-1:50

206B. Project Workshop in International and Comparative Education — The conclusion of the four-quarter A.M. program in IDE, required of all A.M. students. Organized around the students' "Master Project" and provides in-depth reviews of draft project reports. The final version of the report is due at the end of the course. (IDE)
2-5 units, Sum (Honig) W 2:15-4:05

206X. Applied Research Methods in International and Comparative Education — Required for all A.M. students in ICE and IEAPA; others by consent of instructor. Enhances skills in undertaking independent research in international development education through a combination of reading and discussion of the methodological issues most relevant to the field. (ICE)
3-5 units, Win (Honig) T 4:15-6:05
Th 11-12:30

207. Seminar: The Politics of International Cooperation in Education — Analysis of policies and practices in international cooperation, assistance, and exchange. Emphasis is on the role of international organizations (World Bank, UNESCO, OECD) and the politics of multilateral and bilateral assistance programs. (ICE, SSE, APA)
3-5 units, Spr (Honig) TTh 3:15-5:05

208A. Introduction to Curriculum — Curriculum theory and the history of curriculum as a field of study. Aims and objectives, proactive and interactive views, explicit and implicit curricula, introduction to problems of program evaluation. (CTE)
4 units, Aut (Eisner) MW 8-9:50

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, Win (Walker) W 7-10 p.m.

208C. Introduction to Curriculum — Curriculum studies for those concerned primarily with school administration. Topics: curriculum theory, relation of theory and practice, schools and classrooms as contexts for curriculum, curricular policy mandates, leadership in school curricular issues, curriculum development, curriculum implementation. (CTE)
3 units (Walker) not given 1995-96

209X. Communities of Learning: Recasting Relationships in the Classroom and School — Investigates theory, policy, and practice of efforts to build community in schools. What is the role of experience, organization, and context in community-building? What are the assumptions and consequences for schools? Discussion of varied conceptual frameworks for alternative education and school organization from Dewey, Gardner, Sergiovanni, and Goodlad. Enrollment limited. Fee: $55. (CTE)
4 units, Aut (Westheimer) T 7-9:30 p.m.

210. Problems in Sociology of Education — (Meets with 310; same as Sociology 232/330.) Introduction to sociological approaches to educational phenomena. Topics: school organization and environment, the relationship of education to adult roles, the impact of social class and ethnicity on classroom learning, and the social structure of the classroom. Read and evaluate social sciences research. Short written assignments and individual feedback. (SSEP)
4 units, Win (E. Cohen) MW 3:15-5:05

211X. Master's Seminar in Social Sciences in Education — Limited to master's students in SSE. Directed, hands-on forum for SSE students to critically examine the process of developing and shaping a research program, integrating it with academic and field experiences, and building relationships beyond the program. Students conceptualize their projects and focus on researchable topics: effective revising and editing, job searches, working with your adviser, "what next?" or a celebration of our achievements so far. (SSE)
1 unit, Aut (Martos) Th 2:15-4:05
Win (Martos) T 4:15-6:05

212X. Groupwork for Heterogeneous Classrooms — Theory and practice of cooperative learning: organizing and managing the classroom for groupwork, designing multiple ability curricula and treating status problems in classes where students have a wide range of previous academic achievement. Small groups conduct discussions of teacher-
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)

214X. Popper, Kuhn, and Lakatos — (Same as Philosophy 156.) Popper, Kuhn, and Lakatos are 20th-century philosophers of science who have raised fundamental issues dealing with the nature of scientific progress: the rationality of change of scientific belief, science vs. non-science, role of induction in science, truth or verisimilitude as regulative ideals. Their impact in the social sciences and applied areas such as educational research. (SSE)
3 units (Phillips) given 1996-97

215. American Education and Public Policy — (Same as History 158B, Political Science 186K.) For graduate students. See 105. (APA)
3 units, Aut (Kirst, Tyack) MW 2:15-3:05
and by arrangement

216. Survey of Educational Research Methods — For first-year LLC students and others. The basics of conceptualization, design, instrumentation, and interpretation of empirical research using quantitative and qualitative approaches. Designed around individual student projects. (LLC, CTE)
5 units, Aut, Win (Calfee) MWF 8-9:50

217. Intellectual Development and Instructional Design — Research on children's thinking and its development has been conducted within distinct traditions, each with its own focus, methodology, and background assumptions, i.e., the empiricist tradition (from Gesell to Siegler), the rationalist tradition (from Baldwin and Piaget to Case and Carey), and the sociohistoric tradition (from Vygotsky to Cole and Olson). Introduction to these traditions, emphasizing their implications for instruction. Empirically-based paper required. (PSE)
4 units, Sum (Case) F 1:15-4:05
and by arrangement

218. Society, Education, and Dance — (Same as Dance 268.) The role of dance as a transmitter of cultural perspectives. Cross-cultural analysis tracing the roots of dance from ritual to higher education and incorporating 20th-century philosophers' perspectives on the social functions of dance. (CTE)
4-5 units, Aut (Cashion, Ross) TTh 1:15-3:05
and by arrangement

219. Artistic Development of the Child — Introduces research in the behavioral sciences having relevance for understanding the child's artistic development. (CTE)
4 units, Aut (Eisner) MW 1:15-3:05
alternate years, not given 1996-97
consequences, intended and unintended, using one or more of the analytic frameworks presented. Enrollment limited to 30. (APA, SSE)

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

225Y. 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, Win (Levin) by arrangement

221. Issues in Policy Analysis — Major concepts associated with the development, enactment, and execution of social policy. Issues of policy implementation, agenda setting and problem formulation, coalition politics, and intergovernmental relations are examined through case materials and supplementary readings. Objective: identify and understand factors that affect ways in which analysts and policymakers learn about the policy system and ways in which they can influence it. (APA)

3 units, Win (McLaughlin) MW 10-12

222. Resource Allocation in Education — Problems of optimization and design, and evaluation of decision experience. Marginal analysis, educational production functions, cost effectiveness and cost-benefit analysis, constrained maximization, program evaluation. Introduction to linear models for large-scale data analysis. Implications to model assumptions. (APA)

4-5 units, Spr (Levin) MW 1:15-3:05

223. Effective Schools: Research, Policy, and Practice — 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 (Cuban)

alternate years, given 1996-97

224. Information Technology in the Classroom — Use of information technology (computers, interactive video, telecommunications) in secondary school classroom teaching. Basic computer operations and terminology; challenges of planning and teaching with technology; judging the merits of products for educational uses; survey of the types of uses made of technology in schools; and economic, social, and ethical issues, emphasizing equity. Meets fifth-year teacher credential requirement. Winter Quarter open to STEP teachers preferentially. (CTE, STEP)

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

and by arrangement

225. Higher Education Economics, Finance, and Management — Required of Higher Education master's students; recommended for Higher Education doctoral students. Survey of higher education economics, finance, and management. Topics: the general economic model for non-profit entities, revenue sources and uses, cost structures, capital sources and uses, financial reporting, resource allocation methods, information technology, and academic and administrative productivity. Issues such as affordability, cost containment, quality assessment, the teaching-research tradeoff, and approaches to institutional restructuring. Prerequisite: 346. (APA)

4 units, Spr (Massy) MW 10-11:50

226X. Classroom Testing — Research on classroom testing; creating and selecting classroom tests; instructional uses of tests, performance tests, classroom observations, linking testing and instruction, using standardized test results. (PSE)

3 units, Aut (Haertel) MW 3:30-5:05

227. Individual Counseling Psychology Methods — (Same as Psychology 250.) Techniques for helping individual clients learn successful procedures for coping with problems, e.g., shyness, depression, anxiety, obesity, and aggression. (PSE)

3 units (Staff) alternate years, given 1996-97

228. Psychology of Reading — For doctoral and master's students in LLC, PSE, CTE, and SSEP. Focuses on application of psychological principles in understanding the reading and writing process and the acquisition of literacy in school and non-school settings. Key concepts: psycholinguistics, perception and cognition, motivation, and individual differences. (LLC)

3-4 units, Win (Calfee) MW 11-12:30

229X. Teaching and Learning in Japan, China, and the United States — A comparison of approaches and outcomes of education in three cultures. Issues include differences in the profession and practice of teaching, the organization of schooling, socialization into schooling, conceptions of learning, and academic achievement. (PSE)

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

230X. Ethnographic Approaches to Evaluation, Policy Decision Making, and Organizational Transformation — The role of ethnography in addressing contemporary and socially significant issues. Value of ethnographic evaluation in educational settings plus successful strategies to effectively communicate qualitative findings with powerful policymaking bodies to improve our world, including testifying on the hill and sharing findings through the media. Role of ethnographic evaluation in contributing to organizational transformation. (SSEP)

5 units, Spr (Fetterman) W 3:15-5:05
231X. Campus Cultures — Preference given to MA/HE cohort. Ways to recognize and understand the distinctive characteristics of colleges and universities. How an institution's culture shapes its programs, services, policies, governance, and ways of doing things. Seminar on the methods and results of the College Experiences Study and from the college and professional experiences of seminar members themselves. Prerequisite: consent of instructor. (SSEP)
   4 units, Win (Lyons) Th 9-12

233. Counseling Theories and Interventions from a Multicultural Perspective — Review of foundational and new concepts of counseling theory and intervention from a multicultural perspective. Provides students an opportunity to review the impact of culture on clinical presentation, relationship formation, and intervention development and evaluation in individual counseling. Group, community-based, and alternative interventions. (PSE)
   3 units, Spr (LaFromboise) M 1:15-3:05 and by arrangement

234. Career and Personal Counseling in Culturally Diverse Settings — (Same as Psychology 237.) Methods of integrating career and personal counseling with clients and counselors from differing backgrounds. Practice with selected assessment instruments. Case studies of bicultural role conflict. Informal supervised experience. (PSE)
   3 units, Aut (Krumblotz) M 3:15-5:05 and by arrangement

235X. Graduate Proseminar in Educational Policy — Enrollment limited to master's students in Administration and Policy Analysis. (APA)
   1 unit, Aut, Win (Fetterman) W 3:15-4:05
   Spr (Fetterman) W 12-1

236X. Quantitative Methods in Language Research — General notions of level of measurement, norms, standardized scores; different types of reliability, validity, and item analyses as applied to the construction of student designed measures in the language and behavior area, including language functions, attitudes, and beliefs. (LLC)
   4 units, Win (Fishman) TTh 10-12:05

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)
   1-3 units (Staff)
   alternate years, given 1996-97

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

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

238C. Counseling and Health Psychology: Supervised Applications — For first-year counseling psychology students. Advanced study of counseling theories, techniques, and assessment methods. Emphasis on the integration of counseling practice within a research framework. Continuing review of training tapes, role-playing, and supervision of counseling experiences. Prerequisite: consent of instructor. (PSE)
   3 units, Spr (Krumblotz, Thoresen, LaFromboise) by arrangement

239. Contemporary Social Issues in Child and Adolescent Development — Focuses on critical social and developmental issues that affect children and adolescents. Topics: divorce and single parenting, child care, poverty, sexuality, and mass media, emphasizing the impact of these conditions on normal development, education, and school-related social and cognitive performance. (PSE)
   4 units, Win (Padilla) MW 1:15-3:05

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

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

242. First-Year Proseminar in Language, Literacy, and Culture — For master's and first-year doctoral students in LLC. Introduces basic concepts and pragmatics of the field; provides opportunities to meet faculty, respond to critical readings, and explore professional matters. (LLC)
   4 units, Aut (Padilla) MW 11-1:05

243. Research in Writing and Writing Instruction — Tradition and change in writing research, emphasizing theoretical and pedagogical implications. Topics: Formalist, cognitive, and social-con
textual approaches; writing and learning: writing/reading connections; writing/speaking connections; the composing process; writing pedagogy; individual research projects. (LLC, CTE)

4 units (Sperling)

alternate years, given 1996-97

245S. Fostering a Community of Teachers and Learners — Teacher research, design, and implementation of Communities of Learners (COL) curriculum. Issues and strategies. For STEP students. Limited enrollment. (STEP)

1-5 units, Aut, Win, Spr (Westheimer) by arrangement

246A,B,C,D. Secondary Teaching Seminar — Preparation and practice in issues and strategies for teaching in classrooms with diverse students. Topics: instruction, curricular planning, classroom interaction processes, portfolio development, teacher professionalism, patterns of school organization, teaching contexts, and government educational policy. Classroom observation and student teaching with accompanying seminars during each quarter of STEP year. 16 units required for completion of the program. Prerequisite: STEP student. (STEP)

246A. 1-13 units, Sum (Carter) W 1:30-3:15 and by arrangement

246B. 1-13 units, Aut (Carter) W 6-8 p.m. and by arrangement

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

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

247. Moral Education — Philosophical issues in moral theory and education, including consideration of the Kohlberg-Gilligan debate and contemporary issues on values and religious education. (SSE)

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

248. Theory and Issues in Literacy — Theoretical issues in writing and literacy and implications for education. Connections between literacy, thinking, and learning, emphasizing kinds and definitions of literacy, oral and written language, social construction of literacy, historical perspectives, and the functions of reading and writing. (LLC)

4 units, Aut (Sperling) Th 11-2:05 and by arrangement

249. Theory and Issues in the Study of Bilingualism — For graduate students; see 149.

3 units, Aut (Valdés) T 3:15-6:05

250A. Statistics — Regression and categorical models are among the most widely used data-analytic procedures. Topics: basic regression including multiple and curvilinear regression, regression diagnostics, analysis of residuals and model selection, logistic regression, analysis of categorical data. Proficiency with statistical computer packages. Prerequisite: Statistics 60. (SSEP)

4 units, Win (Olkin) MWF 8:30-11

250B. Statistical Analysis in Educational Research: Regression Analysis — Regression and categorical models are among the most widely used data-analytic procedures. Topics: basic regression including multiple and curvilinear regression, regression diagnostics, analysis of residuals and model selection, logistic regression, analysis of categorical data. Proficiency with statistical computer packages. Prerequisite: Statistics 60. (All Areas)

4 units (Olkin) not given 1995-96


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

251X. Language and Ethnicity — Why language is frequently a component of ethnonational consciousness and what attributes are ascribed to language when it becomes consciously associated with ethnic groups and movements. Cases from various parts of the world; general theories of language and ethnicity analyzed. (LLC)

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

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

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

253. Health Psychology Education Proseminar — Primarily for Health Psychology Education master's students. Contemporary topics in promoting health and preventing disease with a focus on education and the utilization of well-designed interventions. Topics: cardiovascular disease and health, cancer, physical activity and fitness, psychosocial support, nutrition, stress reduction, AIDS prevention, personal growth and the spiritual relationship to health. May be repeated for credit. Prerequisite: consent of instructor. (PSE)

4 units, Aut, Win, Spr (Thoresen, Luskin) TTh 10-11:50

254X. Health Psychology Education: Field Work — For students in the Health Psychology masters' program only. The integration of knowledge and skills from course work and practicum experience applied to supervised field setting (e.g., medical clinics, HMOs, public schools, university or corporate settings). Students learn to assess health needs and to design, implement, and evaluate major intervention-driven health enhancement projects. May be repeated for credit. Prerequisite: consent of instructor. (PSE)

3 units, Aut, Win, Spr (Thoresen, Hill) TTh 9
255. Human Abilities — (Same as Psychology 155.) Introductory survey of psychological theory and research on human cognitive abilities; their nature, development, and measurement, and their importance in society. Relation of education and intellectual abilities. Cognitive analysis of verbal reasoning and spatial abilities. Individual differences in relation to motivation, personality, gender, and ethnic differences. Prerequisite: Psychology 1 or equivalent. (PSE) DR:9(4)
3 units, Win (Snow) MWF 10

255A. Human Abilities Research Topics — Discussion of individual student research topics in human abilities. Planned as an adjunct to 255 and Psychology 155, for doctoral students who have special interests not served by the large group instruction provided in those courses. Prerequisites: concurrent registration in 255 or Psychology 155 and consent of instructor. (PSE)
1-2 units, Win (Snow) by arrangement

256. Health Psychology Education: Supervised Practicum — For students in Health Psychology Education Program only. Supervised practice using problem-based learning approaches. Skill training to enable students to assess individual and community health needs and to design, implement, and evaluate health promotion and disease prevention education programs. Students coordinate health programs and function as health education resource aids. May be repeated for credit. Prerequisite: consent of instructor. (PSE)
4 units, Aut, Win, Spr (Thoresen)
TTh 1:15-4:05

257. Statistical Methods for Behavioral and Social Sciences — For students with experience and training in empirical research. Analysis of data from experimental studies through factorial designs, randomized blocks, repeated measures; regression methods through multiple regression, model building, analysis of covariance; categorical data analysis through two-way tables, logistic regression. Integrated with the use of statistical computing packages. URL http://www-leland.stanford.edu/class/ed257 Prerequisites: 191, Statistics 190. (PSE)
6 units, Win (Rogosa) MWF 11-12:30
plus section by arrangement

259. Seminar in Higher Education — For students in MA/HE program only. Students learn about different collegiate cultures, are introduced to several different undergraduate students; graduate students by consent of instructor. The demography and educational needs of the disadvantaged and the investment strategies for improving their situation. Analysis of strategies include educational considerations, cost-benefit studies of interventions, and transformation of educational institutions serving the disadvantaged. Emphasis on the establishment of accelerated schools for all children including the process of change, cultural and organizational issues, and evaluation of results. (APA/SSE)
5 units (Levin) not given 1995-96

262A.B. Curriculum and Instruction (In English) — Approaches to teaching English in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. Prerequisite: STEP student or consent of instructor. (STEP)
262A. 3 units, Sum (Vosovic) TTh 1:15-3:05
262B. 2 units, Win (Spiering) M 4:15-6:05

263A.B. Curriculum and Instruction in Mathematics — Purposes and programs of mathematics in the secondary curriculum; teaching materials, methods. Prerequisite: STEP student or consent of instructor. (STEP)
263A. 3 units, Sum (Brodkey) TTh 1:15-3:05
263B. 2 units, Win (Staff) W 4:15-6:05

264A.B. Curriculum and Instruction in Foreign Languages — Approaches to teaching foreign languages in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. Prerequisite: STEP student or consent of instructor. (STEP)
264A. 3 units, Sum (Azevedo) TTh 1:15-3:05
264B. 2 units, Win (Azevedo) Th 4:15-6:05

265X. History of Higher Education in the U.S. — (Same as History 166/366.) Sec 165X.
3-5 units (Lyman) not given 1995-96

266X. Social Science Research Methods in Education — Introduction to social science research methods commonly used in the study of education. Objectives: prepare students to be thoughtful consumers of educational research; cultivate skills in critiquing research for its strengths and weaknesses; prepare students for further SUSE courses which presume some competence in these areas and/or provide hands-on opportunities to use these research methods. Quantitative and qualitative forms of inquiry are integrated and contrasted, emphasizing correlational and case study research problems and research questions, issues of design, and issues that commonly arise during data collection and data analysis procedures. (SSEP)
6 units, Aut (Gumpert, Shavelson)
MW 10:15-1:15

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

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

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

268A. 3 units, Sum (Cuban, Swenson) TTh 3:15-5:05
268B. 2 units, Win (Cuban, Swenson) T 3:15-5:05

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

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

270. African-American English in Educational Context — The linguistic and cultural conflicts confronting the majority of African-American students. Interdisciplinary research, emphasizing cross-generational educational needs. Ethnographic studies of schools and their students, and the evolution of educational and linguistic research among African Americans. Prerequisite: graduate student, or consent of instructor. (LLC)

3 units, Win (Baugh) M 9-6

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

3-4 units, Spr (Cuban) TTh 8:30-10

273X. Women in Higher Education — Overview of historical, theoretical, and ideological issues related to women's lived experiences as students, faculty, and administrators in higher education, and to the inclusion of feminist scholarship in higher education curriculum. (APA)

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

274. Learning, Teaching, and Schooling in Japanese Society — Education has been a key to Japan's economic prominence and it is a central factor shaping contemporary society. Topics: socialization, formation of the self, schooling and social structure, classroom practice, educational achievement, learning in corporations, and the state's efforts to shape a national ideology. Comparisons with other nations draw out insights into the universal and cultural dimensions of education in industrial societies. (ICE, SSE)

4 units (Rohlen) not given 1995-96

276. Feminist Approaches to Ethics and Education — After reading and discussing background material in ethics and feminism, concentrates on ethical problems in education of interest to feminists. Emphasis on an ethic of care. (SSE)

4 units (Noddings) not given 1995-96

277X. Education of Immigrants in Cities — For graduate students; see 177.

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

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. (SSEP)

3 units, Spr (Phillips) TTh 8:30-10

279X. Urban Youth and Their Institutions: Research and Practice — For graduate students; see 179X.

3 units, Aut (McLaughlin) T 2:15-5:05

280. Ethnographic Approaches to Cultural Diversity in Schooling — (Same as Anthropology 280.) How to learn about culture and to analyze education-relevant situations such as the culturally diverse classroom. The cultural process is approached by acquiring techniques of observation, interview, and interpretation of behavior in context, and soliciting and recording the "native" explanations of their own behavior; developing an internally consistent conceptual structure that orients observation and elicitation productively; and being sensitized to one's own culture and how it influences perception and interpretation of behavior. Techniques of ethnographic research applicable to the study of schooling are demonstrated and applied in field research projects. Writing of one research report or proposal for research. (SSEP)

4 units, Win (G. & L. Spindler) T 5:15-8:30

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

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

282. Linguistics and the Teaching of English as a Foreign/Second Language — (Enroll in Linguistics 189/289.) (LLC)

4-5 units, Win (Hubbard) MW 1:15-3:05
283. Attitudes Toward Languages and Language Study — With language viewed as an intergroup phenomenon, examines attitudes people hold toward their own and different languages, the bias toward and against speakers of different languages, how personal and societal attitudes affect the study and learning of a foreign or second language. A sociopsychological perspective is used as a central framework to guide the study of attitudes toward language. (LLC)

4 units (Padilla) not given 1995-96

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

3 units, Aut (Larriva, Walqui) T 6-9

286A. Second Language Acquisition — For students interested in teaching English as second/foreign language. Second language learning and teaching. Serves as basis of second language pedagogy. Prepares STEP students for CLAD certification. (LLC, STEP)

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

286B. Second Language Acquisition Research — Review of major research findings and theories in second language acquisition. Discussion of second language research and theories in formal and informal settings where a second language is learned. (LLC)

4 units, Spr (Padilla) MW 11-1

287X. Culture and Learning — (Same as Anthropology 136.) Primarily for STEP students. Learning in various institutional settings in America and around the globe. Learning in families, in schools, on the job, and on the streets. Emphasis on the information technologies people use to organize their learning, e.g., the body, language, literacy, money, and the computer as they are embedded in different culture contexts and as they interface with the production technologies that dominate the political order. (SSE, STEP)

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

290. Leadership in Education: Research and Practice — Conceptions of leadership that include the classroom, school, district office, and state capitol. The role complexity of organizational leaders outside of schools, past and present, and how that complexity permitted leadership to arise. Case studies. (APA)

3-4 units (Cuban) alternate years, given 1996-97

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

2-3 units, Aut (Petig) T2:15-4:05

292. Methods of Teaching Spanish — (Enroll in Spanish 301.) (LLC)

3-5 units, Spr (Haro) TTh 11-12:30

293. Methodology of Teaching French — (Same as French 260.) Approaches, methods, and procedures in relation to foreign language acquisition theory; teaching practice regularly observed in a demonstration class. (LLC)

3-5 units, Spr (Hester) T 1:15-3:05

294X. Multicultural Perspectives on Education — Changing conceptions of culture, nationality, “race,” and ethnicity and their relationship to education. Emphasis on construction of ethnic identities as expressed in social movements and particular cultural forms, such as oral history and autobiography. (SSE)

4 units, Spr (Martos) TTh 10-12

295. Psychology of Problem Solving and Reasoning — (Same as Psychology 261.) Introduction to results and methods of research on cognitive processes of solving problems and reasoning. Focus is on accomplishments and limitations of research conducted since 1970, including views of cognition as situated activity. (PSE)

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

296. Substance Dependence: Assessment, Treatment, and Prevention — Open to graduate students in the social sciences. Survey of prevalence, etiology, and treatment of alcohol and drug-related disorders. Focuses on a developmental perspective and how substance abuse disorders manifest themselves in men and women at different ages from childhood through late adulthood. Discussion of various treatment approaches that have been beneficial such as AA, individual and group work, family treatment, and inpatient vs. outpatient care. Required visit to relevant treatment programs during the quarter. Class location is Palo Alto VA Medical Center. (PSE)

3 units, Win (Thompson, Moffett) W 1:15-4:05

297X. Research in Second Language Classrooms — Introduction to qualitative research methods in applied linguistics. Review of classroom-based research on second language teaching and learning. Discussion and critique of research methods including classroom observation, interaction analysis, classroom ethnography, interviews and questionnaires, elicitation techniques, and case studies. Individual projects utilizing data gathered in second language classrooms. (LLC)

3 units, Spr (Valdés) W 3:15-6:05
301. Historiography of American Education — (Same as History 301.) Analysis of the literature of American education history, designed for students who wish to do further work in the field. Weekly colloquium discussions, plus an opportunity to pursue specialized topics in small group tutorial sessions. (SSEP)  
3-4 units (Tyack)  
alternate years, given 1996-97

302X. The Role of Knowledge and Learning in Teaching — Focuses on current literature relevant to the structure of subject matter of instruction in schools, and to the cognitive processes involved as students try to learn material. Implications of the literature of role of the teacher. (CTE)  
3 units (Shulman) not given 1995-96

303. Qualitative Inquiry in Education — The ways in which artistically and humanistically based approaches to the study of teaching, classroom life, and schooling can improve the understanding of education. Introduces qualitative methods of inquiry that emphasize literary and other interpretive forms, and new approaches to inquiry in education. Includes a small study using methods. (CTE)  
4 units (Eisner)  
alternate years, given 1996-97

304. The Philosophical and Educational Thought of John Dewey — (Same as Philosophy 304.) Analysis of important works of John Dewey. Readings vary each year. Emphasis may be on epistemology or social philosophy together with educational philosophy. (SSEP)  
4 units (Noddings)  
alternate years, given 1996-97

305X. Contemporary Social Philosophy and Ethics: Focus on Community — Introduces current issues in social theory, particularly to the debate between liberalism and communitarianism. Attacks on liberalism by feminists and postmodernists, the politics of difference, and the dangers of “strong” communities. (SSEP)  
4 units, Spr (Noddings) MW 10-11:50

306A. Education and Economic Development — Introductory analysis of the role of education in economic growth and development. Case material considers development problems in the U.S. and abroad. Discussion sections on the economic aspects of educational development. (ICE, SSE)  
5 units, Win (Carnoy) TTh 1:15-3:05

306B. Education and Political Development — Introductory analysis of the relations between education and politics from a comparative perspective. Topics: different theoretical approaches to the study of education and politics, questions of legitimacy in educational policy, international factors in educational development, the politics of educational planning and reform, processes and conditions of political learning and the politics of curriculum and pedagogy. (ICE, SSE)  
5 units, Aut (Mintrop) MW 3:15-5:05

306C. Cultural Approaches to Education and Development — Education in the context of specific cultural and social environments. Anthropological perspective of assumptions about education's role in the rise of industrialism, the establishment of the modern state, and the transformation of society by technology, ideology, and urbanism. Topics: cultural transmission and traditionalism, the local translation of modernization efforts, nationalism and culture, bureaucractic cultures, and educational ideology as a global phenomenon. (ICE, SSE)  
3-5 units (McDermott) given 1996-97

306D. World, Societal, and Educational Change: Comparative Perspectives — (Same as Sociology 332.) Analysis of the relations between educational and societal developments from a comparative perspective. Readings on varying theoretical perspectives and empirical studies on the structural and cultural sources of educational expansion and differentiation, and on the cultural and structural consequences of educational institutionalization. Research topics: education and nation-building; education, mobility, and equality; education, international organizations, and world culture. (ICE, SSE)  
5 units, Win (Chabot) MWF 11-12:30  
and by arrangement

308X. The Analysis of Teaching — Teaching is often considered an art or craft rather than a science. Is this true? Do teachers function as performers? Videotapes of teachers in action serve as a resource for the analysis of teaching. Concepts and methods from the field of criticism provide tools to analyze teaching. Literature in criticism, aesthetics, and as qualitative evaluation secures conceptual tools for the analysis of teaching. (CTE)  
4 units, Sum (Eisner)  
alternate years, not given 1996-97

310. Problems in Sociology of Education — (Same as Sociology 232/330.) For doctoral and master's students. Meets with 210. Emphasis on conceptualizing and analyzing applied sociological research in education. Short written assignments, individual feedback, and work with actual research data. (SSEP)  
4 units, Win (Cohen) MW 3:15-5:05

311X. Seminar for First-Year Doctoral Students — Introduces education as a professional field of study to encourage cross-discipline conversation, and to explore the broad range of methods used in current educational research. (All Areas)  
1 unit, Aut (Noddings) W 5:15-7:05  
Win (Noddings) W 4:15-6:05  
Spr (Noddings) Th 4:15-6:05
312. Interaction Processes in Education: Design and Evaluation—(Same as Sociology 224) Educational applications of sociological/social psychological theory and research to classroom processes, staff relations, teams, and task forces. The principles for design and evaluations of group work for students and teamwork for teaching staff. Topics: social processes of influence, role differentiation, and evaluation. Methods for systematic evaluation and observation. Students receive practical experience in using these methods. (SSE)
4 units, Aut (E. Cohen) MW 3:15-5:05

314X. Workshop in Economics of Education—Research by students and faculty engaged in problems in the economics of education. Students must have advanced graduate training in economics theory and methodology and be engaged in research on the topic. (SSEP)
1-2 units, Aut, Win, Spr (Levin, Carnoy) W 3:30-5:15

315. Cultural Transmission: Education in Cross-Cultural Perspectives—(Same as Anthropology 266) The transmission and communication of explicit and implicit cultural assumptions in a variety of formal and informal educational contexts. The patterning of education in a cross-cultural perspective, the sequence of culturally constructed experiences in life careers, cultural analysis, and sensitization. Attention to education in the U.S. and other complex societies, and in non-literate cultures. (SSE)
3-5 units, Spr (G. & L. Spindler) Th 5:15-8:05

317. Research on Teaching—Introduction to theory, methodology, and substantive findings of research on teaching and teacher education. (PSE)
4 units (Shulman) alternate years, given 1996-97

320X. Instruction of Heterogenous Populations—The challenges facing schools having multilingual, multiracial, and multicultural populations, emphasizing critical evaluation of problems statements and proposed solutions. The role of the principal in promoting innovations designed to address these challenges. Issues related to leadership for staff support and training and program coordination. (APA)
3 units (Cohen) given 1996-97 and every third year

321A. 4-5 units (Rohlen) not given 1995-96
321B. 4-5 units, Aut (McDermott) TTh 9-10:50

322X. Discourse Analysis in Educational Research—Issues and strategies for studying oral and written discourse as a means for understanding classrooms, students, and teachers, and teaching and learning in the context of school. The forms and functions of oral and written language in the classroom, emphasizing teacher-student and peer interaction and student-produced texts. Individual projects utilizing discourse analytic techniques. Prerequisite: graduate status or consent of instructor. (LLC)
4 units, Spr (Sperling) TTh 2:15-4:05

323A. Federal and State Policy: Education and Children—The formulation and improvement of federal and state education and children policies. Key current policy issues and trends in politics. (APA)
3 units (Kirst) given 1996-97

331A,B. Administration and Policy Analysis Research Seminar—Limited to first-year APA doctoral students. Introduces rudiments of problem statements, conceptual frameworks, research design, and critical reviews of literature. (APA)
331A. 1-2 units, Spr (Bridges) T 3:15-4:05
331B. 1-2 units, Spr (Bridges) F 3:15-4:05

335X. Language Policy and Planning: National and International Perspectives—For graduate students and undergraduates with consent of instructor. International study of social, political, and educational tensions that shape language policy. Emphasis on language education that affects immigrants, guestworkers, and indigenous linguistic minority populations; policies that determine foreign language instruction and U.S. language policies in a comparative approach. (LLC)
3 units (Valdés) not given 1995-96

338A.B.C. Practicum in Counseling and Health Psychology—For Counseling Psychology majors only. Intensive supervised field experience in local schools or social agencies. (PSE)
338A. 1-6 units, Aut (Krumholz, Thoresen, LaFromboise) by arrangement
338B. 1-6 units, Win (Krumholz, Thoresen, LaFromboise) by arrangement
338C. 1-6 units, Spr (Krumholz, Thoresen, LaFromboise) by arrangement

339X. Family Therapy: Systemic Approach to Assessment and Treatment—Doctoral seminar examines the assumptions underlying the family-systems paradigm, viewed as an expansion of and alternative to the individual model. Development of a conceptual framework for family and couples assessment provides the basis for comparing influential models of family therapy. Conceptual, obser-
341X. Educational Applications of Sociolinguistics — For students interested in the broad applications of linguistic research in educational contexts. Formal integration of sociolinguistics and applied linguistic research is examined in relation to a broad range of international case studies among students and teachers in socially stratified speech communities worldwide. Theoretical concepts from linguistics are introduced as they relate to practical educational problems in socially stratified speech communities. Recommended: background in linguistic science for students who seek to use course as an introduction to applied linguistic research. (LLC)
3 units (Baugh) not given 1995-96

346. Research Seminar in Higher Education — Required for Higher Education students. Overview of research perspectives on the U.S. system of higher education and how it evolved. Central questions: What are the structural and cultural features of contemporary system? How did organizational structures and purposes get defined? How and why have they changed? Examines research in topic areas (e.g., organization and governance, faculty, students, curriculum) and recurrent system-wide issues (e.g., stratification, decentralization, excellence, and diversity). (APA)
4 units, Aut (Gumport) T 2:15-5:05
F by arrangement

347. Problems of Teacher Education — Students formulate researchable problems and promising methods for the study of teacher education. Compares teacher education with education in other professions and other issues in the preservice and inservice education of teacher professionals. (CTE)
4 units, Spr (Shulman) MW 1:15 -3:05
alternate years, not given 1996-97

350A. Psychological Studies in Education — Required of first-year doctoral students in Psychological Studies; others by consent of instructor. Introduction to the doctoral program in Psychological Studies in Education and to faculty and student research. (PSE)
1 unit, Aut (Snow, Fernandez) Th 2:15-4:05

350B, C, D. Research Practicum in Psychological Studies in Education — Five-quarter sequence provides students in PSE an opportunity to engage in all facets of the research process. Individual projects in a group context are designed to provide extensive opportunities for training and feedback concerning specific projects and the general enterprise of psychological research in education. 350B and C are required of first-year students in PSE; 350D is required of second-year students in PSE. Others by consent of instructor. (PSE)
350B. 3 units, Win (Krumboltz, Greeno)
Th 10-11:50 and by arrangement
350C. 3 units, Spr (Haertel, Fernandez)
Th 10-11:50 and by arrangement
350D. 1 unit, Aut, Win, Spr (Haertel, Snow) by arrangement

351. Design and Analysis of Longitudinal Research — The analysis of longitudinal data is central to empirical research on learning and development. Topics: growth models, measurement of change, repeated measures designs, quasi-experiments, structural regression models, reciprocal effects, analysis of durations including survival analysis. Prerequisites: statistical training at least at the level of 257. (PSE)
3 units, Spr (Rogosa) Th 3:15-5:05
and by arrangement

353A. Problems in Measurement: Item Response Theory — Survey of alternative mathematical models used in test construction, analysis, and equating. Emphasizes applications of item response theory (latent trait theory) to measurement problems, including estimation of item parameters and person abilities, test construction and scoring, tailored testing, mastery testing, vertical and horizontal test equating, and detection of item bias. Prerequisites: 252 and 257 or Psychology 248 and 252, or equivalent. (PSE)
3 units, Win (Haertel) MW 9-10:30
alternate years, not given 1996-97

354X. School-Based Decision Making — Leadership and organizational issues in the movement toward school-based decision making. Emphasizes building capacity for individual schools to make decisions, establishment of an inquiry process at the school level, use and availability of information, implementation and evaluation of decisions, parental involvement, support of school-based decisions by districts. (APA)
3 units (Levin) given 1996-97

356X. Research Seminar on Educational Organizations — For doctoral students interested in applying ideas from organizational theory to educational organizations. Focuses on appropriateness of different theoretical perspectives for studying selected aspects of educational organizations. Students work with organizational ideas and must have completed basic course work in research methods. (APA)
4 units (Hannaway) not given 1995-96

359A, B, C, D. Research in Science and Mathematics Education — Participants gain familiarity with research in science education, with references to mathematics education and other school subjects as appropriate. Historical and international perspectives; emphasis is on trends and issues in contemporary American research and policy. Seminars offer
an opportunity to develop and discuss dissertation plans, but are not limited to those students. (CTE)

359A. Assessment and Evaluation
2 units, Aut (Rowe) M 5-7
alternate years, not given 1996-97

359B. Instruction
2 units, Spr (Rowe) M 5-7
alternate years, not given 1996-97

359C. Curriculum
2-3 units (Atkin, Rowe)
alternate years, given 1996-97

359D. Teacher Education
2 units (Rowe)
alternate years, given 1996-97

360X. Action Research in Education — Introduction to the theory and practice of action research. Basic concepts and methods; historical and ideological influences on this form of inquiry by teachers. Participants analyze action research reports and engage in a small-scale action-research project. (CTE)
3 units, Aut (Atkin) M 7-9 p.m.
alternate years, not given 1996-97

368. Student Affairs, Administration Practices, and Issues — Objectives: provide an overview of college student services to ask what they do, how they are organized, why they are provided, and to explore current trends and issues; identify and analyze policy and other issues that transcend particular services, but that are usually among the concerns of student affairs deans and their associates; and to become familiar with some of the literature about college students and student affairs work. (APA)
4 units, Aut (Lyons) F 9-11:50

369. Personnel Administration — Topics: selection, supervision, evaluation, and staff development. The legal, social science, and educational aspects of these topics. Connects theory and practice through use of problem-based learning. (APA)
4 units (Bridges) not given 1995-96

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

375X. Organizational Development: Theory and Practice — (Same as Business 375.) Designed to develop familiarity with the theory and practice of planned organizational change through case analyses, role plays, simulations, etc. (APA)
4 units (Staff) not given 1995-96

376. Education and Theories of the State — 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. (ICE, SSE)
5 units (Carnoy) not given 1995-96

379X. Public Policy Toward Abused and Neglected Children — Standards that are, and should be, used in defining child abuse and neglect and evaluating means of state intervention to protect such children. Role of various professionals (doctors, lawyers, mental health workers, police, and social workers) in dealing with problems of child abuse and neglect. Types of research currently being done and identification of new research directions. Limited to 20 graduate and law students and meets for 15 weeks under Law School semester system. Prerequisite: consent of instructor. (APA)
5 units total (Wald) not given 1995-96

380. Supervised Internship
any quarter (Staff) by arrangement

384. Advanced Topics in Higher Education — Preference given to higher education graduate students. In-depth analysis of selected topics in the study of higher education. Topics vary each year among faculty development, legal issues, curricular change, knowledge production, professional socialization, management of organizational decline, leadership and innovation, authority and power, diversity and equity, interactions with government and industry. Prerequisites: 346, consent of instructor. (APA)
3 units, Spr (Gumport) T 2:15-5:05

387A,B,C. Workshop: Comparative Systems — (Same as Sociology 311A,B,C) Analysis of quantitative and longitudinal data on national educational systems and political structures. Prerequisite: consent of instructor. (ICE)
387A. 2-5 units, Aut (Meyer)
by arrangement
387B. 2-5 units, Win (Meyer)
by arrangement
387C. 2-5 units, Spr (Meyer)
by arrangement

388A,B. Bilingual Education — Research issues of policy and practice, particularly in the U.S., in programs for language minority students. Topics: the history of policy and legislation in bilingual 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, STEP)
388A. — Prepares STEP students for CLAD certification.
3 units, Spr (Henderson) T 6-9 p.m.
388B. — For LLC students.
3 units (Staff)
alternate years, given 1996-97.

390. Advanced Seminar in Bilingual Education —
For doctoral students specializing in bilingual education. Topical treatment of current research and policy issues in bilingual education. Prerequisite: 388B or consent of instructor. (LLC)
1-3 units, Aut, Win, Spr (Padilla)
by arrangement

397. 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, Win, Spr (Padilla)
alternate years, given 1996-97

406X. Topics in Comparative Educational Research —
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). (ICE)
2-3 units (Atkin) given 1996-97

408. Research Workshop in International and Comparative Education —
Limited to advanced doctoral students in ICE and SSE. Research workshop for the review of key issues in the methodology and epistemology of social research in education, research proposals, and findings by students and faculty. Prerequisites: 306A,B,C,D or equivalent. (ICE, SSE)
2-5 units, Spr (Carnoy) M 10-11 W 10-11:50

410. Topics in Symbolic Systems in Education —
For students in PSE, CTE, LLC. Topics in the interdisciplinary study of intelligence, information, meaning, and learning, emphasizing research relevant to educational practice. Research perspectives from anthropology, artificial intelligence, linguistics, philosophy, and psychology. (PSE)
1-3 units, Aut, Win, Spr (Staff) M 3:15-5:05

414. Higher Education Research Seminar —
Topics from current projects at the Stanford Institute for Higher Education Research with student opportunities to contribute to the work. Subject matter: conceptual and quantitative models for college and university decision-making and productivity, faculty roles and incentives, applications of information technology, and institutional restructuring. Discussions include theory development, quantitative and qualitative research methods, and implications for management and policy-making.
Prerequisite: intermediate or advanced doctoral student, or consent of instructor. (APA)
4 units, Aut (Massy) M 1:15-4:05

415. Seminar in Educational Psychology —
Topical seminar for advanced students. Prerequisite: consent of instructor. (PSE)
not given 1995-96

416. Seminar on Aptitude —
Limited to doctoral students in education and psychology. Study of individual differences in learning, cognitive, connotative, and affective processes related to education. Design and evaluation of instruction with respect to individual differences. Prerequisites: 255 or equivalent, and consent of instructor. (PSE)
3 units (Snow) alternate years, given 1996-97

418. Foundations of Field Research in Higher Education —
For higher Education/APA graduate students. Advanced seminar examines rationales for doing interpretive social science research in higher education settings. Students acquire methodological training in fieldwork through hands-on opportunities to collect, analyze, and critique case study data obtained from interviews, observation, and document analysis. Appropriate for doctoral students working on qualifying papers or dissertations. Prerequisites: 346, consent of instructor. (APA, SSEP)
3-5 units (Gumport) not given 1995-96

420A,B. Advanced Seminar in Philosophy of Education —
Seminar on particular issues during designated quarters. Enrollment limited; sign up with instructor prior to beginning of quarter. (SSEP)
1-3 units (Noddings) not given 1995-96

421. Internship in Educational Administration —
Field experience for students in the educational administration program. Supervised by staff; project centered. (APA)
1-3 units (Staff) not given 1995-96

422A,B,C. Practicum for School Principals —
The major tasks and related activities of principals. Uses a training approach that is problem rather than discipline based and provides for a substantial degree of self-directed learning by students under the guidance of professors and practicing principals. (APA)
422A. 6 units, Sum (Bridges, Hill)
TTh 1:15-4:05
422B,C. 6 units, Sum (Bridges, Hill)
MW 1:15-4:05

423A. Introduction to Research Design: Educational Administration and Policy Analysis — Preference to APA doctoral students working on their sixth-quarter qualifying paper. Focuses on the key issues in conceptualizing and designing research in the social sciences. (APA)
3-5 units, Aut (Levin) MW 3:15-5:05
431. Doctoral Seminar: Counseling and Health Psychology — Analysis of professional problems. May be repeated for credit. Prerequisites: doctoral candidates in counseling psychology, consent of instructor. (PSE)

1 unit, Aut, Win, Spr (Krumboltz, LaFromboise, Thoresen) T 4:15-6:05, biweekly

444X. Research in Progress: Curriculum and Teacher Education — Required of first- and second-year doctoral students in Curriculum and Teacher Education. Introduction to current research in the Curriculum and Teacher Education area. Presentations of research planned, under way, or ready to be reported on some aspect of curriculum and teacher education. Weekly presentations by SUSE faculty, SUSE masters’ or doctoral candidates, and faculty from elsewhere in the University or Bay Area. Questions and discussion of conceptual and methodological issues. (CTE)

7 unit, Aut, Win, Spr (Staff) W 12

451. Research in Mathematical Education — Overview of the major problems, controversies, and findings in current research in mathematics education. (PSE)

2-4 units (Greeno) not given 1995-96

453. Doctoral Dissertation — (All Areas)

any quarter (Staff) by arrangement

466. Doctoral Seminar in Curriculum — Required of all doctoral students in C&TE. Opportunity to become acquainted with research in the field, student research activities, and the kinds of problems they believe important in the field. Introduces research and scholarship related to the C&TE program at Stanford. All C&TE faculty participate as well as other Stanford faculty and outside speakers. Major problems in this field and the ways these are addressed by current investigators. (CTE)

2-5 units, Win (Eisner) T 7-9:30 p.m.

470. Practicum — For advanced graduate students. (All Areas)

any quarter (Staff) by arrangement

470E. Practicum in Evaluation — Topics of current interest in the area of educational evaluation. Prerequisite: student member of the Evaluation Consortium. (All Areas)

any quarter (Staff) by arrangement

480. Directed Reading — For advanced graduate students. (All Areas)

any quarter (Staff) by arrangement

490. Directed Research — For advanced graduate students. (All Areas)

any quarter (Staff) by arrangement

493B. Statistical Methods for Meta-Analysis — (Same as Health Research and Policy 206, Statistics 211.) Meta-analysis is a quantitative method for combining results of independent studies, and enables researchers to synthesize the results of related studies so that the combined weight of evidence can be considered and applied. Examples from the medical, behavioral, and social sciences. Topics: literature search, publication and selection bias, statistical methods (contingency tables, cumulative methods, sensitivity analyses, non-parametric methods). Project required. Prerequisites: basic sequence in statistics and consent of instructor. (All Areas)

1-3 units, Win (Olkin) MWF 11-12:30
Dean: James F. Gibbons
Senior Associate Deans: James L. Adams, (Special Projects), John C. Bravman (Student Affairs), Dwain N. Fullerton (External Relations), Ann R. Gaddy (Administration), James D. Plummer (Faculty Affairs)
Associate Deans: Anthony J. DiPaolo (SITN), Noë P. Lozano (Minority and Affirmative Action Programs)
Assistant Deans: Susan Clement (Graduate Financial Aid/Policy), Rene Cortinaz (Human Resources), Cheryl Hawthorne (Undergraduate Minority Programs)
Faculty Teaching General Engineering Courses
Associate Professors: David L. Freyberg, Bruce Lusignan, Reginald E. Mitchell, Stephen Rock, Sheri D. Sheppard
Assistant Professors: Martin J. Blunt, Jean H. Heegaard, Jonathan How, Sanjiva K. Lele
Lecturer: David Lougee
Visiting Associate Professor: Sultan A. Bhimjee
School of Engineering Advisory Committee on Engineering in Biology and Medicine: (Chair) Charles R. Steele (Mechanical Engineering); Dennis Carter (Mechanical Engineering), I-Dce Chang (Aeronautics and Astronautics), Lambertus Hesselink (Aeronautics and Astronautics), 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 ten academic departments: Aeronautics and Astronautics, Chemical Engineering, Civil Engineering, Computer Science, Electrical Engineering, Engineering-Economic Systems, Industrial Engineering and Engineering Management, Materials Science and Engineering, Mechanical Engineering, and Operations Research. These departments and two interdisciplinary programs, Scientific Computing and Computational Mathematics, and Science, Technology, and Society are responsible for graduate curricula, research activities, and the departmental components of the undergraduate curricula. In research, where faculty interest and competence embrace both engineering and the supporting sciences, there are numerous programs within the school as well as several interschool activities, including Center for Integrated Systems, Center for Materials Research, Center for Space Science and Astrophysics, Institute for Electronics in Medicine, Joint Institute for Aerosciences, Microwave Laboratory, a program in Product Design, Radio Astronomy Institute, and the Stanford Institute for Manufacturing and Automation. Petroleum Engineering is offered through the School of Earth Sciences.

Instruction in engineering is offered primarily during the Autumn, Winter, and Spring Quarters of the regular academic year. During the Summer Quarter, a small number of undergraduate and graduate courses are offered.

UNDERGRADUATE ADMISSION

Students admitted to the University may declare a major in the School of Engineering if they elect to do so; no additional courses or examinations are required for admission to the school.

RECOMMENDED PREPARATION

FRESHMEN

Students who plan to enter Stanford as freshmen and intend to major in engineering should take the highest level of mathematics offered in high school. (See the "Mathematics" section of this bulletin for information on advanced placement in mathematics.) High school courses in physics, chemistry, and computer science are strongly recommended but not required. Additional elective course work in the humanities and social sciences is also recommended.

TRANSFER STUDENTS

Students who do the early part of their college work elsewhere and then transfer to Stanford to complete their engineering programs should follow an engineering or pre-engineering program at the first school, selecting insofar as possible courses applicable to the requirements of the School of Engineering, that is, courses comparable to those described below under "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 Senior Associate Dean for Student Affairs in the School of Engineering at Stanford.

3/2 DEGREE PROGRAMS

The 3/2 engineering program at Stanford is a special opportunity that allows a student to complete three years at a liberal arts college followed by two years at Stanford. After completing the five-year program, the student is awarded two degrees, a B.S. in Engineering from Stanford and an A.B. from the liberal arts college.

Candidates for this special dual-degree program are considered as regular transfer applicants and are expected to meet the same admissions standards as all other transfer candidates. This distinguishes the Stanford 3/2 program from those of most other institutions that “guarantee” admission to students who meet certain grade and course requirements and are recommended by the 3/2 coordinator of the liberal arts college.

All 3/2 transfer applicants are required to submit the transfer application forms, a final secondary school transcript, official transcripts from each college attended, and the official results of either the College Board Scholastic Aptitude Test (SAT) or the American College Test (ACT). All materials must be submitted by the regular transfer deadline.

In addition to the above mentioned documents, dual-degree candidates are required to have a letter of recommendation sent from the liberal arts college 3/2 program coordinator. Also required is a letter from the appropriate academic dean indicating the intention of the liberal arts college to award the A.B. degree, not the B.S. degree, upon completion of the required number of course credits. Applications are only accepted from students attending a liberal arts college that does not offer a degree program in engineering.

UNDERGRADUATE PROGRAMS

The principal goals of the undergraduate engineering curriculum are to provide opportunities for intellectual growth, for the attainment of professional competence, and for the development of a sense of the social context of technology. The curriculum is sufficiently flexible that a number of decisions on individual courses are left to the student and the adviser. For a student with well-defined educational goals, there is often a great deal of latitude.

In addition to the special requirements for engineering majors described below, all undergraduate engineering students are subject to the University distribution, writing, and foreign language requirements outlined in the first pages of this bulletin. Most engineering programs automatically satisfy the University distribution requirements in Area 4 (Mathematical Sciences), Area 5 (Natural Sciences), and Area 6 (Technology and Applied Sciences). Depending on the program chosen, students will have the equivalent of from one to three quarters of free electives to bring the total number of units to 180.

The School of Engineering’s Handbook for Undergraduate Engineering Programs, available from the Office of the Senior Associate Dean for Student Affairs in Terman Engineering Center, provides detailed descriptions of all undergraduate programs in the school, as well as additional information about extracurricular programs and services. Because the handbook is published in the summer, it reflects the most up-to-date information for the academic year and is the definitive guide for all undergraduate engineering programs.

BACHELOR OF SCIENCE

Departments within the School of Engineering offer programs leading to the B.S. degree in the following fields: Chemical Engineering, Civil Engineering, Computer Science, Electrical Engineering, Industrial Engineering, Materials Science and Engineering, and Mechanical Engineering. The School of Engineering itself offers interdisciplinary programs leading to the B.S. degree in Engineering with specializations in Aeronautics and Astronautics, Computer Systems Engineering, and Product Design. In addition, students may elect a Science, Technology, and Society or Individually Designed Major leading to the B.S. in Engineering.

ACCREDITATION

The Accreditation Board for Engineering and Technology (ABET) accredits college engineering programs nationwide using criteria and standards developed and accepted by U.S. engineering communities. At Stanford, the following undergradu-
ate curricula are accredited: Chemical Engineering, Civil Engineering, Electrical Engineering, Industrial Engineering, and Mechanical Engineering. In ABET-accredited departments, students must meet specific requirements for engineering science, engineering design, mathematics, and science course work. Students are urged to consult the School of Engineering Undergraduate Handbook and their adviser.

Accreditation is important in many areas of the engineering profession; students wishing more information about accreditation should consult their department office or the office of the Senior Associate Dean for Student Affairs in Terman 208.

**POLICY ON SATISFACTORY/NO CREDIT GRADING AND MINIMUM LETTER GRADE INDICATOR**

All courses taken to satisfy major requirements (including the requirements for mathematics, science, engineering fundamentals, Technology in Society, and engineering depth) for all engineering students (including both department and School of Engineering majors) must be taken for a letter grade.

For departmental majors, the minimum LGI (letter grade indicator) for all courses taken in fulfillment of the Engineering Fundamentals requirement and the Engineering Depth requirement is 2.0. For School of Engineering majors, the minimum LGI on all engineering courses taken in fulfillment of the major requirements is 2.0.

**DEPARTMENTAL MAJORS**

Curricula for majors offered by the Departments of Chemical Engineering, Civil Engineering, Electrical Engineering, Industrial Engineering and Engineering Management, Materials Science and Engineering, and Mechanical Engineering have the following components: 40-47 units of mathematics and science (see Notes 1 and 2); engineering fundamentals (five course minimum, see Note 3); Technology in Society (TIS) (one course minimum, see Note 4); engineering depth (courses such that the total of units for Engineering Fundamentals and Engineering Depth is between 60 and 75). Included within the courses taken to fulfill the preceding curriculum components is a requirement for a minimum of 8 units of experimentation (see below). Curricular requirements for departmental majors were being revised at the time of publication. Please consult the 1995-1996 Handbook for Undergraduate Engineering Programs for the most up-to-date listing of curricular requirements.

The curriculum for the major offered by the Department of Computer Science has separate requirements as described below.

**CHEMICAL ENGINEERING**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics:</td>
<td></td>
</tr>
<tr>
<td>Math. 41, 42, 43. Calculus and Analytic Geometry</td>
<td>15</td>
</tr>
<tr>
<td>Math. 44. Calculus</td>
<td>3</td>
</tr>
<tr>
<td>Math. 130. Ordinary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>Science:</td>
<td></td>
</tr>
<tr>
<td>Phys. 51. Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>Phys. 53 Electricity and Magnetism</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 31. Chemical Principles</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 33. Structure and Reactivity</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 35. Organic Monofunctional Compounds</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 36. Chemical Separations</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 131. Organic Polyfunctional Compounds</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Fundamentals:</td>
<td></td>
</tr>
<tr>
<td>Five courses from a list of six*</td>
<td>19-22</td>
</tr>
<tr>
<td>Technology in Society: 1 course</td>
<td>(see Note 4)</td>
</tr>
<tr>
<td>Chemical Engineering Depth:</td>
<td></td>
</tr>
<tr>
<td>Chem. 130. Theory and Practice of Identification</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 171. Physical Chemistry: Chemical Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 173. Physical Chemistry: Quantum Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 175. Physical Chemistry: Kinetics and Statistical Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>Engr. 20. Introduction to Chemical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 100. Chemical Process Modeling, Dynamics, and Control</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 110. Equilibrium Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 120. Separations Processes</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 130. Kinetics and Reactor Design</td>
<td>3</td>
</tr>
<tr>
<td>Chem. Engr. 140. Fluid Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>Chem. Engr. 150. Energy and Mass Transport</td>
<td>4</td>
</tr>
<tr>
<td>Chem. Engr. 180A,B. Chemical Engineering Laboratory</td>
<td>6</td>
</tr>
<tr>
<td>Mech. Engr. 33. Introductory Fluids Engineering</td>
<td>4</td>
</tr>
</tbody>
</table>

**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.
Restricted Elective† 3-4
Total .......................... 52-53
* Students must choose five courses from Engr. 14 or 15, 30, 40, 50, 60 or 62, 70A or 70X.
† Students must choose one course from Chem. Engr. 230, 231; Mat. Sci. & Engr. 151, 152; Elect. Engr. 111; Pet. Engr. 170, 251, 260. (Petitions for alternative are considered.)

CIVIL ENGINEERING (CE)
Mathematics and Science: 45 units minimum* (see Notes 1 and 2)
Technology in Society: one course: (see Note 4)
Engineering Fundamentals: five coursest (see Note 3) 17-19
Engineering Depth:
CE 100. Managing Civil Engineering Projects 4
CE 101A. Structural Systems 4
CE 101B. Mechanics of Fluids 4
CE 101C. Geotechnical Engineering 4
Specialty courses in either Environmental and Water Studies**, or Structures and Construction††.
CE 110. Analysis and Numerical Modeling of Civil Engineering Systems 4
CE 170. Environmental Science and Technology 3
plus other engineering electives 26-28
Total for Engineering Fundamentals plus Depth: . 68
* Mathematics must include Math. 130 (or Mech. Engr. 100), and Stat. 190. Science must include Physics 51 or equivalent, Chem. 31, and Geol. and Envir. Sci. 1. For students in Environmental and Water Studies, Chem. 33 and either Chem. 35 or 135 are also required.
† Fundamentals must include Engr. 14 and 60. In addition, students selecting the Environmental and Water Studies option must take Engr. 30; those in Structures and Construction must take Engr. 50.
** Environmental and Water Studies: CE 160, 161, 162, 163, 169, 171, 172, and 176.

COMPUTER SCIENCE (CS)
Mathematics: (25 units)
CS 157. Logic and Automated Reasoning or Phil. 160A. First Order Logic 4
Math. 41, 42, 43. Calculus 15
Math. 103 or 113. Linear Algebra 3
Math. Elective* 3
Science: (12 units)
Phys. 51. Mechanics 4
Phys. 53. Electricity and Magnetism 4
Other Science† 4
Engineering Basics: (10 units)
CS 106X. Programming Methodology and Abstractions (Accelerated) or CS 106A and 106B 5
Engr. 40. Electronics 5
Technology in Society: (3-5 units) one course** (see Note 4)
Computer Science Courses: (49 units)
CS 107. Programming Paradigms 5
CS 108. Object-Oriented Systems Design 4
CS 109A.B. Introduction to Computer Science 8
CS 143. Compilers 4
CS 154. Introduction to Automata and Complexity Theory 4
CS 161. Data Structures and Algorithms 4
CS 221. Introduction to Artificial Intelligence 3
CS 240A. Operating Systems 4
Elect. Engr. 182. Computer Organization 4
Computer Science Electives†† 6
Senior Project (CS 191 or CS 194)*** 3
* Any course of 3 or more units from the School of Engineering list (see Note 1) may be taken.
† Other science courses are to be taken from the School of Engineering list (see note 2), plus Psych. 102, 106. Physics 61 and 63 or Physics 21 and 23 may be taken instead of Physics 51 and 53, as long as a total of 12 science units are taken.
** CS 201 also fulfills this requirement.
*** CS 201 also fulfills this requirement.

ELECTRICAL ENGINEERING (EE)
Mathematics: 21 units minimum* (See Note 1)
Science: 20 units minimum** (See Note 2)
Engineering Fundamentals*** (See Note 3)
Technology in Society: one course (See Note 4)
Engineering Depth:
EE 101. 102. 103. Circuits and Systems 11
EE 111, 112, 113. Electronics 11
EE 121, 122. Digital and Analog Laboratory 6
EE 141. Electromagnetic Fundamentals 4
Engr. 102E. Writing for Electrical Engineers 1
Specialty courses†† 9
One course in Design† 3
Electrical Engineering electives 7
Total ...................................... 52
* Mathematics must include 130. These requirements are subject to change. The final requirements are published along with example programs in the School of Engineering Undergraduate Handbook during the summer.
† The design course may, but need not, be part of the specialty sequence. The following courses satisfy this requirement: Comp. Sci. 194; EE 133, 144, 183, 189A, 281; Engr. 206.
** Science is to include one course in both Physics and Chemistry. Science and math units must total at least 45.
Three courses from one of the specialty areas shown below (consultation with an adviser in the selection of these courses is especially important):

- **Computer Hardware**: CS 107; EE 182, 183 or 281, 218 or 271
- **Computer Software**: Comp. Sci. 107, 108, 194
- **Controls**: Engr. 105, 205 or 209 and 206
- **Electronics**: EE 133, 144, 212, 214, 216
- **Fields and Waves**: EE 142, 144, 241, 242, 246, 252
- **Signal Processing**: EE 133, 261, 264, 278; Stat. 116

**INDUSTRIAL ENGINEERING (IE)**

 Mathematics and Science: 45 units minimum* (See Notes 1 and 2)
Engineering Fundamentals: five courses† (See Note 3)
Technology in Society: one course (See Note 4)
Engineering Depth:
- Comp. Sci. 106B or 106X. Programming Abstractions 5
- IE 100. Organizations: Theory and Management 4
- IE 121. Statistics and Quality 4
- IE 125. Manufacturing Systems Design 5
- IE 133. Industrial Accounting 3
- IE 180. Senior Project 4
- IE 235. Introduction to Financial Decisions 4
- IE 260. Analysis of Production Systems 4
- Stat. 110. Statistical Methods 4
Total 45

* Math and science courses should include Stat. 116 and Math. 103.
† Engineering Fundamentals courses must include Engr. 40, 60, and 70A.

**MATERIALS SCIENCE AND ENGINEERING (MSE)**

 Mathematics: 21 units minimum (See Note 1)
Science: 20 units minimum (See Note 2)
Engineering Fundamentals: five courses (See Note 3)
Technology in Society: one course (See Note 4)
Engineering Depth:
- MSE 151. Structural Materials Engineering 3
- MSE 152. Electronic Materials Engineering 3
- MSE 161. Materials Science Lab I 2
- MSE 162. Materials Science Lab II 2
- MSE 163. Materials Science Lab III 2
- Materials Science Fundamentals* 23
- Science and Engineering Options† 9
Total 44

* MSE Fundamentals: 23 units from MSE 191, 193, 194, 195, 196, 197, 198, 199, Chem. 171
Chemistry (Chem. 151, 153, 171, 173, 175)
Chemical Engineering (Chem. Engr. 110, 130, 140, 150, 170; Engr. 20; Mech. Engr. 33)

**MECHANICAL ENGINEERING (ME)**

 Mathematics: 24 units minimum (See Note 1)
Science: 18 units minimum* (See Note 2)
Engineering Fundamentals: five courses† (See Note 3)
Technology in Society: one course (See Note 4)
Engineering Depth:
- ME 33. Introductory Fluids Engineering 4
- ME 103D. Engineering Drawing 1
- ME 101. Visual Thinking 3
- ME 103. Manufacturing Technology 4
- ME 111. Stress, Strain, and Strength 3
- ME 112. Mechanical Systems 3
- ME 113. Engineering Design 3
- ME 131A. Heat Transfer 5
- ME 131B. Fluid Mechanics 3
- ME 132. Thermosciences Laboratory 3
- or ME 130. Internal Combustion Engines 3
- ME 161. Mechanical Vibrations 4
Total 45

Options to complete the ME Depth sequence (pick two items below):
- ME 131C. Thermodynamics 3
- ME 117. Introduction to Sensors 3
- ME 118. Introduction to Mechatronics 4
- Egr. 105 Control Systems 3

* Math: 24 units required and must include a course in differential equations (e.g., ME 100). Science: 18 units minimum and must include chemistry and physics, with at least one year's study in one of them.
† Engr. 15, 30, 40, 70 are required.

**PETROLEUM ENGINEERING**

Petroleum Engineering is offered by the School of Earth Sciences. Consult the “Petroleum Engineering” section of this bulletin for requirements.

School of Engineering majors who anticipate summer jobs or career positions associated with the oil industry may wish to consider enrolling in Engineering 120, Fundamentals of Petroleum Engineering.

**SCHOOL OF ENGINEERING MAJORS**

The School of Engineering offers the degree of Bachelor of Science in Engineering. School of Engineering programs must be approved by the Undergraduate Council of the school. There are two types of programs: majors that have been proposed by cognizant faculty groups and have
been preapproved by the council, and Individually Designed Majors. At present, there are three preapproved majors, Aeronautics and Astronautics, Computer Systems Engineering, and Product Design. Total units required for these majors must be at least 90 and not more than 107. These majors are not accredited by ABET.

### AERONAUTICS AND ASTRONAUTICS (AA)

- **Mathematics:** 21 units minimum* (See Note 1)
- **Science:** 20 units minimum† (See Note 2)
- **Engineering Fundamentals:** five courses** (See Note 3)
- **Technology in Society:** one course (See Note 4)
- **Engineering Depth:**
  - AA 100. Introduction to Aeronautics and Astronautics 3
  - AA 131. Experimentation in Aeronautics and Astronautics 3
  - AA 192. Vector and Tensor Analysis 3
  - AA 200A. Applied Aerodynamics 3
  - AA 210A. Fundamentals of Compressible Flow 3
  - Civ. Engr. 180B. Structural Analysis 4
  - Engr. 104. Dynamic Response 3
  - Mech. Engr. 33. Introduction to Fluids Engineering 4
- **Restricted Electives**: 11
- **Total**: 45

* Must include Math. 44, 130.
† Must include Physics 51, 53.
** Must include Engr. 14, 30.

### COMPUTER SYSTEMS ENGINEERING (CSE)

- **Mathematics:** (21 units)
  - Math. 41, 42, 43, 44. Calculus 18
  - Math. 103 or 113. Linear Algebra 3
- **Science:** (12 units)
  - Phys. 51. Mechanics 4
  - Phys. 53. Electricity and Magnetism 4
  - Phys. 55. Light and Heat 4
- **Basic Engineering:** (10 units)
  - Engr. 40. Electronics 5
  - Engr. 70X. Programming Methodology and Abstractions (or Comp. Sci. 106A and B) 5
- **Technology in Society:** (3-5 units)
  - one course* (see Note 4)
- **Depth:** (55 units)
  - Comp. Sci. 107. Programming Paradigms 5
  - Comp. Sci. 108. Object-Oriented Systems Design 4
  - Comp. Sci. 109A,B. Introduction to Computer Science 8
  - Comp. Sci. 143. Compilers or Comp. Sci. 240A. Operating Systems 4
  - Elect. Engr. 101. Circuits 4
  - Elect. Engr. 111, 112. Electronics 8
  - Elect. Engr. 121. Digital Design Laboratory 3
  - Elect. Engr. 182. Computer Organization 4
  - Elect. Engr. 183. Advanced Logic Laboratory 3
  - Elect. Engr. 271. Introduction to VLSI Systems 3
  - Electives† 6
  - Senior Project (CS 191 or 194)** 3
- **Total**: 101-103

* Comp. Sci. 201 also fulfills this requirement.

### PRODUCT DESIGN

- **Mathematics:** 21 units minimum (See Note 1)
- **Science:** 20 units minimum (could include 3 units of Behavioral Sciences)
- **Technical Electives:** Engr. 40, 70 required plus two courses from Engr. 14, 15, 20, 30, 50, 60; Indus. Engr. 100, 133
- **Technology in Society:** one course (See Note 4)
- **Engineering Depth:** 42 units
  - Art 60. Basic Design 3
  - Art 160. Intermediate Design 3
  - Art 161 or 70 3
  - Art Studio course 3
  - Mech. Engr. 103. Manufacturing and Design 4
  - Mech. Engr. 103D. Engineering Drawing 1
  - Mech. Engr. 111. Stress, Strain, and Strength 3
  - Mech. Engr. 112. Mechanical Systems 3
  - Mech. Engr. 115A. Human Values in Design 3
  - Mech. Engr. 115C. Design Sketching or 116D. Advanced Design Sketching 1
- **Minimum Total Units**: 101-102

### INDIVIDUALLY DESIGNED MAJORS (IDMs)

IDMs are intended for undergraduates interested in pursuing engineering programs that fall outside the purview of department majors or the preapproved School of Engineering majors. Programs are designed by students with the assistance of two faculty advisers of their choice and
are presented to the Undergraduate Council for approval. The degree is designated Bachelor of Science in Engineering: (approved title).

Students must submit written proposals to the Undergraduate Council detailing their programs. Programs must comply with the following requirements: mathematics (21 units minimum, see Note 1 below), science (17 units minimum, see Note 2), 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 Senior Associate Dean for Student Affairs, Terman 208.

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

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

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

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

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

- Engr. 20. Introduction to Chemical Engineering
- Engr. 30. Engineering Thermodynamics
- Engr. 40. Electronics*
- Engr. 50. Introductory Science of Materials*
- Engr. 60. Engineering Economics or Engr. 62. Introduction to Operations Research 1

* Engr. 40 and 50 may be taken on video at some of Stanford's Overseas Centers.

Note 4 (Technology in Society) — It is important to obtain a broad understanding of engineering as a social enterprise. To introduce this aspect of intellectual and professional development, all engineering majors require one course on the interaction of technology with values and beliefs, social institutions, or behavior.

Courses preapproved for this requirement are listed in the Handbook for Undergraduate Engineering Programs.

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. For more information, see the “Graduate Degrees” section of this bulletin.

DUAL AND COTERMINAL DEGREE PROGRAMS
A Stanford undergraduate may work simultaneously toward two bachelor's degrees or toward a bachelor's and a master's degree, that is, A.B. and M.S., A.B. and A.M., B.S. and M.S., or B.S. and A.M. The degrees may be granted simultaneously or at the conclusion of different quarters. Usually five years are needed for a combined program.

Dual A.B. and B.S. Degree Program — To qualify for both degrees, a student must (1) complete the stated University and department requirements for each degree, (2) complete 15 full-time quarters, or three full-time quarters after completing 180 units, and (3) complete a total of 225 units (180 units for the first bachelor's degree plus 45 units for the second bachelor's degree).

Coterminal Bachelor's and Master's Degree Program — A Stanford undergraduate may be admitted to graduate study for the purpose of working simultaneously toward a bachelor's degree and a master's degree. To qualify for both degrees, a student must (1) complete three full-time quarters (or the equivalent) after completing 180 units, (2) complete, in addition to the 180 units required for the bachelor's degree, the number of units required by the graduate department for the master's degree (not fewer than the University minimum of 36 units), (3) complete the requirements for the bachelor's degree (department, school, and University) and apply for the degree at the appropriate time at the Office of the Registrar, and (4) complete the department and University requirements for the master's degree and apply for the degree at the Graduate Degree Progress Section of the Registrar's Office.

Admission to the coterminal program requires admission to graduate status by the pertinent department. Admission criteria vary from department to department.

Procedure for Applying for Admission to Coterminal Degree Programs — A Stanford undergraduate may apply (using the University coterminal application form) for admission to the coterminal bachelor's and master's degree program after the beginning of the eighth quarter of undergraduate work and at least four quarters in advance of the anticipated date of conferral of the master's degree. Students seeking a graduate degree in engineering must apply to the pertinent department.

GRADUATE ADMISSION
Application for admission with graduate standing in the school should be made to the departmental graduate admissions committee. While most graduate students have undergraduate preparation in an engineering curriculum, it is feasible to enter from other programs, including chemistry, geology, mathematics, or physics.

THE HONORS COOPERATIVE PROGRAM
A number of industrial firms, government laboratories, and other organizations participate in the Honors Cooperative Program (HCP), a program that permits qualified professional employees of member companies to register for Stanford courses and obtain a graduate degree on a part-time basis. The courses are offered by the School of Engineering on campus or through the Stanford Instructional Television Network (SITN). SITN broadcasts approximately 200 courses a year over a five-channel system to 250 corporate sites in the San Francisco and Silicon Valley area. This program enables students to receive live courses and interact by means of a telephone talkback system from their corporate location. Students outside the local broadcast range may pursue their graduate degree by participating in SITN's Turored Videotape Instruction (TVI) Program. SITN offers additional programs to member companies such as Non-Credit Option (NCO), Audit Option, several certificate programs, short courses, and course licensing. For a full description of educational services provided by SITN, telephone 415-725-3000; fax 415-725-2868; write 401 Durand Bldg., Stanford, CA 94305-4036; or send electronic mail to na.itv@forsythe.stanford.edu

REGISTRATION
New graduate students should follow procedures for registration as listed in the University's quarterly Time Schedule. Adviser assignments can be obtained from department offices.

GRADUATE CURRICULA
For further details about the following programs, see the department sections in this bulletin.

Related aspects of particular areas of graduate study are commonly covered in the offerings of several departments and divisions. Graduate students are encouraged, with the approval of their
department advisers, to select courses in departments other than their own to achieve a broader appreciation of their field of study. For example, most departments in the school offer courses concerned with properties of materials, and a student interested in an aspect of materials engineering can often gain appreciable benefit from the related courses given by departments other than her or his own.

Departments and divisions of the school offer graduate curricula as follows:

**AERONAUTICS AND ASTRONAUTICS**
- Acoustics
- Aerodynamics
- Aeroelasticity
- Aerophysics and Experimental Space Science
- Aerospace Robotics
- Aerospace Structures
- Aerospace Systems Analysis
- Analytical and Experimental Methods in Solid and Fluid Mechanics
- Biomedical Mechanics
- Composite Materials
- Computational Fluid Dynamics
- Flight Mechanics
- Gaskinetics
- Guidance and Control
- Hypersonic and Physical Gas Dynamics
- Modern Optical Diagnostics in Fluids
- Propulsion
- Waves and Vibrations

**CHEMICAL ENGINEERING**
- Applied Statistical Mechanics
- Biocatalysis
- Biochemical Engineering and Biophysics
- Computational Materials Science
- Equilibrium and Transport Properties of Colloidal Dispersions
- Hydrodynamic Stability
- Kinetics and Catalysis
- Newtonian and Non-Newtonian Fluid Mechanics
- Polymer Physics
- Rheo-Optics of Polymeric Liquids and Colloidal Suspensions
- Surface and Interface Science

**CIVIL ENGINEERING**
- Construction Engineering and Management
- Environmental and Water Studies
- Environmental Engineering and Science
- Environmental Fluid Mechanics and Hydrology
- Structural Engineering and Geomechanics
- Geomechanics
- Structural Engineering

**COMPUTER SCIENCE**
- Analysis of Algorithms
- Artificial Intelligence
- Asynchronous Systems
- Automated Deduction
- Autonomous Agents
- Combinatorial Mathematics
- Complexity Theory
- Computational Geometry
- Computer Architecture
- Computer Graphics
- Computer Vision
- Database Systems
- Design Automation
- Distributed and Parallel Computation
- Human-Computer Interaction
- Knowledge-Based and Expert Systems
- Knowledge Representation and Logic
- Mathematical Theory of Computation
- Networks and Distributed Systems
- Operating Systems
- Programming Systems/Languages
- Robotics
- Scientific Computing and Numerical Analysis

**ELECTRICAL ENGINEERING**
- Computer Hardware
- Computer Software Systems
- Control and Systems Engineering
- Communication Systems
- Electronic Circuits
- Electronic Devices, Sensors, and Technology
- Fields, Waves, and Radioscience
- Lasers, Optoelectronics, and Quantum Electronics
- Network Systems
- Optics and Imaging
- Signal Processing
- Solid State Materials and Devices
- VLSI Design

**ENGINEERING IN BIOLOGY AND MEDICINE**
- Biostatistics
- Design for Medical Applications
- Information Processing in and for Biomedical Systems
- Mechanics of Hearing
- Medical Imaging
- Neuromuscular Biomechanics
- Orthopedic Biomechanics
- Rehabilitation Engineering
- Transport Phenomena in Biological Systems
ENGINEERING-ECONOMIC SYSTEMS

Business Systems
Decision Analysis
Economic Analysis
Energy Modeling Analysis and Policy
Information Policy
Intelligent Systems
Mathematical Systems Analysis
Social Analysis

INDUSTRIAL ENGINEERING AND ENGINEERING MANAGEMENT

Financial Decisions
Inventory Control
Manufacturing Systems
Organizational Design and Control
Production and Operating Systems Quality Assurance
Risk Analysis
Technology Management

MATERIALS SCIENCE AND ENGINEERING

Biomaterials
Ceramics and Composites
Computational Materials Science
Design/Manufacturing
Electrical and Optical Behavior of Solids
Electron Microscopy
Fracture and Fatigue
Imperfections in Crystals
Kinetics
Magnetic Behavior of Solids
Magnetic Storage Materials
Phase Transformations
Physical Metallurgy
Solid State Chemistry
Structural Analysis
Thermodynamics
Thin Films
X-ray Diffraction

MECHANICAL ENGINEERING

Biomechanics
Combustion
Composites, Fracture of Solids
Continuum Mechanics
Controls
Dynamics
Energy Conversion
Engineering Design
Environmental Measurements
Experimental Mechanics
Fluid Mechanics
Heat Transfer
High Temperature Gasdynamics
Kinematics
Manufacturing Systems Engineering

Optimization
Product Design
Robotics
Thermodynamics
Transport Processes
Turbulence

OPERATIONS RESEARCH

Applied Probability
Combinatorial Optimization
Dynamic Programming
Energy and Economic Modeling
Equilibrium Programming
Integer Programming
Inventory Theory
Linear, Nonlinear Programming
Mathematical Programming
Networks
Nonlinear Equations
Queuing Theory
Reliability Theory
Simulation Methodology

SCIENTIFIC COMPUTING AND COMPUTATIONAL MATHEMATICS

See the "Scientific Computing and Computational Mathematics" section of this bulletin.

SPACE SCIENCE

See the "Center for Space Science and Astrophysics" section of this bulletin.

ENGINEERING IN BIOLOGY AND MEDICINE

Stanford does not have a formal department of bioengineering; however, there are several faculty in the School of Engineering whose primary research activities are in this general area. There are many opportunities in the medical and biological sciences for collaboration. Although 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; a list of their names, together with a summary of their research interests, is available from the committee chair.

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

In addition to the standard engineering department degrees, the degree of MSE: Biomechanical Engineering is offered. Details on this pro-
gram 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 shear suspensions onto polymer films, protein conformation at fluid/polymer interfaces, and factors that influence growth and product formation in genetically engineered mammalian cells is pursued in the Department of Chemical Engineering. Faculty in Mechanical Engineering are doing research on aids for the disabled, bone mechanics, the mechanics of hearing, neuromuscular dynamics, orthopedic biomechanics, and rehabilitation engineering. Cardiovascular dynamics and hemodynamics are being studied in Computer Science. In Electrical Engineering, advanced analysis techniques are applied to signal processing EKG, EEG, and x-ray image. Most research projects are carried out in collaboration with faculty of the Medical School or members of the local medical community.

Both the master’s and the Ph.D. degree are ordinarily awarded by a particular department, and the candidate must meet the degree requirements of that department. The student’s adviser assists in constructing a program of study incorporating appropriate courses in biology and medicine that also satisfies the degree requirements of the department in which the student is registered.

A student wishing to earn the M.S. in Engineering while pursuing the M.D. degree must apply separately for admission to the M.D. program and an engineering department. If the student is admitted to both, each school will encourage his or her pursuit of the other degree.

In addition to the financial support available through the departments in the form of fellowships, research assistantships, and teaching assistantships, there are externally administered fellowship programs for the support of graduate study in health-related fields. In particular, both the National Institute of Health and the National Science Foundation offer such fellowships based on national competition.

MANUFACTURING

Programs in manufacturing are available at the undergraduate, master’s, and Ph.D. level. Master’s programs are offered by the Department of Industrial Engineering and Engineering Management (IE-EM) and as joint programs by IE-EM and Mechanical Engineering. The CE program in Construction is also a “manufacturing” program for students interested in facility and public works manufacturing. All of these programs take advantage of modern computer technology.

Doctoral programs related to manufacturing are available in a number of departments and involve research projects ranging from machine tool design to the integration of databases into production software.

The Future Professors of Manufacturing (FPM) program prepares graduates for university faculty careers with an emphasis on manufacturing. Candidates are first admitted to a Ph.D. program in a department of the School of Engineering or the Graduate School of Business, and then interested students may be nominated for the FPM program by the department.

For detailed information about the master’s and Ph.D. programs, see the sections of this bulletin pertaining to industrial, mechanical, and civil engineering. For more information on the FPM program, contact Stanford Integrated Manufacturing Association (SIMA). Inquiries by email may be addressed to sima@sierra.stanford.edu.

GRADUATE PROGRAMS

MASTER OF SCIENCE

The M.S. degree is conferred on graduate students in engineering according to the University regulations stated in the “Graduate Degrees” section of this bulletin, and is described in the various department listings. A minimum of 45 units is usually required in M.S. programs in the School of Engineering. However, the presentation of a thesis is not a school requirement.

MASTER OF SCIENCE IN ENGINEERING

The M.S. in Engineering is available to students who wish to follow an interdisciplinary program of study that does not conform to a normal graduate program in a department.

There are three school requirements for the M.S. degree in Engineering: (1) the student’s program must be a coherent one with a well-defined objective and must be approved by a department within the school, (2) the student’s program must include at least 21 units of courses within the School of Engineering with numbers 200 or above in which the student receives letter grades, (3) the program must include a total of at least 45 units. Each student’s program is administered by the particular department in which it is lodged and must meet the standard of quality of that department.

Applications for admission should indicate the department in the school in which the student expects to take most of her or his courses. Transfer into this program is also possible from any program within the school by application to the appropriate department.
ENGINEER

The degree of Engineer is awarded at the completion of a comprehensive two-year program of graduate study. It is intended for students who desire more graduate training than can be obtained in an M.S. program. The program of study must satisfy the student's department and usually includes 90 units beyond the B.S. degree, of which at least 60 must be devoted to advanced or graduate study in the major subject or closely related subjects. The presentation of a thesis is required. The University regulations for the Engineer degree are stated in the "Graduate Degrees" section of this bulletin, and further information is found in the 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 (for example, Bioengineering), can be arranged. See the "Graduate Special Programs" section of this bulletin. University regulations for the Ph.D. are given in the "Graduate Degrees" section of this bulletin. Further information is found in departmental listings.

FELLOWSHIPS AND ASSISTANTSHIPS

Departments and divisions of the School of Engineering award graduate fellowships, research assistantships, and teaching assistantships each year. Information and application forms may be obtained from the chair of the appropriate department or division.

COURSES

The "Engineering" courses deal with subject areas within engineering that are, in their essential nature, broader than the confines of any particular branch of engineering. These courses are taught by professors from several departments of the School of Engineering, under the supervision of those listed below.

Of the courses described in this section, many are of general interest to both engineering and nonengineering students. In addition, certain departmental courses are of general interest and without prerequisites.

Students interested in the interactions between technology and society should also consult the "Science, Technology, and Society" section of this bulletin.

PRIMARILY FOR UNDERGRADUATES

1. The Nature of Engineering — (Same as Science, Technology, and Society 51.) The engineering process and the people and organizations involved in engineering. Topics: some history; nature and source of engineering problems; interaction between engineering, science, mathematics, and business; the nature of the intellectual disciplines involved in engineering; and, specific aspects of the engineering process, e.g., design, development and test, production, research. Examples from engineering programs at Stanford. Lectures, problem sets, design exercises, writing assignments, field trips. DR:6(8)

3 units, Aut (Freyberg) MWF 2:15

14. Applied Mechanics: Statics and Deformables — Introduction to engineering mechanics (freebody diagrams, equilibrium, trusses, frames, cables, internal forces, shear and bending moment, stress and strain, Hooke's law, Mohr's circle, Poisson's ratio, and torsion of circular sections). Alternates between concepts of statics and solid mechanics, explaining where static and elastic assumptions are valid. Emphasizes the modeling of physical systems and design of simple members and structures in two dimensions. Prerequisite: Physics 51. DR:6(8)

5 units, Aut (Shah) MTWThF 9
Win (Shah) MWF 9
Spr (Sheppard) MWF 9
problem sessions by arrangement

15. Dynamics — Application of Newton's Laws to solve static and dynamic problems, particle and rigid body dynamics, freebody diagrams, writing equations of motion. 2-D and 3-D cases including gyroscopes, spacecraft, rotating machinery. Solution of equations of motion and dynamic response of simple mechanical systems. Prerequisites: Math. 23 or 43, Physics 51. DR:6(8)

5 units, Aut (Heegaard) MWF 10
Spr (Ashley) MTWTh 10
problem sessions by arrangement

20. Introduction to Chemical Engineering — Overview of chemical engineering through discussion and engineering analysis of physical and chemical processes. Topics: overall staged separations, material and energy balance, concepts of rate processes, staged separations, heat and mass transport, and kinetics of chemical reactions. Applications of these concepts to areas of current technological importance: biotechnology, production of chemicals, materials processing, and purification. Prerequisite: Chemistry 31.

3 units, Spr (Frank, Robertson) MWF 9

30. Engineering Thermodynamics — Introduction to the concepts of energy and entropy from elementary considerations of the microscopic nature of matter. Use of basic thermodynamics concepts in the solution of engineering problems. Methods and problems in the socially responsible economic generation and utilization of energy in central power stations, solar systems, gas turbine engines, refriger-
eration devices, automobile engines, etc. Prerequisites: freshman calculus and physics. DR:6(8)
3 units, Aut, Win (Staff) MWF 10

35. Automobile Technology — For non-scientists. An engineering description of today’s automobile, how it works, and why it’s designed the way it is. How the auto affects air pollution and aspects of engine design for improving exhaust emissions. Alternate power plants and fuels and their options for the long term. DR:6(8)
3 units (Powell)
alternate years, given 1996-97

40. Introductory Electronics — Overview of electronic engineering. Electrical quantities, and their measurement including the operation of the oscilloscope. Digital logic circuits and their functions including the elementary microprocessor. Basic function of electronic components including ideal diodes and transistors; tuned circuits. Lab assignments complement lecture. Enrollment limited to 200. May be taken on video at some of Stanford’s Overseas Centers; see Overseas Studies for details. Prerequisites: Physics 53 or equivalent, one course of calculus. DR:6(8)
5 units, Aut (Pease) MWF 11-12:15
Win (Khuri-Yakub) MWF 11-12:15
three-hour lab weekly by arrangement

50. Introductory Science of Materials — Crystalline structure and the microstructures that determine the important physical properties of engineering materials. Introduction to phase diagrams and their use in predicting phase changes in materials. Elementary treatment of diffusion and of the kinetics of reactions in solids. Discussion of methods for controlling the properties of engineering materials by controlling internal structure. May be taken on video at some of Stanford’s Overseas Centers; see Overseas Studies for details. DR:6(8)
3 units, Win (Bravman) MWF 11
Spr (Sinclair) MWF 11

60. Engineering Economy — Economic analysis for choice among alternatives. Use of compound interest calculations. Selection of appropriate minimum attractive rates of return. Effects of depreciation, sources of funds, and income tax. Analysis of decisions under uncertainty. May be taken by freshmen, but recommended for second year or higher students. Prerequisite: Math. 41 or equivalent. Recommended: previous knowledge of elementary probability.
3 units, Aut (Staff) MWF 11
Win (Staff) MWF 2:15
Sum (Bhimjee) MTWTh 10

62. Introduction to Operations Research I — Theory and computation of optimal selection of decisions under certainty. Linear programming, network optimization models, dynamic programming, non-linear programming, and integer programming. Applications from a variety of areas, emphasizing high-level problems frequently faced by industrial engineers and management scientists. Prerequisite: Math. 43 or consent of instructor. DR:6(8)
4 units, Aut, Spr (Staff) MWF 1-2:05

70A. Programming Methodology — (Enroll in Computer Science 106A.)

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

100. Teaching Public Speaking — Theory and practice of teaching public speaking and presentation development. Lectures/discussions on developing an instructional plan, using audiovisual equipment for instruction, devising tutoring techniques, and teaching delivery, organization, audience analysis, visual aids, and unique speaking situations. Weekly practice speaking. Students serve as apprentice speech tutors. Those completing course may become paid speech instructors in the Technical Communications Program. Prerequisite: consent of instructor.
5 units, Aut, Win, Spr (Lougee, Staff)
M 7:30-10 p.m., Th 12:15

102E. Technical/Professional Writing for Electrical Engineers — Required of Electrical Engineering majors. Examines process of writing technical/professional documents. Lectures, writing assignments, individual conferences. Pre- or corequisite: Electrical Engineering 121, or consent of instructor.
1 unit, Win, Spr (Lougee) W 4:15

102S. Writing: Special Projects — Structured writing instruction for students working on non-course-related materials (theses, dissertations, journal articles). Weekly individual conferences.
1-5 units, Aut, Win, Spr (Staff)

102W. Technical and Professional Writing — Explores, systematically, the process of writing technical and professional documents; lectures/discussions on analyzing audiences, defining purpose, generating and selecting appropriate report materials, structuring and designing clear and convincing reports, drafting effective reports, and editing reports that are clear, concise, emphatic, and mechanically and grammatically “clean.” Weekly writing assignments and individual conferences.
3 units, Aut, Win, Spr (Lougee) TTh 11

103. Public Speaking/Presentation Development — Priority given to Engineering students. Introduction to the full range of speaking activities, from impromptu talks to carefully rehearsed formal professional presentations. How to organize and write speeches for a variety of occasions, analyze audiences, create and use appropriate visual aids, combat nervousness, and deliver informative and persuasive speeches effectively. Students become confident speakers through weekly practice in class,

105. Feedback Control Design — Design of linear feedback control systems for command-following error, stability disturbance rejection, and dynamic response. Root-locus and frequency response design techniques. Examples from a variety of fields. Some use of computer aided design with MATLAB. Prerequisite: 104 or Electrical Engineering 102. 3 units, Aut (DeBra) MWF 9
Win (Franklin) MWF 11


130. Science, Technology, and Contemporary Society — (Same as Science, Technology, and Society 101.) Analysis of the interplay of science, technology, and society in the contemporary U.S. Topics: key social, cultural, and values issues raised by contemporary scientific and technological developments; distinctive features of science and engineering as socio-technical activities; major influences of scientific and technological developments on 20th-century society, including transformations and problems of work, leisure, human values, the fine arts, and international relations; ethical conflicts in scientific and engineering practice; and the social shaping and management of contemporary science, and technology. DR:9(5)
4-5 units, Aut (McGinn) TTh 2:15-4:05 optional section for extra unit

131. Ethical Issues in Engineering — (Same as Science, Technology, and Society 115.) Examination of ethical issues in contemporary engineering practice. Topics: moral rights and responsibilities of engineers in relation to society, employers, colleagues, and clients; cost-benefit-risk analysis, safety, and informed consent; the ethics of whistleblowing; ethical conflicts of engineers as expert witnesses and managers; ethical issues in engineering design, manufacturing, and operations; ethical issues arising from engineering work in foreign countries; and ethical implications of the social and environmental contexts of contemporary engineering. Use of real-life case studies, guest practitioners, and field research. Limited enrollment. DR:8(3)
4 units (McGinn) given 1996-97

151. French Media and Communications — (Enroll in French 127.) 3-4 units, Win (Giraud) MW 11-12:15

152. Management of Technological Resources — (Enroll in French 128.) 3-5 units, Spr (Weil)

153. Advances of Technology in Europe — (Same as French 129.) 3-5 units, Spr (Giraud)

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

3 units, Aut (How) TTh 11-12:15

208B. Modern Control Design I — Design and analysis of digital controllers using classical and state space techniques. Discretization of continuous systems, 

208C. Modern Control Design II — Design of optimal controllers and estimators for continuous systems with stochastic disturbances. Probability theory, basic identification techniques, finite-time horizon controllers, recursive filtering, duality, and properties of optimal regulators. Sensitivity, robustness, and design trade-offs. Extensions to other quadratic cost functions. Lab experiments on computers connected to an analog system. Prerequisites: 208A; Math. 103 or Mechanical Engineering 200A.

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


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


235A,B. Space Systems Engineering — 40-50 students, mostly from engineering, science, and business, form a team to prepare a preliminary design study of a space system. International engineers have joined the team to define an initiative to put humans on Mars by 2010. Continued studies with Japan, Russia, and Europe define space vehicles for the missions. About 20 invited speakers from government and industry give the necessary background information. End of the second quarter, class gives a verbal briefing to government and industry representatives and publishes a final report on the system. Prerequisite: senior or graduate standing in Engineering or Physics, or consent of instructor.

235A, 3 units, Win (Lusignan)

TTh 12:30-2:30 plus two hours by arrangement

235B, 3 units, Spr (Lusignan) TTh 12:30-2:30 plus two hours by arrangement

290. Graduate Environment of Support — Discussion by guest faculty, advanced graduate students, specialists from industry and government, and dean’s office. Topics and information related to adapting to the graduate study environment in terms of psychosocial, financial, and career issues. How these relate to diversity, affirmative action, and minority services, resources, policies, and procedures.

1 unit, Aut (Lozano, Mitchell, Mungal) M 5:15

297A,B,C. Ethics of Development in a Global Environment (EDGE) — (Same as Anthropology 297A,B,C, Political Science 140A,B,C.) Wednesday evening seminars on world affairs, mostly on issues affecting poor nations. Autumn Quarter treats war and peace: the background of current wars and peace negotiations, the UN peace keeping efforts, war and religion, arms trade. Winter Quarter treats international resources and commerce: the debt crisis, environmental protection, resource depletion, Japan in the world economy, aid and monetary institutions. Spring Quarter treats “poverty and prejudice”: development models, comparative national health, AIDS, control of wealth, India-China-Africa America today. Speakers from Stanford and other institutions are experts who deal directly with world policy makers through research and advisory activities.

1-4 units, Aut, Win, Spr (Lusignan, Packenhem, Gupta)

lecture W 7:30-9:30 p.m.

workshops by arrangement

298. Seminar in Fluid Mechanics — Interdepartmental seminar on problems in all branches of fluid mechanics, with talks by visitors, faculty, and students. Graduate students may register for 1 unit, without letter grade; a letter grade is given for talks.

1 unit, Aut (Baganoff) T 4:15-5:30

Win (Moin) T 4:15-5:30

Spr (Lele) T 4:15-5:30
299. Special Studies in Engineering — Special studies, lab work, or reading under the direction of a faculty member. Students enroll in the section number corresponding to the particular faculty member. Prerequisite: consent of the instructor.

1 or more units, any quarter (Staff) by arrangement

610. Manufacturing Systems Analysis — (Same as Business T610.) Causal models of material flow in manufacturing systems. Topics: capacity and capacity utilization; functions of inventory; the manufacturing enterprise as a linear economic system; product structure and requirements planning; models of manufacturing response time; product portfolios and manufacturing flexibility. Emphasis on descriptive modeling.

4 units (Staff) not given 1995-96

611. Understanding Manufacturing Processes — (Same as Business T611.) Provides a framework for understanding the technology of modern manufacturing processes, focusing on the key factors in developing an understanding of any manufacturing process. Topics cover underlying microscopic physical and analytical theories; steps that control the performance, quality, and cost of the product; the history of the process; and the potential for improvement through research. Examples of fabrication processes (semiconductor devices, precision machining).

4 units, Win (Cutkowsky, Wood)

612. Manufacturing Organization — (Same as Business T612.) Overview of organization theory, research, and research methods relevant to the study of manufacturing systems. Conceptual domains include selection, socialization, promotion systems, reward systems, job design, creativity, innovation, social networks, group problem-solving, and the relationship between technology and social structure. Research focuses on papers that used organizational theory and methods to understand behavior of and in manufacturing settings.

4 units, Spr (Sutton)

613. Design for Manufacturability — (Same as Business T613.) Structured methodologies of the DFM process, emphasizing the pivotal role of design in manufacturing effectiveness. Topics: the initial stages of the concurrent engineering process including functional analysis, benchmarking, quality function deployment, value analysis, cost drivers, design for assembly and serviceability, design for process, advanced research issues on topics. Projects involve independent study of the design and manufacture of a product currently in production leading to a new product definition offering improved competitive advantage.

4 units, Win (Ishii)

614. Manufacturing Performance Measurement — (Same as Business T614.) Managerial accounting as a discipline devoted to modeling manufacturing processes, and representing physical events in economic terms. Topics: fundamental issues in measurement theory, cost-volume-profit analysis, activity-based costing, variance analysis, and the costs and benefits of flexibility. Finance functions: capital investment in technology, interactions with the financial markets, capital structure, and taxation. Quality, where modeling of economic effects is a relatively recent phenomenon. Statistical process control, cost of quality measures, ISO 9000, the Baldrige Award process, and environmental protection.

4 units (Staff) not given 1995-96

615. Manufacturing Information and Coordination — (Same as Business T615.) Systems for sharing information, coordinating activities, and aligning different objectives in a manufacturing organization. Cross-functional coordination, goal conflicts among agents, design of incentives, resource allocation. The information systems that support coordination activities through a value delivery chain (systems for order entry, master scheduling, requirements planning, product scheduling, and material flow control).

4 units (Staff) not given 1995-96

616. Proseminar in Manufacturing Education — (Same as Business T616.) For students in the Future Professors of Manufacturing Program; open to others with consent of instructor. Presentation of a core module, invited speakers from academia, industry, and government. Discusses manufacturing topics not covered in traditional courses and which are needed to help prepare students for academic careers in manufacturing. Each quarter focuses on a particular theme, e.g., environmental issues in manufacturing, manufacturing across the product spectrum, finding, and getting the best possible academic position, etc.

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

AERONAUTICS AND ASTRONAUTICS


Chair: George S. Springer
Associate Chair: J. David Powell
Professors: Donald Baganoff, Jr., Brian J. Cantwell, Lambertus Hesselink, Robert W. MacCormack, Bradford W. Parkinson, J. David Powell, George S. Springer, Charles R. Steele
AERONAUTICS AND ASTRONAUTICS

Associate Professors: Fu-Kuo Chang, Ilan Kroo, Stephen Rock
Assistant Professors: Jonathan How, Sanjiva Lele
Professor (Research): Per Enge, Steven W. Tsai
Courtesy Professors: Peter Bradshaw, Ronald K. Hanson, William C. Reynolds
Lecturer: Thomas Pulliam
Consulting Professors: Donald Jacobs, Robert T. Jones, Michael Lee, Bernard Ross, Michael Tauber
Visiting Professors: Nicholas Rott, Robert Twiggs
* Recalled to active duty.

The Department of Aeronautics and Astronautics (AA) prepares students for professional positions in industry, government, and academia by offering a comprehensive program of graduate teaching and research. In this broad program, students have the opportunity to learn and integrate multiple engineering disciplines. The program emphasizes structural, aerodynamic, guidance and control, and propulsion problems of aircraft and spacecraft. Courses in the teaching program lead to the degrees of Master of Science, Engineer, and Doctor of Philosophy. Specific programs are available in the following areas:

Acoustics
Aerodynamics
Aeroelasticity
Aerophysics and Experimental Space Science
Aerospace Robotics
Aerospace Structures
Aerospace Systems Synthesis and Design
Analytical and Experimental Methods in Solid and Fluid Mechanics
Biomedical Mechanics
Composite Materials
Computational Fluid Dynamics
Flight Mechanics
Gaskinetics
Guidance and Control
Hypersonic and Physical Gas Dynamics
Modern Optical Diagnostics in Fluid Mechanics
Propulsion
Waves and Vibrations

Requirements for all degrees include courses on basic topics in aeronautics and astronautics, as well as in mathematics, physics, and applied mechanics.

The current research activities cover a number of advanced fields, with special emphasis on:

Active Noise Control
Aerodynamic Noise
Aeroelasticity
Aircraft Performance and Control
Applied Aerodynamics
Astrodynamics
Computational Fluid Dynamics

Control of Robots, including Space Robots
Conventional and Composite Structures/Materials Systems Optimization
Hypersonic Flight
Inertial Instruments
Navigation Systems
Nonequilibrium Flow
Optical Diagnostics in Fluid Dynamics
Optimal Control and Estimation
Robust Control of Flexible Spacecraft
Spacecraft Design and Satellite Engineering
Shock Tube Studies of Vortex Interactions
Structural Aeroacoustics
Turbulence
Wave Propagation

INSTRUCTION AND RESEARCH FACILITIES

The work of the department is centered in the William F. Durand Building for Space Engineering and Science. This 120,000 square foot building houses advanced research and teaching facilities and concentrates in one complex the Department of Aeronautics and Astronautics as well as the activities of other engineering organizations allied in space exploration and aerospace technology.

The Guidance and Control Laboratories include a wide spectrum of specialized facilities for making and testing novel instruments of extremely high precision. The facilities include active table-leveling (0.1 arc sec); spacecraft thruster evaluation chamber for force measurement down to a dyne; spherical gyrorotor alignment facility (optical-to-principal-axis alignment less than 1 arc sec); an air cushion vehicle to simulate the Stanford Drag-Free Satellite in an orbital dynamic environment to an altitude of 275 km.; an air-bearing simulator for tethered satellite simulation and for spinning-spacecraft attitude control to a few arc seconds; plus facilities for a number of inertial instrument test stands on an isolated test pad with visual access to Polaris. Clean facilities, ultra-precision machining, and advanced electronics design and fabrication support the guidance, control, and instrumentation experiments. A new facility enables the testing of systems for controlling flexible spacecraft on laboratory models. This facility includes dedicated high-capacity digital-control computers. Cryogenic gyro test facilities are available in the nearby Varian Physics Building, and Electrical Engineering's Integrated Circuit Fabrication Facility is adjacent. Active flutter suppression research is performed in the 0.5 m x 0.5 m low-speed wind tunnel. Computer-aided engine test facilities are available in the Mechanical Engineering Laboratories and are an integral part of the Guidance and Control research program.
The Global Positioning System (GPS) Laboratory is engaged in research on precise aircraft and ground vehicle navigation. The laboratory has approximately 10 GPS receivers and related equipment as well as the capability to build pseudolites. Remote reference stations have also been established for the evaluation of the Wide Area Differential GPS concept. The laboratory has access to a satellite for flight evaluations of the various projects.

The Aerospace Robotics Laboratory (ARL) is developing advanced robot systems and control techniques applicable to industrial automation and space and underwater robotics. Experimental research facilities include very-flexible-beam manipulators, SCARA-configured manipulators with flexible drive trains, quick mini-manipulators, and pairs of cooperating manipulators. A collection of model-free-flying space robots that experience the dynamics of space through the use of air-cushion support systems makes possible leading-edge research in space-manipulator system dynamics. Our object-based control puts the human operator at the task command level. We work closely with the Computer Science Robotics Laboratory on task-planning/task-execution systems.

The computing facilities include a dozen Sun-Sparc workstations for control system design, analysis, and simulation; for real-time software development; for mechanical and electrical CAD; and for documentation. The workstations are complemented by a collection of real-time control computers networked by the labwide LAN. These microprocessor-based, single-board computers are used in multiprocessor configurations for implementing and testing control algorithms on experimental hardware.

The ARL and the Computer Science Robotics Laboratory are partners in Stanford's Center for Automation and Manufacturing Science (CAMS). An ultraprecision machining laboratory is also part of the center.

The spacecraft design program is a total lifecycle space mission program. The Satellite Systems Development Laboratory (SSDL) provides the opportunity for building, testing, and operating low-earth-orbiting microsatellites. Students at the master's degree level participate in mission planning, project management, spacecraft design, fabrication, testing, launch integration, and mission operations. Students in the engineer's and doctoral programs are involved with multiyear satellite programs for more complex missions. These programs involve direct interaction with payload customers and industry in both design and operations.

Research in hypervelocity fluid dynamics, aerophysics, and vortex interactions makes use of the Stanford high-pressure shock tube, a device that can produce gas motion at very high Mach numbers, but which can also be used as a transonic wind tunnel. The shock tube can also generate high-density, partially ionized plasmas under well-defined conditions. The associated instrumentation stresses modern optical diagnostics, especially holographic interferometry and high-speed spectroscopy.

Research in turbulent reacting flows is carried out in the Turbulence/Combustion Laboratory. This laboratory is centered around a variable pressure flow facility that permits studies of reacting flows under pressure conditions ranging from vacuum to 10 atmospheres. The apparatus is fully instrumented for laser diagnostics and fast local data acquisition. Current research includes studies of pulsed flames, development of particle tracking velocimetry, and visualization of the small-scale structure of turbulent jets.

Diagnostics of shock-wave phenomena emphasize modern optical methods, including resonant interferometry and holography. Other recently outfitted laboratories deal with holography, optical data processing, tomography, and related problems involving Fourier optics. Several student instructional laboratories include facilities to study blunt-body flow with ballistic freeflight range equipment, flame temperature by line reversal, gyroscopic behavior, hot-wire application with a small low-turbulence air-flow apparatus, refractive index of gases and free-correction flow fields with interferometer equipment, shock-wave interaction by use of a shock tube, supersonic jets, supersonic flow fields with schlieren techniques, and vibration modes of a simulated wing. An experiment using laser holography is currently being designed. A continuous low-speed wind tunnel with an 18" x 18" working section and speeds to 200 feet per second is available for use in instructional laboratories and research. Cooperative programs between the department and the nearby NASA-Ames Research Center have permitted research students access to the extensive collection of fluid- and aerodynamic research facilities and advanced instrumentation at the NASA labs.

Excellent facilities exist in the Fourier Optics and Optical Diagnostics Laboratory for the development and evaluation of new diagnostic techniques, including stable continuous wave and pulsed laser sources, extensive optical and electronic equipment, and a complete stand-alone digital image processing computer, linked to a Sun 3-260, several Sun workstations, and two Silicon Graphics Iris machines.

The Experimental Fluid Dynamics group has developed an extensive capability in modern, state-of-the-art optical diagnostics for fluids studies, including several applications of laser techniques, Fourier optics, and interferometry. Spe-
cial opportunities exist for students with overlapping interests in fluid dynamics and experimental physics.

Included among the facilities in the Durand Building are the Structures and Composites Laboratories for studying and testing the behavior of small-scale structures of metal and fiber reinforced composites. Equipment is also available to fabricate structural elements made of composite material by autoclave curing and filament winding.

Service facilities in the building include a chemistry lab and several conference rooms. Attached to the building is a modern classroom building equipped for televising lectures; it contains a lecture auditorium.

The department has over 100 computers in the Durand Building for use in the academic and research programs. Two clusters of PCs and Macintoshes are available for student use, and each research group is equipped with clusters of PCs, Macintoshes, or workstations.

There are other computer and terminal clusters throughout the campus. Terminals in these facilities provide for individual on-line, time-shared computation with the campus academic computer system. They are available to all students at no cost for their course work or unsponsored research.

Through the consortium arrangement between Stanford and the nearby NASA-Ames Research Center, students and faculty have access to one of the best and most extensive collections of experimental aeronautical research facilities in the world, as well as the latest generation of supercomputers.

The Institute for Space Studies and Astrophysics (ISSA). Several faculty of the Department of Aeronautics and Astronautics (AA) participate in the Center for Space Science and Astrophysics (CSSA). Graduate students in the department can arrange a program that emphasizes astronautics, planetary and space sciences, and work with faculty associated with CSSA.

At the master's level, a program in Computational Fluid Dynamics (CFD) is an option within the general structure of the master's requirements. Students intending to seek a Ph.D. degree with an emphasis on CFD should take the CFD series AA 214A, B, C during their master's year. Choice of math courses, theoretical and experimental dynamics courses, and electives most suitable for the CFD program should be done in consultation with the student's adviser. Research topics in CFD are supervised by a number of faculty members in both the Department of Mechanical Engineering and the Department of Aeronautics and Astronautics. Students undertaking theses in CFD generally utilize the large computer facilities of the NASA-Ames Research Center through a cooperative program with the University.
WAIVERS AND TRANSFER CREDITS

Students may receive departmental waivers of required courses for the M.S. degree in Aeronautics and Astronautics by virtue of substantially equivalent and satisfactorily performed course work at other institutions. A format memo (signed by the course instructor and adviser) should be submitted to the Candidacy Committee through the student services office indicating (1) the Stanford University course number and title and (2) the institution, number(s), and title(s) of the course(s) wherein substantially equivalent material was treated.

A similar procedure should be followed for transfer credits. Please note, however, that transfer credit is allowed only for courses taken as a graduate student in which equivalence to Stanford courses is established and for which a letter grade indicator (LGI) of 'B' or better has been awarded.

The number of transfer credits accepted for each degree (M.S., Engineer, and Ph.D.) is delineated in the “Graduate Degrees” section of this bulletin.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

An interdisciplinary program in Aeronautics and Astronautics (AA) leading to the B.S. degree in Engineering is available. For further information, see the “School of Engineering” section of this bulletin and the Undergraduate Handbook, available from the Office of the Dean of Engineering. As a graduate-level department, Aeronautics and Astronautics has no other undergraduate component.

COTERMINAL PROGRAM

This special program allows Stanford undergraduates an opportunity to work simultaneously toward a B.S. in another field and an M.S. in Aeronautical and Astronautical Engineering. General requirements for this program and admissions procedures are described in the “School of Engineering” section of this bulletin. Admission is granted or denied through the departmental faculty Admissions and Awards Committee. A coterminal student must meet the course and scholarship requirements detailed for the M.S. below.

GRADUATE PROGRAMS

MASTER OF SCIENCE

The University’s basic requirements for the master’s degree are outlined in the “Graduate Degrees” section of this bulletin. Students with an aeronautical engineering background should be able to qualify for the master’s degree in three quarters of work at Stanford. Students with a bachelor’s degree in physical science, mathematics, or other areas of engineering may find it necessary to take certain prerequisite courses, which would lengthen the time required to obtain the master’s degree. The following are departmental requirements.

SCHOLARSHIP REQUIREMENTS

A minimum letter grade indicator (LGI) of 2.75 is required to fulfill the department’s M.S. degree requirements and a 3.0 is the minimum required for eligibility to attempt the Ph.D. qualifying examination. It is incumbent upon both M.S. and potential Ph.D. candidates to request letter grades in all courses except those that do not offer a letter grade option and those that fall into the categories of colloquia and seminars (for example, AA 293, 297, and 298). Insufficient grade points on which to base the LGI may delay expected degree conferral or result in refusal of permission to take the qualifying examinations. Candidates with LGIs of 3.0 through 3.2 must request the permission of the Candidacy Committee to attempt the qualifying examinations.

AERONAUTICS AND ASTRONAUTICS

(45 Quarter units)

The master’s program in Aeronautics and Astronautics (AA) is designed to provide a solid grounding in the basic disciplines and a foundation for systems engineering. All candidates for this degree are expected to meet the basic course requirements in fluid mechanics, structural mechanics, guidance and control, propulsion, and experimentation in aeronautics and astronautics (Category A below), in addition to work in applied mathematics (Category B) and technical electives (Category C).

When planning their programs, candidates should check course descriptions carefully to ensure that all prerequisites have been satisfied. A course that is taken to satisfy a prerequisite for courses in Category A cannot be counted as a technical elective, but can count toward the M.S. degree in Category D (Other Electives).

A. Basic Courses — Candidates select eight courses as follows:

1. Five courses in the basic areas of Aeronautics and Astronautics (one each):
   a) Fluids: 200A or 210A
   b) Structures: 240A
   c) Guidance and Control: 242
   d) Propulsion: 280 or 283
   e) Experimentation: 131 or Engr. 206 or 208B or 236A

2. Three courses, one each from three of the areas below:
   a) Fluids: 200A or 210A
   b) Structures: 240B or 256
   c) Guidance and Control: 271A or 279A
d) One course selected from AA courses numbered 200 and above, excluding seminars and independent research.

Candidates who believe they have satisfied 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 competence in the applied mathematics pertinent to his or her major field. This requirement can be met by matriculating in a minimum of 6 units in either (1) applied mathematics (for example, linear algebra, partial differential equations, complex variables, probability) or (2) technical electives that strongly emphasize applied mathematics. A list of courses approved for the mathematics requirement is available in the departmental student services office. Note that 25 percent of the major-field Ph.D. qualifying examination is devoted to pertinent mathematics.

C. Technical Electives — Candidates, in consultation with their advisers, select at least four major-field courses (in addition to those taken under Category A) from among the three-digit-series courses offered by the departments of the School of Engineering and the Department of Physics in the School of Humanities and Sciences. This requirement increases by one course (taken in either the major or peripheral fields) for each basic course that is waived. Technical electives taken in satisfaction of the mathematics requirement (category B) may not also be counted in this four-course minimum.

D. Other Electives — It is recommended that all candidates enroll in at least one humanity or social science course. Practicing courses in, for example, art, music, and physical education, do not qualify in this category.

ENGINEERING
(45 Quarter Units)

Students whose career objectives require a more interdepartmental or narrowly focused program than is possible in the M.S. program in Aeronautics and Astronautics (AA) may pursue a program for an M.S. degree in Engineering. This program is described in the School of Engineering “Graduate Programs of Study” section of this bulletin.

Sponsorship by the Department of Aeronautics and Astronautics in this more general program requires that the student file a proposal before completing 18 units of the proposed graduate program. The proposed program must include at least 12 units of graduate-level work in the department and meet rigorous standards of technical breadth and depth comparable to the regular AA master of science program. The proposal must be accompanied by a statement explaining the objectives of the program and how the program is coherent, contains depth, and fulfills a well-defined career objective. The grade and unit requirements are the same as for the M.S. degree in Aeronautics and Astronautics.

ENGINEER

The degree of Engineer represents an additional year (or more) of study beyond the M.S. degree and includes a research thesis. The program is designed for students who wish to do professional engineering work upon graduation and who want to engage in more specialized study than is afforded by the master’s degree alone.

The University’s basic requirements for the degree of Engineer are outlined in the “Graduate Degrees” section of this bulletin. The following are department requirements. The candidate’s study program must fulfill the department’s requirements for the master’s degree or a substantial equivalent. Beyond the master’s degree, a total of 45 units of work is required, including a thesis and a minimum of 30 units of courses chosen as follows:

1. Twenty-four units of approved electives, of which 9 shall be in mathematics or applied mathematics and the remainder usually selected from one of the following fields: (a) acoustics, (b) aeroelasticity, (c) aerophysics, (d) aerospace structures, (e) aerospace systems synthesis and design, (f) analytical and experimental methods in solid and fluid mechanics, (g) computational fluid mechanics, (h) flight mechanics, (i) gas kinetics, (j) guidance and control, (k) physical gas dynamics, (l) propulsion, and (m) waves and vibrations.

2. Six units of free electives.

Candidates for the degree of Engineer are expected to have a minimum letter grade indicator (LGI) of 3.0 for work in courses beyond those required for the master’s degree.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the Ph.D. degree are outlined in the “Graduate Degrees” section of this bulletin. Department requirements are stated below.

Qualifications for candidacy for the doctoral degree are contingent on:

1. Fulfilling department requirements for the master’s degree or its substantial equivalent.
2. Maintaining a high scholastic record for graduate course work at Stanford.
3. Completing 3 units of a directed research problem (AA 290 or an approved alternative).
4. In the first year of doctoral study, passing an oral Ph.D. qualifying examination given by the department during Autumn and Spring Quarters (following mid-term exams but before Dead Week).

Detailed information about the nature and scope of the Ph.D. qualifying examination can be obtained from the department. Research on the doctoral dissertation may not be formally started before passing this examination.

Beyond the master's degree, a total of 90 additional units of work is required, including a minimum of 36 units of approved formal course work (excluding research, directed study, and seminars). The courses should consist primarily of graduate courses in engineering and sciences, and should form a strong and coherent doctoral program. At least 12 units must be from graduate-level courses in mathematics or applied mathematics. University requirements for continuous registration do apply to doctoral students for the duration of the degree, including registration for each quarter in which the student requires department consultation to complete dissertation work.

University Oral and Dissertation — The Ph.D. candidate is required to take the University oral examination after the dissertation is substantially completed (with the dissertation draft in writing) but before final approval. The examination consists of a public presentation of dissertation research, followed by substantive private questioning on the dissertation and related fields by the University Oral Committee (four selected faculty members, plus a chair from another department). The University oral normally occurs toward the end of the fourth graduate year. Once the oral has been passed, the student finalizes the dissertation for reading committee review and final approval. Forms for the Ph.D. reading committee and University oral scheduling are submitted with a one-page dissertation abstract at least three weeks prior to the date of the oral.

Ph. D. MINOR

A student who wishes to obtain a Ph.D. minor in Aeronautics and Astronautics should consult the department office for designation of a minor adviser. A minor in Aeronautics and Astronautics may be obtained by completing 20 units of graduate-level courses in the Department of Aeronautics and Astronautics, following a program (and performance) approved by the department’s Candidacy Chair.

The student’s Ph.D. reading committee and University Oral Committee must each include at least one faculty member from Aeronautics and Astronautics.

FELLOWSHIPS AND ASSISTANTSHIPS

Fellowships and course or research assistantships are available to qualified graduate students. Fellowships sponsored by Gift Funds, Stanford University, and Industrial Affiliates of Stanford University in Aeronautics and Astronautics provide grants to first-year students for the nine-month academic year to cover tuition and living expenses. Students who have excelled in their master’s-level course work are eligible for course assistantships in the department; those who have demonstrated research capability are eligible for research assistantships from individual faculty members. A half-time course or research assistantship provides a semimonthly living stipend and a 9-unit tuition grant per quarter. Research assistants may be given the opportunity of full-time summer employment at twice the half-time rate. They may use their work as the basis for a dissertation.

Further information and application forms may be obtained from Graduate Admissions, the Registrar’s Office.

COURSES

100. Introduction to Aeronautics and Astronautics — The principles of fluid flow, flight, and propulsion; the creation of lift and drag, aerodynamic performance including take-off, climb, range, and landing performance, structural concepts, propulsion systems, trajectories, and orbits. Remarks on the history of aeronautics and astronautics. Prerequisites: Math. 41, 42; elementary physics.

3 units, Aut (Staff) TTh 11-12:15

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

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

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

135. Introductory Acoustics — Basic concepts of acoustics and selected applications. Physics of sound wave propagation in various fluids and solids emphasizing one-dimensional analysis. Characterization of sound waves in terms of pressure, energy, and intensity. Reflection and transmission at media boundaries. Nature of acoustic sources and analysis

3 units (Staff) not given 1995-96


3 units, not given 1995-96

200A. Applied Aerodynamics — Review of fundamental equations of fluid dynamics and the physical assumptions on which they are based; overview of appropriate methods for solving these equations including nonlinear CFD, conformal mapping, linear panel and vortex methods; estimation of pressure distributions and resultant airloads on 2-D airfoils, finite wings, slender bodies, and lifting systems; compressibility effects; boundary layer analysis and prediction of drag, separation, and displacement effects. Application to airfoil and wing design. Prerequisite: undergraduate aeronautics course. Recommended: 210A.

3 units, Win (Kroo) MWF 10

200B. Applied Aerodynamics — Companion to 200A for those interested in control and guidance. Emphasis on the development of the full three-dimensional nonsteady field equations and the associated constitutive relations representing the work- ing fluid. Examples for the specialized cases of modern airfoils and the home computer. Munk’s thin airfoil theory. Reverse flow and reciprocal theorems. Slender wing theory, swept wings, oblique wings. Material for outside reading (Wing Theory. Robert T. Jones) and computer program available. Prerequisites: knowledge of elementary aerodynamics and complex variables.

1 unit, Win (Jones) T 3:15

205. Current Topics in Aerodynamic Design — Fundamental theory and simple computational methods are employed in a survey of recent aerodynamic design developments. Topics: airfoils (natural laminar flow, low Reynolds number airfoils, supercritical sections), wing design (optimization, winglets, swept-forward, and oblique wings), unconventional configurations (canard, three surface, tailless designs), propulsion (propfans, propellers, flapping flight), and applications of CFD in aircraft design. “Hands-on” experience with aerodynamic design problems using back-of-the-envelope analyses, microcomputer programs, and supercomputer results. Prerequisite: 200A.

3 units, Spr (Kroo) MWF 3:15

210B. Fundamentals of Compressible Flow — Continuation of 210A with emphasis on more general flow geometry. Use of exact solutions to explore the supersonic limit. Identification of similarity parameters. Review of solution methods for the linearized potential equation with applications to wings and bodies in steady flow; relation to physical acoustics and wave motion in nonsteady flow. Nonlinear solutions for nonsteady constant area flow and introduction to Riemann invariants. Elements of the theory of characteristics; nozzle design; extension to nonisentropic flow. Real gas effects in compressible flow. Flows in various gas dynamic testing facilities. Prerequisite: 210A.

3 units, Win (Baganoff) MWF 1:15

211A. Physical Gas Dynamics — (Enroll in Mechanical Engineering 262A.)

213. Atmospheric Entry — High-speed atmospheric entry subjects vehicles to intense heating, decelerations, and structural loads. These are formulated and their intensity determined for a variety of flight paths. Trajectories range from nonlifting (ballistic) to constant lift and variable lift paths. Different heat shielding methods and their effectiveness compared. Applications: the Space Shuttle, aerospace plane, Mars return missions, and atmospheric probe vehicles. Comprehension of fundamental physical principles is emphasized. Recommended: understanding of compressible, equilibrium, and real gas flows (210A and/or 212).

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

214A. Numerical Methods in Fluid Mechanics — The basic principles underlying the Navier-Stokes equations. Relations between time-accurate and relaxation methods. Implicit and explicit methods combined with flux splitting and space factorization. Considerations of accuracy, stability of numerical methods, and programming complexity. Prerequisites: knowledge of linear algebra and Mechanical Engineering 200A, 200B, or equivalent approved by instructor.

3 units, Aut (Pulliam) MW 3:30-4:30


3 units, Win (MacCormack) MWF 11


3 units, Spr (MacCormack) MWF 11


3 units (Warming) alternate years, given 1996-97

218. Similitude in Engineering Mechanics — Application of similarity methods to the reduction and simplification of physical problems: similarity rules revealed by dimensional analysis and other groups of transformations; use of Lie groups in the generation of integrating factors for nonlinear ordinary differential equations, reduction of order; generation of similarity variables for partial differential equations, reduction of dimension; invariant groups of the heat equation, compressible and incompressible Navier-Stokes and Euler equations. Examples: boundary layers, heat conduction in nonlinear media, gasdynamic analogy for shallow water waves, motion of viscous vortices, similarity rules for turbulent shear flows, local solutions of autonomous systems, evolution of 3-D tensor fields. Prerequisite: Mechanical Engineering 210A or Math. 131, or consent of instructor.

3 units, Spr (Cantwell) MWF 10


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

221. Hypervelocity Flight — Flowfields about advanced aeromaneuvering vehicles at moderate to very high altitudes (around 100 km). Navier-Stokes equations and macroscopic gradient vector applied to real gas flowfields including transport of mass, momentum, energy, chemical species, and surplus charge for dissociating and ionizing gases. Effects of chemical concentration, thermal, pressure, and forced diffusion: radiative transfer; and ablation. Consideration of chemical equilibrium, and chemical and thermodynamic nonequilibrium (for flight at very high altitude). Recommended: 212 or equivalent.

3 units (Howe)

225. Stochastic Processes in Aeronautics — Applications of probability theory to problems in aeronautics, emphasizing random behavior in fluid, ther-
modynamic, chemical, structural, and control systems of aerospace interest. The random-walk model introduces basic concepts and connects the topics. Time evolution of probability distributions, linking problems in chemical kinetics, rarefied gas flows, thermodynamic nonequilibrium, and finite difference methods in fluid mechanics. Statistical variables: power spectra, correlation functions, transform techniques, the response of a linear system to a random forcing function, and the statistical theory of turbulence. Stochastic models on microcomputers.

3 units, Spr (Baganoff) MWF 1:15

240A. Analysis of Structures —Elements of two-dimensional elasticity theory. Boundary value problems; energy methods; analyses of solid and thin walled section beams, trusses, frames, rings, semimonocoque structures. Prerequisite: Engineering 14 or equivalent.

3 units, Aut (Springer) MWF 9


3 units, Win (F. Chang) MWF 3:15

241A.B. Introduction to Aircraft Design, Synthesis, and Analysis —The total development of new aircraft systems emphasizing commercial aircraft; underlying economic and technological factors that create markets for new aircraft from rational and historical viewpoints; determining market demands and system mission performance requirements; optimizing configurations to comply with requirements, emphasizing the interaction of various disciplines (aerodynamics, structures, propulsion, guidance, payload, and ground support; parametric studies); applied aerodynamic and design concepts for use in configuration analysis (airplane layout, wing design, high lift systems, drag, stability and control requirements, and tail sizing). Application to an individually chosen aeronautical system; applied structural fundamentals emphasizing fatigue and fail-safe considerations; design load determination; weight estimation; propulsion system performance and installation; engine types; environmental problems (noise and smoke); performance estimation (takeoff, climb, cruise, and landing). Direct/indirect operating costs prediction and interpretation. Aircraft functional systems (hydraulic, electrical, environmental control); avionics; importance and achievement of aircraft reliability and maintainability.

3 units each, Win, Spr (Kroo) MWF 2:15


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

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.

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


258. Introduction to Modern Optics — (Enroll in Electrical Engineering 268.)


261. Introduction to Continuum Mechanics — (Enroll in Mechanical Engineering 238A.)

262. Theory of Elasticity — (Enroll in Mechanical Engineering 238B.)

263. Theory of Plates — (Enroll in Mechanical Engineering 241A.)

264. Theory of Shells — (Enroll in Mechanical Engineering 241B.)

265. Theory and Numerical Simulation of Shells — (Enroll in Mechanical Engineering 241C.)

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

267. Dynamical Systems — (Enroll in Mechanical Engineering 233A.)


270. Introduction to Modern Optics — (Enroll in Electrical Engineering 268.)

271A. Dynamics and Control of Spacecraft and Aircraft — The dynamic behavior of spacecraft and aircraft, and design of automatic control systems for them. For spacecraft in orbit: natural longitudinal and lateral dynamic behavior and design of attitude control systems using combinations of gravity gradient, reaction thrusting and reaction wheels or control moment gyro. For aircraft: natural longitudinal and lateral dynamic behavior and design of autopilots for flight path control, automatic landing, etc. Prerequisites: 200A or 208, 242, Engineering 105A.


274. Readings in Control Theory — Readings, presentations, and discussions by graduate students on current topics of interest in control theory. Possible topics: robust, adaptive, and nonlinear control; numerical techniques. Possible lectures by experts in the field. Limited enrollment. Prerequisites: 208A, B, C or equivalent; consent of instructor.
275. Introduction to Control Design Techniques — (Enroll in Engineering 205.)
276. Control System Design and Simulation — (Enroll in Engineering 206.)
277. Nonlinear Control — (Enroll in Engineering 209.)
  3 units (Powell) alternate years, given 1996-1997
279. Space Mechanics — Orbits of near-earth satellites and interplanetary probes; transfer and rendezvous; decay of satellite orbits; influence of earth’s oblateness; sun and moon effects on earth satellites. Prerequisite: 242.
  3 units, Win (Kasdin) TTh 9:30-10:45
280. Rocket Propulsion Fundamentals — Introductory rocket dynamics, fundamentals of nozzle flow, use of performance parameters, thermochemical calculation of performance, heat transfer in rockets, basic design procedures, elements of electric propulsion, recent developments in space transportation systems. Prerequisite: thermodynamics or elementary gas dynamics.
  3 units, Win (Cantwell) MWF 3:15
283. Aircraft Propulsion — Design and performance of airbreathing engines. Topics: introduction to 1-D gas dynamics; physical parameters and cycle analysis of ramjets, turbojets, turbofans and turboprops; design of supersonic inlets and nozzles, compressor maps, component matching, fuel injection, ignition and combustion systems.
  3 units, Aut (Cantwell) TTh 11-12:15
290. Problems in Aeronautics and Astronautics — Investigation, experimental or theoretical, of problems in aeronautics and astronautics. Students may work in any field of special interest.
  1-5 units, any quarter (Staff)
291. Practical Training — Educational opportunities in high-technology research and development labs in industry. Qualified graduate students engage in internship work and integrate that work into their academic program. Students register in the quarter following internship work, and complete a research report outlining their work activity, problems investigated, key results, and any follow-on projects they expect to perform. Meets the requirements for Curricular Practical Training for students on F-1 visas. Sign up for section number corresponding to your academic adviser. Student is responsible for arranging own employment and should see department Student Services Manager before enrolling.
  1 unit, any quarter (Staff) by arrangement
293. Seminar in Spacecraft Application — For undergraduate and graduate students interested in small low-cost satellites, their applications in earth-orbiting and interplanetary exploration, and the commercial and scientific opportunities; others invited. Topics are related to the present small spacecraft mission planning, design, fabrication and operation; presented by industry lecturers, faculty, and students. Registration for credit optional; letter grade given for students who make presentations. May be repeated for credit.
  1 unit, Aut, Win, Spr (Twiggs) M 4:15
297. Seminar in Mechanics and Control of Flight — For graduate students with an interest in automatic control applications in flight mechanics, guidance, navigation, and mechanical design of control systems; others invited. Problems in all branches of vehicle control, guidance, and instrumentation presented by researchers on and off campus. Registration for credit optional; letter grade given for students who make presentations.
  1 unit, Aut, Win (Rock) W 4:15
  Spr (Powell) W 4:15
298. Seminar in Fluid Mechanics — (Enroll in Engineering 298.)
  1-75 units, any quarter (Staff) by arrangement
  1-15 units, any quarter (Staff) by arrangement
351A,B,C. Advanced Fluid Mechanics — (Enroll in Mechanical Engineering 351A,B,C.)
366. Introduction to Fourier Optics — (Enroll in Electrical Engineering 366.)
370. Advanced Modern Optics — (Enroll in Electrical Engineering 349.)

CHEMICAL ENGINEERING*
Senior Lecturer: Robert H. Schwaar  
Lecturer: Conrad Schadt  
Consulting Professors: Charles F. Goochee, Wolfgang Knoll, John Rabolt, Jerome Swalen

* The curriculum leading to the B.S. degree in Chemistry is described in the "School of Humanities and Sciences" section of this bulletin.

**UNDERGRADUATE PROGRAM**

**BACHELOR OF SCIENCE**

The engineering depth sequence required for the B.S. degree (see the "School of Engineering" section of this bulletin) provides a background in the fundamentals of chemistry and basic training in applied chemical kinetics, engineering thermodynamics, plant design, polymer science, process analysis and control, separation processes, and transport phenomena. The B.S. program in Chemical Engineering additionally requires basic courses in chemistry, engineering, mathematics, and physics.

Otherwise, there is no set B.S. program for Chemical Engineering students to follow. A sample program is available from the department's advisers or the Dean's Office, School of Engineering. It is recommended that the student discuss the prospective program with his or her adviser, especially if transferring from chemistry, physics, or another field in engineering. With some advanced planning, the student can usually arrange to attend one of the overseas campuses.

**GRADUATE PROGRAMS**

**MASTER OF SCIENCE**

An M.S. program comprising an academic year of appropriate course work is available to accommodate students wishing to pursue a professional chemical engineering career after receiving the B.S. degree, including foreign students who plan on returning to their homeland. The M.S. degree is awarded, without requiring a formal thesis, after a minimum of three quarters of broad study subject to the specifications stated below.

Unit and Course Requirements — For students terminating their graduate work with the M.S. degree in Chemical Engineering, a program consisting of 45 units of academic work is required, including at least four lecture courses selected from the Chemical Engineering 200-lecture series. The remaining courses may be chosen from department approved graduate or advanced undergraduate courses in basic or applied sciences and engineering according to the following guidelines. (1) Approved courses include (a) all graduate courses offered in the Departments of Aeronautics and Astronautics, Chemical Engineering, Civil Engineering, Computer Science, Electrical Engineering, Materials Science and Engineering, Mechanical Engineering, Operations Research, Applied Physics, Biological Sciences, Chemistry, Mathematics, Physics, Statistics, and the School of Earth Sciences, and (b) all upper-division undergraduate courses in Biological Sciences, Computer Science (108 and above), Mathematics, Physics, and Statistics. (2) Undergraduate courses in chemical engineering excluding 100, 110, 130, and 180A,B may be included as part of the 45-unit master's program. Departures must be approved by petition of the student to the chair of the Department of Chemical Engineering. Credit toward the M.S. degree is not given for Chemical Engineering Special Topics courses numbered 270-279, or for the colloquium, 300. Note, however, that the student must register for 300 and attend the colloquia. Students wishing to obtain research experience should choose a research adviser and enroll in Chemical Engineering Research 290; up to 6 units may count toward the 45-unit requirement. 290, however, may not be substituted for any of the required lecture courses in the Chemical Engineering 200-lecture series. A written report describing the results of this research must be submitted to and approved by the research adviser.

To ensure that an appropriately balanced program is taken by all M.S. candidates, the student's program must be approved by the departmentally appointed graduate adviser, and a program proposal for the master's degree should be worked out by the student and adviser at their first meeting of the academic year.

Minimum Grade Requirement — All courses intended to satisfy the 45-unit M.S. degree requirements must be taken for letter grades, if offered, with the minimum average letter grade indicator (LGI) of 3.0.

**ENGINEER**

The degree of Engineer is awarded after completion of six quarters of study beyond the bachelor's degree, plus the requirements listed below. This degree is not required to enter the Ph.D. program.

Unit and Course Requirements — A minimum of 72 total units (including research) and 39 units of course work is required for the Engineer degree, including the following Chemical Engineering courses: 220, 221, 222, 230, 231, and either 232 or 233/234. After completing this series of courses and at least three quarters of residence (36 units or more of course or research work), the student is eligible to apply for the M.S. degree in Chemical Engineering. The remaining courses, to total 39 units, may be chosen from the basic sciences and engineering. Students may participate in a research project during their first year. Following consultation with their adviser, they may register for up to 6 units of chemical
engineering research. These research units may be applied toward the 36-unit requirement for the M.S. but may not be applied toward the 39-unit course requirement for the Engineer degree. No credit is given for Chemical Engineering 270-279 and 300, undergraduate chemical engineering courses, or courses usually required for the B.S. degree. All courses intended to satisfy the degree requirements must be taken for letter grades, if offered, and an average letter grade indicator (LGI) of 3.0 must be maintained.

Thesis Requirement — The thesis must represent a substantial piece of research equivalent to nine months of full-time effort and must be approved by a reading committee consisting of two members of the Chemical Engineering faculty.

Qualification for the Ph.D. Program by Students Receiving the Degree of Engineer — After completing all the requirements for the Engineer degree, a student may request to be examined on the Engineer research work for the purpose of qualifying for the Ph.D. If the request is granted, the student’s thesis must be available in its final form for inspection by the faculty and must have been approved by the Reading Committee at least two weeks prior to the scheduled date of the examination.

DOCTOR OF PHILOSOPHY

The Ph.D. degree is awarded after completion of a minimum of nine quarters of study plus the requirements listed below.

Unit and Course Requirements — A minimum of 72 total units (including research) and 39 units of course work is required for the Ph.D. degree, including the following Chemical Engineering courses: 220, 221, 222, 230, 231, and either 232 or 233/234. After completing this series of courses and at least three quarters of residence (36 units or more of course or research work), the student is eligible to apply for the M.S. degree in Chemical Engineering. The remaining courses, to total 39 units, may be chosen from the basic sciences and engineering. Students may participate in a research project during their first year. Following consultation with their adviser, they may register for up to 6 units of chemical engineering research. These research units may be applied toward the 36-unit requirement for the M.S. but may not be applied toward the 39-unit course requirement for the Ph.D. degree. No credit is given for Chemical Engineering 270-279 and 300, undergraduate chemical engineering courses, or courses usually required for the B.S. degree. All courses intended to satisfy the degree requirements must be taken for letter grades, if offered, and an average letter grade indicator (LGI) of 3.0 must be maintained.

Teaching Requirement — All Ph.D. candidates, regardless of the source of their financial support, are required to gain teaching experience as an integral part of graduate training in the Department of Chemical Engineering.

Qualifying Examination — To be advanced to candidacy for the Ph.D. degree, the student must pass a preliminary qualifying examination. First-year students are asked to present orally and defend a critical review of a published paper before the faculty at the beginning of the Spring Quarter. This examination is used to decide whether or not these students will be allowed to choose research advisers and begin thesis research in the Spring Quarter of their first year. Failing this examination leads to termination of the student’s study with an M.S. degree and precludes financial aid beyond that already promised. Students passing this preliminary examination take a qualifying examination consisting of an oral defense of their research work before the faculty early in the Autumn Quarter of their second year.

Dissertation Requirement — A dissertation based on a successful investigation of a fundamental problem in chemical engineering is required; the student enrolls in Chemical Engineering 290 during the course of this research. In four calendar years after enrolling in the department, the student is expected to have fulfilled all the requirements for the Ph.D. including submission of a completed dissertation that has already been approved by his or her research adviser to the reading committee. No sooner than four weeks after this date, the student’s University oral examination is scheduled. This exam, based on the candidate’s dissertation research, is in the form of a public seminar followed by private questioning by an examining faculty committee. After satisfactory performance in the examination and submission of the dissertation to the Graduate Degree Progress Section of the Registrar’s Office, the Ph.D. degree is awarded.

RESEARCH ACTIVITIES

Research investigations are currently being carried out in the following fields: applied statistical mechanics, biocatalysis, bioengineering, polymeric systems, computational materials science, equilibrium and transport properties of colloidal dispersions, hydrodynamic stability, kinetics and catalysis, Newtonian and non-Newtonian fluid mechanics, polymer adsorption, polymeric liquids and colloidal suspensions, rheoptics of polymeric systems, computational materials science and surface and interface science. A brochure describing research projects currently being pursued in these areas is available from the department upon request.
FELLOWSHIPS AND ASSISTANTSHIPS

A number of fellowships and assistantships are awarded each year to incoming students. Application forms may be obtained from the department. The completed application should be received no later than January 1 preceding the start of the academic year for which the award is to be made.

COURSES

PRIMARILY FOR UNDERGRADUATES

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

   3 units, Aut (Homsy) MWF 9-10

110. Equilibrium Thermodynamics — Thermodynamic properties, equations of state, properties of non-ideal systems including mixtures, and phase and chemical equilibria. Prerequisite: Chemistry 171.
   3 units, Win (Madix) MWF 11-12:15

120. Separation Processes — Analysis and design of equilibrium and non-equilibrium separation processes. Possible examples: distillation, liquid-liquid extraction, electrophoresis, centrifugation, chromatography, and reaction-assisted separation processes.
   3 units, Spr (Khosla) TTh 1:15-2:30

130. Kinetics and Reactor Design — Chemical kinetics, elementary steps, mechanisms, rate-limiting steps, and the 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 (Gasi) MWF 10

140. Fluid Mechanics — The flow of isothermal fluids from a momentum transport viewpoint. Continuum hypothesis, scalar fields, fluid statics, deformation of continuous media, non-Newtonian fluids, the equations of motion, creeping and potential flow, boundary layer theory, turbulence, free-surface phenomena, porous media flows. Prerequisites: junior standing in chemical engineering or consent of instructor; 100 and Math. 130, or equivalent.
   4 units, Win (Robertson) TTh 2:30-3:45 discussion M 4

150. Energy and Mass Transport — The transport of energy and mass in solid and fluid continua. Fourier's law, heat transfer in solids, laminar flow, forced and free convection, boundary-layer heat transfer, natural convection with application to geophysical flows, energy transport by radiation, Fick's Law, binary diffusion, the equation of convective diffusion, mass transfer with chemical reaction, transport in turbulent flows, heat and mass transfer analogies. Prerequisite: 140 or equivalent.
   4 units, Spr (Shaqfeh) TTh 10:30-11:45

160. Chemical Engineering Plant Design — Open to seniors in chemical engineering or by consent of instructor. Application of chemical engineering principles to design of practical plants for manufacture of chemicals and related materials. Topics: flowsheet development from a conceptual design, equipment design for distillation, chemical reactions, heat transfer, pumping, and compression; estimation of capital expenditures and production costs; plant construction.
   3 units, Spr (Schwar) 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.
   180A. 3 units, Aut (Frank) MTThF 9-12
   plus lab by arrangement
   180B. 3 units, Win (Fuller) MF 12:15-1:15
   TTh 12 plus lab by arrangement

190. Undergraduate Research in Chemical Engineering — Lab or theoretical work for undergraduate students under the direct supervision of a faculty member. Research in one of the graduate research groups or other special projects in the undergraduate chemical engineering lab. Students should consult advisers for information on available projects.
   (Staff) by arrangement

PRIMARILY FOR GRADUATE STUDENTS

220. Applied Mathematics in Chemical Engineering — Mathematical problems in heat and mass transfer, fluid mechanics, and chemical reactor design. Applications of tensor calculus, solution of ordinary differential equations, perturbation techniques, stability of steady solutions, phase plane methods: numerical methods for ordinary and partial differential equations, introduction to Fourier transformations to solve par-
tial differential equations. Prerequisites: Math. 113, 130, 131, or equivalent.

3 units, Aut (Shaqfeh) MW 1:15-2:30


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

F 1:15-2:30

222. Transport Phenomena II — Continuation of 221 emphasizing boundary layer phenomena, heat and mass transport, transport with chemical reaction, and reaction-diffusion systems. High Reynolds number flows; boundary layers, vorticity layers. Transport for low and high Peclet numbers in unbounded flows; transport in tubes, Leveque approximations; applications in membrane transport; transport in flows with closed streamlines, drops, bubbles, and interphase transport. Prerequisite: 221.

3 units Spr (Fuller) TTh 9-10:15

223. Microrheology — Flow phenomena of polymeric and colloidal liquids; fundamental concepts of rheology; measurement techniques in rheometry; molecular models of dilute and concentrated polymer solution dynamics (flexible and rigid macromolecules); prediction of rheo-optical properties from molecular models; dynamics of colloidal suspensions.

3 units Spr (Fuller)


3 units (Fuller)

alternate years, given 1996-97


3 units, Aut (Frank)

231. Structure and Spectroscopy of Molecular Systems — For graduate students in all engineering and science disciplines with an interest in spectroscopic studies of the gas and condensed phases. Diffraction. Photon and electron spectroscopies of the gas and solid phases. Infrared, electron energy loss and Raman vibrational spectroscopies. Auger, x-ray and ultraviolet photoelectron spectroscopies. Synchrotron spectroscopy methods, including near edge absorption fine structure and extended x-ray, absorption fine structure analysis. Basic nuclear magnetic resonance spectroscopy.

3 units, Win (Madix) MW 2:15-3:30

F 2:30-3:45

232. Protein Science and Engineering — Emphasis on physico-chemical interactions that govern structure and function of proteins. Topics: protein function and structure, techniques for probing protein structure and function, mechanisms of protein function, design of proteins with novel properties. Examples from literature on enzymes. Recommended: background in physical and organic chemistry.

3 units, Win (Khosla) TTh 9-10:30

233. Polymer Physics — Emphasis on statistical analysis of the molecular structure of high polymers. Topics: spatial configuration of the isolated polymer chain; morphology in amorphous and semi-crystalline polymers, polymer blends, liquid crystal polymers; rubber elasticity. Recommended: one introductory course in statistical thermodynamics.

3 units, Win, Spr (Frank)

alternate years, not given 1996-97

234. Polymer Chemistry — Emphasizes the statistical and kinetic aspects of polymer synthesis. Condensation, addition, anionic, cationic, and heterogeneous polymerization processes, emphasizing molecular weight, stereoregularity, and composition. Molecular structure-property relationships used to establish design principles for polymer materials development. Introduction to techniques of polymer processing. Recommended: one course in introductory organic chemistry.

3 units (Frank)

alternate years, given 1996-97


3 units, Spr (Gast)

237. Introduction to Biotechnology — (Same as Biochemistry 237, Biology 237, Biophysics 237, Chemistry 237, Civil Engineering 237, Developmental Biology 237, Structural Biology 237.) Fac-
ulty from the Departments of Biochemistry, Biological Sciences, Chemical Engineering, Chemistry, Civil Engineering, Developmental Biology, Structural Biology, and invited industrial speakers review the interrelated elements of modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering.

3-5 units. Spr (Robertson) TTh 2:15-3:30 F 3:15-4:30

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. Computational Materials Science (Musgrave)
273A, B, C. Bioengineering (Robertson)
274A, B, C. Microrheology (Fuller)
275A, B, C. Surface and Interface Science (Madix)
276A, B, C. Polymer Physics (Frank)
277A, B, C. Stability of Fluid Motions (Homsy)
278A, B, C. Statistical Mechanics of Dispersed Systems (Gast)
279A, B, C. Transport Mechanics (Shafran)

290. Graduate Research in Chemical Engineering — Lab and theoretical work for graduate students on chemical engineering problems leading to partial fulfillment of requirements for an advanced degree. Credit is given after the student has satisfied the specific report or dissertation requirement.

(Staff) by arrangement

300. Colloquium — Students attend the colloquia of the Department of Chemical Engineering. Must be taken every quarter by candidates for advanced degrees in Chemical Engineering.

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

CIVIL ENGINEERING

Emeriti: (Professors) Jack R. Benjamin, James Douglas, Rolf Eliassen, John W. Fondahl, Joseph B. Franzini, James M. Gere, Eugene L. Grant, George Herrmann, En Y. Hsu, Paul Kruger, Henry W. Parker, George A. Parks, Cedric W. Richards, Victor K. Thomson (Architecture)

Chair: Jeffrey R. Koseff


Associate Professors: Ronaldo I. Borja, David L. Freyberg, Jeffrey R. Koseff, Kincho H. Law, Stephen G. Monismith

Assistant Professors: Martin Fischer, Lynn M. Hildemann, Mark Z. Jacobson, H. Allison Smith (on leave Spring), Alfred M. Spormann

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

Professor (Teaching): Gilbert M. Masters (on leave Winter, Spring)

Courtesy Professors: Joel H. Ferziger, Thomas J. R. Hughes, Robert E. McGinn (Teaching), Stephen H. Schneider, George S. Springer

Acting Associate Professor: Mark N. Goltz


Consulting Associate Professors: E. Marco Aita, Angelos N. Findikakis, Eric D. Herbert, Michael W. London, Hernan Martinez, Martin W. McCann, Jr., Isao Sugiyai

Consulting Assistant Professors: Mutaseh El Fadel, James Michael Williams, Yan Zang

Visiting Professors: Gregory G. Deierlein, Tony Maxworthy

The undergraduate curriculum provides a preprofessional program stressing the fundamentals common to many special fields of civil engineering. Free elective units plus the proper selection of courses for the requirements in mathematics, science, and engineering fundamentals permit students to obtain a broad civil engineering education, as well as a more specialized education in Environmental and Water Studies, Structures and Construction. Laboratory facilities are available to students in construction, fluid mechanics, environmental engineering and science, structural and earthquake engineering, building energy, and experimental stress analysis.
At least one year of graduate study is strongly recommended for professional practice. Students who contemplate advanced study at Stanford should discuss their plans with their advisers in the junior or senior year. The coterminal B.S.-M.S. program should be considered by students who want an integrated five-year program. Potential coterminal students in Environmental Engineering and Science should be aware that applications are considered once a year, near the beginning of Winter Quarter.

The Department of Civil Engineering, in collaboration with other departments of the University, offers graduate degree programs in:
- Construction Engineering and Management
- Environmental and Water Studies
- Environmental Engineering and Science
- Environmental Fluid Mechanics and Hydrology
- Structural Engineering and Geomechanics
- Geomechanics
- Structural Engineering

Research work and instruction under these programs are carried out in the following facilities: building energy laboratory, Environmental Fluid Mechanics Laboratory (EFML), soil mechanics laboratory, structural engineering laboratory, and water quality control research and teaching laboratories. Research in earthquake engineering is conducted in the John A. Blume Earthquake Engineering Center and at Stanford/USGS Institute for Research in Earthquake Engineering and Seismology. Research on control of hazardous substances is coordinated within the Western Region Hazardous Substance Research Center. Office space is provided for most of the graduate students who are research or teaching assistants.

In collaboration with the Department of Computer Science, the Center for Integrated Facility Engineering (CIFE) employs advanced CAD, database, artificial intelligence, and communications concepts to integrate the presently fragmented participants in the facility development process and to support construction automation. CIFE is stimulating significant new research and educational activities in the two departments.

**PROGRAMS OF STUDY**

**CONSTRUCTION**

The Construction Engineering and Management program prepares technically qualified students for responsible management roles in all phases of the development of major constructed facilities. It emphasizes management techniques useful in planning, coordinating, and controlling the activities of diverse specialists (designers, contractors, subcontractors, and client representatives) within the unique project environment of the construction industry. In addition, the program offers subjects that focus on engineering aspects of heavy, industrial, and building construction. By appropriate choice of elective subjects, students wishing to work for a contractor, design firm, construction management consultant, or the facilities department of an owner's organization can design a program for their needs.

The construction curriculum offers opportunities to focus on construction engineering, construction management, environmental construction, and construction research. Subjects offered include estimating, productivity improvement, equipment and methods, planning and control techniques, managing human resources, construction administration, project and company organizations, computer applications, building systems, construction finance and accounting, international construction, real estate development, labor relations, and computer applications. Additional related course work is available from other programs within the department, from other engineering departments, and from other schools in the University such as Earth Sciences and the Graduate School of Business.

The program leads to the degrees of Master of Science (M.S.), Engineer, and Ph.D. Students with undergraduate degrees in chemical, electrical, mechanical, mining, petroleum engineering, or architecture who do not wish to satisfy the undergraduate prerequisite courses for the M.S. in Civil Engineering—Construction Engineering and Management have the option of meeting the same graduate course requirements as the above and obtaining the M.S. in Engineering—Construction Engineering and Management. A limited number of M.S.-level graduate students are supported each year through the sponsored research and teaching activities.

The Construction Program faculty and students are active participants in the Center for Integrated Facility Engineering (CIFE). CIFE conducts research on automation, integration, and management of technology.

The program maintains close ties with the construction industry through the Stanford Construction Institute. Students participate in weekly discussions with visiting lecturers from all sectors of the U.S. construction industry.

**ENVIRONMENTAL AND WATER STUDIES**

This program covers a broad spectrum of specialties, including environmental engineering and science, environmental fluid mechanics, hydrology, and environmental planning. Course offerings are scheduled to permit either intensive study in a single area or interrelated study between areas. Seminars provide a broad coverage of environmental problems.

Students with backgrounds in all areas of engineering and science who are interested in ap-
plying their specialized abilities to solving environmental and water problems are welcome. Comprehensive introductory courses in each major area of study are given to provide common understanding among those with dissimilar backgrounds. The major areas of specialization in the program are in environmental engineering and science and in environmental fluid mechanics and hydrology.

The Environmental Engineering and Science Program emphasizes water quality, but also encompasses other environmental areas and the broader aspects of environmental concerns and planning activities. Course offerings include the chemical, biological, and engineering aspects of water supply, water and air pollution, hazardous substance control, and the fate and effects of pollutants in surface and groundwater, soil, and the atmosphere. Companion courses in the Environmental Fluid Mechanics and Hydrology Program include environmental planning and impact assessment, as well as hydrology, environmental fluid mechanics, and transport modeling. Other departments offering relevant courses are listed at the conclusion of the Environmental Fluid Mechanics and Hydrology Program section below. Research on hazardous substances is coordinated through the Western Region Hazardous Substance Research Center. The objective of this center, sponsored by the U.S. Environmental Protection Agency, is to promote through fundamental and applied research the development of alternative and new technological, chemical, biological, and institutional processes for the treatment of hazardous substances in the environment, with emphasis on groundwater contamination.

The Environmental Fluid Mechanics and Hydrology Program focuses on developing an understanding of the physical processes controlling the movement of mass, energy, and momentum in the water environment and the atmosphere. The program also considers environmental and institutional issues involved in planning water resources development projects. Environmental fluid mechanics courses address fluid transport and mixing processes; turbulence and its modeling; the fluid mechanics of stratified flows; natural flows in coastal waters, estuaries, lakes, and open channels; and experimental methods. Hydrology courses consider stochastic methods in both surface and subsurface hydrology, watershed hydrology and modeling, and flow and transport in porous media. Planning courses emphasize environmental policy implementation and sustainable water resources development. Courses from many other programs and departments both complement and supplement the Environmental Fluid Mechanics and Hydrology Program offerings. Some examples include Environmental Engineering and Science (chemical and microbiological processes), Mechanical Engineering (applied math, fluid mechanics, heat transfer, experimental methods), Geological and Environmental Sciences (hydrogeology, geostatistics), Computer Science (numerical methods), Petroleum Engineering (reservoir engineering, well-test analysis), and Statistics (probability and statistics).

The programs are kept flexible to foster interaction among students and to encourage the development of individual programs suitable for a broad range of engineering and science backgrounds and career goals. The Stanford laboratories for water quality control and environmental fluid mechanics are well-equipped and instrumented for advanced research and instruction.

**STRUCTURAL ENGINEERING AND GEOMECHANICS**

Structural engineering at Stanford encompasses teaching and research programs in earthquake engineering and structural dynamics, risk and reliability analysis, structural analysis and design, and computational mechanics. The programs are designed to provide a broad knowledge in these fields and to prepare students for industrial or academic careers. Academic programs can be designed to meet the needs of students wishing to launch careers as engineering analysts, designers, and consultants on large and small projects. Students have the opportunity to balance strong engineering fundamentals with modern computational methods.

Course work in earthquake engineering and structural dynamics provides an understanding of the earthquake phenomenon, the resulting ground shaking, and in-depth knowledge on the behavior, analysis, and design of various types of structures under seismic or other dynamic forces. Automated structural control systems and devices, and the utilization of advanced materials for civil infrastructures and seismic retrofits are part of the ongoing research activities. Advanced analytical and experimental research in earthquake engineering is conducted at the John A. Blume Earthquake Engineering Center, which houses static and dynamic testing equipment including two shaking tables. Research at the interface between earthquake engineering and the earth sciences is conducted at the Stanford/USGS Institute for Research in Earthquake Engineering and Seismology.

Reliability and risk analysis focuses on instruction and research in advanced methods for structural safety evaluation and design, including methods for loss estimation from damage and failures of structures and lifeline systems. Course work combines a strong background in structural analysis and design with probability theory and statistics. Research in this area deals with seismic risk and reliability of large structural sys-
temds, wind hazards, regional loss and damage evaluation, and reliability of marine systems.

Courses and research in structural analysis and design focus on conceptual and detailed design of structural systems and on computational methods for predicting the static and dynamic, linear and non-linear response of structures. Included are courses that emphasize earthquake resistant design and computer-based design concepts. Related course work is available from other departments such as mechanical engineering, materials science and engineering, and computer science. In collaboration with CIFE, issues involving design for constructibility and collaborative engineering are addressed as an integral part of the research.

Computational mechanics emphasizes the application of modern computing methods to structural engineering and geomechanics. It draws on the disciplines of mechanics, mathematics, and computer science, and encompasses numerical structural and geotechnical analysis, including finite element analysis and boundary element methods. There is collaborative research in bioengineering with the Medical School and high performance computing with the Scientific Computing and Computational Mathematics Program.

Students with primary interests in the application of the principles of applied mechanics to problems involving geologic materials have the option of enrolling in a degree program in geomechanics. This program focuses on instruction and research in theoretical soil and rock mechanics, computational methods, and analysis and design of foundations and earth structures. In addition to the program’s offerings, related courses are available in structural engineering, construction engineering, earth sciences, and the water resources program.

**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 by means of Engineering 102S or its equivalent. Students are encouraged to present their results in a seminar for faculty and other students. Up to 10 units of CE 199, Directed Reading and Special Studies in Civil Engineering, may be taken to support the research and writing (not to duplicate Engineering 102S). These units are beyond the normal civil engineering program requirements.

**GRADUATE PROGRAMS**

**Admission** — Applications require submission of the application form, statement of purpose, three letters of recommendation, results of the General Section of the Graduate Record Examination, and transcripts of courses taken at colleges and universities. Policies for each of the department’s programs are available from the Department of Civil Engineering. Successful applicants will be advised as to the degree and program for which they are admitted. If students wish to shift from one program to another after being accepted, an application for transfer must be filed with the department, and they will be advised if the transfer is possible. If, after enrollment at Stanford, students wish to continue toward a degree beyond the one for which they were originally admitted, a written application must be made to the Department of Civil Engineering.

**MASTER OF SCIENCE**

The University requirements governing the M.S., the Engineer, and Ph.D. are described in the “Graduate Degrees” section of this bulletin. Programs are available leading to the M.S. degree in Civil Engineering with the following special field designation on the diploma: Construction Engineering and Management, Environmental Engineering and Science, Environmental Fluid Mechanics and Hydrology, Geomechanics, and Structural Engineering. Detailed statements of the requirements for all master’s degrees and the specific designation may be secured from the Department of Civil Engineering.
Students admitted to graduate study with a B.S. in Civil Engineering (or its equivalent) from an accredited curriculum can satisfy the requirements for the M.S. degree in Civil Engineering by completing a minimum of three quarters of full tuition registration and a minimum of 45 units of study beyond the B.S. At least 36 of the units must be taken at Stanford. A minimum 2.75 letter grade indicator (LGI) is required for candidates to be recommended for the M.S. degree. No thesis is required.

The program of study must be approved by the faculty of the department and should include at least 45 units of courses in engineering, mathematics, science, and related fields unless it can be shown that other work is pertinent to the student’s objectives.

Candidates for the M.S. in Civil Engineering who do not have a B.S. in Civil Engineering may, in addition to the above, be required to complete those undergraduate courses deemed important to their graduate programs. In such cases, more than three quarters of residence is usually required to obtain the degree.

ENGINEER

A student with an M.S. in Civil Engineering may satisfy the requirements of the degree of Engineer in Civil Engineering by completing, in residence, 45 or more units of work (3 quarters minimum) including an acceptable thesis (12 to 15 units) and maintaining a ‘B’ LGI average (3.0) or higher. The program of study must be approved by the member(s) of the faculty of the department.

This degree is recommended for those desiring additional graduate education, especially those planning a career in professional practice. The thesis normally should be started in the first quarter of graduate study after the M.S. degree. Programs are offered in the fields of specialization mentioned for the M.S. degree.

DOCTOR OF PHILOSOPHY

The Ph.D. is offered under the general regulations of the University as set forth in the “Graduate Degrees” section of this bulletin. This degree is recommended for those who expect to engage in a professional career in research, teaching, or technical work of an advanced nature 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 department’s General Qualifying Examination to be admitted to candidacy. After completing their research, students are required to pass the University oral examination, which is a dissertation defense.

Ph.D. MINOR

A Ph.D. minor is a program outside a major department. A minor is not a requirement for any degree, but is available when agreed on by the student and the major and minor departments. Requirements for a minor are established by the minor department. Acceptance of the minor as part of the total Ph.D. program is determined by the major department. Application for candidacy must be approved by both the major and the minor department, and the minor department must be represented at the University oral examination.

A student desiring a Ph.D. minor in Civil Engineering (CE) must have a minor program adviser who is a regular CE faculty member in the program of the designated subfield. This adviser must be a member of the student’s University oral examination committee and the reading committee for the dissertation.

The program must include at least 20 units of graduate-level course work (that is, courses numbered 200 or above, excluding special studies and thesis) in CE completed at Stanford University. The list of courses must form a coherent program and must be approved by the minor program adviser and the CE chair. An average LGI of at least 3.0 must be achieved in these courses.
FINANCIAL ASSISTANCE

The department maintains a large and continuing program of financial aid for graduate students. Applications for financial aid and assistantships should be filed by January 1; it is important that Graduate Record Examination scores be available at that time.

Teaching assistantships carry stipends for as much as one-half time work to assist with course offerings during the academic year. Research assistantships also are available. Engineer and Ph.D. candidates may be able to use research results as a basis for the thesis or dissertation. Assistantships and other basic support may be supplemented by fellowship and scholarship awards or loans. Continued support is generally provided for further study toward the Engineer or Ph.D. degree based on the student's performance, availability of research funds, and requisite staffing of current projects.

COURSES

UNDERGRADUATE

100. Managing Civil Engineering Projects — (Formerly 104.) Introduction to the facility life cycle and project delivery process and organization. Techniques for planning, organizing, and executing civil engineering projects from conception to completion. Project objectives (scope, quality, cost, time, and safety) from multiple perspectives throughout the facility life cycle. Time and cost planning and control, including scheduling and cost estimating techniques using information systems. Small team projects and individual research paper.
4 units, Aut (Fischer) MWF 10
plus hour by arrangement

101A. Structural Systems — (Formerly 108.) Structural loads in design, structural systems, serviceability and deflections, safety against failures, examples of failures, energy methods, soil classification, soil and site improvement, computers and structures, concepts in computer aided engineering. Lab experiments and field trips. Prerequisites: 100, Engineering 14.
4 units, Win (Smith) TTh 10 W 2:15-4:05

101B. Mechanics of Fluids — (Formerly lecture part of 160N.) Physical properties of fluids and their effect on flow behavior; equations of motion for incompressible ideal flow, including the special case of hydrostatics; continuity, energy, and momentum principles; control volume analysis; laminar and turbulent flows; internal and external flows in specific engineering applications. Prerequisite: 101A.
4 units, Spr (Street) MWF 9, M 1:15

101C. Geotechnical Engineering — (Formerly 190.) 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. Prerequisites: 101A, 101B, Engineering 14.
4 units (Borja) given 1996-97

102. Legal Context of Civil Engineering — Introduction to U.S. legal system as it applies to civil engineering and construction. Fundamental concepts of contract and tort law, claims, risk management, business, formation and licensing, agency, insurance and bonding, and real property.
3 units, Win (London) T 6:15-9:05 p.m.

106. Water Resources — (Last time offered, see 162.) The role and movement of water in the natural and constructed environment. Introduction to hydrologic processes, including precipitation, infiltration, water use by vegetation, water movement in soils, and runoff. Flood and drought hazard analysis. Water supply and use. Hydroelectric power generation. Irrigation. Water law and institutions. Required field trip. Prerequisite: Physics 51.
4 units, Win (Freyberg) MWF 11-12:30

110. Analysis and Numerical Modeling of Civil Engineering Systems — Development of a working knowledge of analytical and numerical techniques needed to solve a range of problems in civil engineering. Application of the techniques to specific problems in civil engineering systems. Governing equations plus appropriate boundary and/or initial conditions derived from the physical contexts. Application of ordinary differential equation methods. Introduction to: partial differential equation models of physical phenomena and solution of the models, linear algebra and its application, modeling of systems with uncertain inputs and data, role of probability. Prerequisites: 100, 101A, 101B, 170, Math. 130 or Mechanical Engineering 100, Statistics 190. Corequisite: 101C. Recommended: Computer Science 106A.
4 units (Street) given 1996-97

140. Construction Surveying — Introduction to basic field surveying methods, use of level, theodolite, and EDM. Field activities include level loops, traverses, construction layout, As-built measurements. Advanced measurement and positioning technologies.
3 units, Spr (Williams, Parker)
F 10, lab F 1-5

141. Design and Construction of Concrete Canoe for ASCE Competition — Design, construction, and testing of canoe; structural and hydrodynamic analysis; selection of materials and construction methods; participation in competition.
1 unit, Aut, Spr (Fischer) hour
by arrangement
Win (Fischer) Th 12:15
Constrution Equipment and Methods — (Formerly 145; graduate students register for 253.) Application of engineering fundamentals to the selection and design of equipment and systems to carry out production operations in construction; analysis of production output and costs; operations simulation; application of engineering economy to equipment and process decision making. Prerequisites: 100; Engineering 14, 60.
4 units, Win (Paulson) MW 8-9:50

Building Systems Design — (Formerly 146; graduate students register for 256.) Design concepts, materials of construction, and installation operations for conventional building systems. Lectures and group projects on heating, ventilation, and air conditioning (HVAC) systems; building electrical systems; and water and waste systems. Student groups analyze selected building systems on active projects. Written and oral reports describe existing design, redesigned portion of system, materials of construction, and installation. Prerequisite: Physics 53.
4 units, Win (Tatum) MWF 10-11:50

Mechanics of Fluids Laboratory — (Formerly lab part of 160N.) Lab experiments/demonstrations illustrate conservation principles and flows of real fluids. Corequisite: 101B.
2 units, Spr (Street) M 2:15
plus two hours by arrangement

Mechanics of Fluids — (Spring Quarter see 101B, 160.) Equations of motion for incompressible ideal flow, including the special case of hydrostatics; continuity, energy, and momentum principles; control volume analysis; laminar and turbulent flows; internal flows in specific engineering applications. Lab experiments/demonstrations complement lectures. Prerequisites: 106, Physics 51, Math. 23 or 43. Recommended: Engineering 30.
5 units, Aut (Monismith) MWF 10, M 3:15
plus two hours by arrangement

Open Channel and Pipe Flows — (Beginning 1996-97, given Autumn Quarter.) 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 11, M 1:15
plus two hours by arrangement

Hydrology and Water Resources — (Formerly 106.) Introduction to hydrologic processes, including precipitation, evapotranspiration, snowmelt, infiltration, soil moisture, groundwater flow, runoff, and streamflow. Reservoir and channel routing, watershed models, and statistical tools. Water as a resource: irrigation, hydroelectric power generation, urban water systems, water quality control processes, groundwater development, water law and institutions. Required field trips. Prerequisites: 161, 170, Engineering 60.
4 units, Win (Koseff) MW 8-9:50

Meteorology and the Atmospheric Environment — Introduction to meteorology and its effects on air pollution. Structure and composition of the atmosphere; pressure, temperature, and humidity; condensation; stability; aerosol, fog, and cloud formation; light, color, and atmospheric optics; radiative transfer and radiation balance; forces and local winds; pollutant transformation and transport; high and low pressure systems; westerlies, jet streams, and other global scale winds; El Niño and atmosphere-ocean interactions, air masses, fronts, cyclones, thunderstorms, tornadoes, and hurricanes. Prerequisites: Math. 43 and Physics 51 or equivalents, or consent of instructor.
3 units, Aut (Jacobson) MWF 2:15

Environmental and Water Studies: Design — The design of water resources systems. Design as a process. Application of fluid mechanics, hydrology, water resources, environmental science, planning, and engineering economy fundamentals to the design of systems, addressing a complex problem of water in the natural and constructed environment. Problem varies each year, e.g., remediation of a contaminated groundwater site, rehabilitation and expansion of an urban water supply system, management and reduction of risk in a floodplain, management of urban stormwater. Student design groups. Prerequisite: 162.
5 units, Spr (Freyberg) given 1996-97

Environmental Science and Technology — For science and nonscience majors. Introduction to the causes, effects, and methods of controlling environmental degradation associated with air and water pollution. Global climate change, stratospheric ozone depletion, regional and urban air pollution; water supply and water quality, risk assessment, and hazardous waste management. DR:6(8)
3 units, Aut (Masters) MWF 8

Environmental Planning Methods — For juniors and seniors. Use of microeconomics and mathematical optimization theory in design of environmental regulatory programs; tradeoff between equity and efficiency in designing regulations; procedures for estimating monetary benefits of environmental improvement; techniques for predicting visual, noise, and traffic impacts in environmental impact assessments. Prerequisites: 170, Math. 43. Recommended: Economics 1, 51.
3 units, Win (Ortolano) MW 3:15-4:30

Air Quality Management — Quantitative introduction to engineering methods used to study and seek solutions to current air quality problems. Topics: global atmospheric changes, urban sources of air pollution, indoor air quality problems, design and efficiencies of pollution control devices, and
engineering strategies for managing air quality. Prerequisite: Math. 43.
3 units, Win (Hildemann) MWF 10

4 units, Spr (Roberts)
MWF 10, section T 11:15-3:05

174. Ethical Issues in Civil Engineering — (Fulfills the School of Engineering’s “Technology in Society Requirement.”) Seminar on ethical issues and conflicts in civil engineering practice, including environmental, construction, and structural engineering. Analysis of value-laden components of civil engineering work (e.g., environmental impact assessment and air/water pollution, toxic dump cleanup, and building safety standard setting). Ethical dimensions of the siting, design, and construction of structures (e.g., dams, bridges, hotels) and infrastructure components. Exploration of environmental justice conflicts and ethical issues associated with civil engineering work in foreign countries. Real-life case studies. Guest practitioners. Limited enrollment.
3-4 units, Spr (McGinn) TTh 3:15-4:45

175. Environmental and Natural Resource Economics — (Same as Economics 155, Earth Systems 112.) Analysis of economic sources of environmental problems in a market economy and evaluation of alternative policies (regulation, taxation, marketable permits) for dealing with these problems. Regional issues (local air and water pollution, traffic congestion) and global issues (climate change, stratospheric ozone depletion). Economics of natural resource management and protection; connections between population growth and the environment. Prerequisite: Economics 51.
5 units, Spr (Gould)

3 units, Spr (Komor) MWF 9

177. Building Energy Laboratory — Measurement of small-building heat losses, infiltration, indoor air quality, use of thermal mass, and energy efficient lighting. Performance measurements of solar thermal and photovoltaic energy systems. Prerequisite: concurrent or previous enrollment in 176.
2 units (Masters) given 1996-97

180A. Introduction to Structural Analysis — (Beginning 1996-97, given Spring Quarter.) Energy principles and virtual work; analysis of indeterminate beams; columns; deflections by moment-area; deflections by energy methods and virtual work; advanced topics in stress and strain including plane stress and strain, and principal stresses; analysis of inelastic and nonlinear beams. Prerequisites: 101A, Engineering 14.
3 units, Aut (Kiremidjian) TTh 11-12:15

180B. Structural Analysis — Analysis of beams, trusses, frames; method of indeterminate analysis by consistent displacement, least work, superposition equations, moment distribution. Introduction to matrix methods and computer methods of structural analysis. Prerequisite: 180A.
4 units, Spr (Pinsky) TTh 9-10:50

181. Design of Steel Structures — Concepts of design of steel structures with load and resistance factor design (LRFSD) approach; types of loading: structural systems; design of tension members, compression members, beams, beam-columns, and connections; and design of trusses and frames. Comprehensive project on the structural design of an industrial building. Prerequisite: 180A.
4 units, Win (Law) TTh 2:15-4:05

182. Design of Reinforced Concrete Structures — Properties of concrete and reinforcing steel; behavior of structural elements subject to bending moments, shear forces, torsion, axial loads, and combined actions; design of beams, slabs, columns and footings; strength design and serviceability requirements; design of simple structural systems for buildings. Comprehensive project on the structural design of a reinforced concrete office building. Prerequisite: 180A.
4 units, Spr (Krawinkler) TTh 11
W 2:15-4:05

190. Geotechnical Engineering — (See also 101C.) 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 14.
4 units, Aut (Borja) MWF 11

197. Professional Development Seminar — Weekly presentations by practicing engineers on topics relevant to students planning to enter the civil engineering profession. Environmental, structural, construction, and development prospectives.
1 unit, Spr (Fischer) T 12:15-1:05

199. Directed Reading or Special Studies in Civil Engineering — Practice in execution of an engineering investigation; preparation of a written report on the investigation. Student must obtain a faculty sponsor.
1 or more units, any quarter (Staff) by arrangement
203. Statistical Models in Structural Engineering — Applications of probability and statistical analysis to structural engineering, model construction from probability theory, descriptive statistics, recognition of variation including professional elements, models for reliability studies of civil engineering designs, and introduction to structural component reliability analysis. Prerequisite: 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, sources and estimation of uncertainties, first and second order reliability methods, simulation methods in reliability analysis, solution techniques for complex systems, application to structural codes. Prerequisite: 203 or equivalent.
4 units, Spr (Robertson) TTh 2:15-3:30

214. Symbolic Modeling in Engineering — Issues concerning symbolic model-based reasoning systems in engineering. Lab course to study and create symbolic models using Artificial Intelligence representation and reasoning techniques, and engineering principles and heuristics. Prerequisite: Computer Science 106 or equivalent.
4 units, Spr (Kunz) T 12:15-2:05

237. Introduction to Biotechnology — (Same as Biochemistry 237, Biology 237, Biophysics 237, Chemistry 237, Chemical Engineering 237, Developmental Biology 237, Structural Biology 237.) Faculty from the Departments of Biochemistry, Biological Sciences, Chemical Engineering, Chemistry, Civil Engineering, Developmental Biology, Genetics, Molecular Pharmacology, Structural Biology, and invited industrial speakers review the interrelated elements of modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering.
3-5 units, Spr (Robertson) TTh 2:15-3:30

240. Analysis and Design of Construction Operations — Planning and management of construction work at the field operations level. Data collection, analysis, simulation, modeling, and design. Emphasis on work methods development, productivity, safety, and total quality management. Group term project on studies of and reports about local construction projects.
4 units, Aut (Paulson) MW 9-10:50

240L. Applications of Operations Analysis and Design — Hands-on experience as construction volunteer at a Bay Area low-cost housing project. Opportunities to apply planning and analysis skills learned in 240, with the possibility for later supervision of groups of volunteers performing specific field tasks. Corequisite: 240.
1 unit, Aut (Paulson) four Sat 7:30-5

241. Techniques of Project Planning and Control — Fundamental concepts of project planning and control; current and future project information technologies; project planning and control systems at the firm and project level. Topics: cost estimating at conceptual, schematic, detailed, and bid stages, measurement and pricing of work; work breakdown structures; planning and scheduling techniques, including CPM, PERT, LOB; resource allocation; project control; and integration of time and cost planning and control. Group term project including technical report and presentation.
4 units, Win (Fischer) TTh 10-11:50

242. Project and Company Organizations — (Formerly 250.) Builds on crew-level work process design concepts from 240, providing an introduction to organizational behavior, and in-depth contingency theory of organizational design for construction projects and firms, using computer-based organizational analysis tools. Case studies on facility design and construction organizations; concepts are applicable to project-focused teams in other industries. Groups of 12 students practice running problem-focused meetings, once case study per week outside class. Prerequisite: 240 or equivalent.
4 units, Win (Levitt) M 2:15-4:05, W 2:15 plus one hour by arrangement

243. Computer Applications in Construction — Analysis, design, development, and implementation of computer-based systems for construction engineering and management. Supporting topics cover computer hardware and software technology. Required individual and group projects build on construction knowledge and experience. Tutorials or field trips on selected Fridays. Prerequisite: Computer Science 106A or equivalent.
4 units, Spr (Paulson) TTh 8-9:50
field trips by arrangement

244A. Fundamentals of Construction Accounting and Finance — (Formerly 244.) Introduces concepts and fundamentals of financial accounting and economics in general and specifically in the construction industry. Financial statements and accounting concepts, project accounting methods, and the nature of project costs. Ownership structure, working capital, and the sources and uses of funds.
2 units, Aut (Tucker, Meyer) F 8-9:50

244B. Advanced Construction Accounting, Financial Issues, and Claims — (Formerly 245.) Continuation of 244A. Emphasis is on advanced construction accounting and economic issues and the

2 units, Spr (Herbert) Th 4:15-6:05

247. Cases and Special Topics in Construction Management and Leadership — (Formerly 242.) Case studies in managing construction projects, emphasizing leadership skills and the understanding of personalities. Actual cases and trips to local projects.

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

248. Construction Financing in Real Estate and Land Development Problems — The interrelationships between all of the variables that make up a successful real estate project. Emphasis is on financial aspects involved in land acquisition and development, construction, permanent lending, and project management. Aspects of joint venturing including the control of functions and equity financing. Enrollment limited to 20. Prerequisites: 244A or equivalent, Engineering 60.

3 units, Spr (Martinez, Medearis) MWF 8

249. Labor and Industrial Relations in Construction — The history, laws, institutions, social and economic forces affecting labor and industrial relations in construction; covers union and open-shop sectors.

3 units, Aut (Clark, Walton) T 3:15-6:05

250. International Construction — (Formerly 254.) Prepares construction professionals for international projects; to understand differences in construction systems, technology, management, and culture between advanced industrial countries (AIC), newly industrialized countries (NIC), and less developed countries (LDC); to understand the economic drivers of construction projects, to appreciate risks, and to study tools to manage these risks. Material from a construction market viewpoint and the viewpoint of a single project and firm. Individual research paper and class presentation.

3 units, Spr (Fischer) M 1:15-3:05 W 1:15

251. Management of Technology and Innovation in Construction — (Ph.D. students register for 351.) Preparation for roles as technical champions and change agents in progressive design and construction engineering application on an actual project. Discussion topics/cases: technical change in the design and construction industry, technology strategy for the industry and firms, differences in the culture of learning construction organizations, and roles and actions for innovation. Individual or group research paper or project analyzing a design or construction firm and recommending actions to implement a selected technology.

2 units, Spr (Tatum) MW 10-11:50

252. Construction Engineering: Principles and Applications — Application of engineering first principles from materials, structures, fluid mechanics, thermodynamics, electric power, and automatic control systems to illustrate the practice of construction engineering. Principles and example applications, field trips to projects, individual student estimates illustrate application of each first principle, and a group assignment completes larger scope construction engineering application on an actual project.

4 units, Aut (Clough, Tatum) TTh 9-10:50

253. Construction Equipment and Methods — (Formerly 145; undergraduates register for 153.) See 153. Group project required. Prerequisite: 252.

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

254. Infrastructure Construction Methods — (Formerly 253.) Analysis of problems in infrastructure construction techniques, methods, and equipment through lecture, case studies, and field trips.

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

256. Building Systems Analysis — (Formerly 257; undergraduates register for 156.) Design concepts, components, materials of construction, and installation operations for conventional and special building systems. Topics: heating, ventilating, and air conditioning (HVAC), building electrical, building water and waste. Student groups analyze a selected building system on an active project (e.g., vertical transportation, life safety, lighting, instrumentation and control). Written and oral reports describe design, materials of construction, installation, and results of technical and managerial analysis.

4 units, Win (Tatum) MWF 10-11:50

257. High-Tech and Industrial Construction — Seminar. Fundamental processes, special equipment and materials of construction, and special installation operations for high-tech manufacturing (e.g., semiconductor fabrication, bio-pharmaceutical, laboratory) and industrial plants (e.g., hydrocarbon processing, power, waste water, food and beverage, natural resource processing). Provides a background for construction engineering assignments on these projects. Student outline describes design and construction of selected plant type, and analyzes actual project for written report and class presentation.

2 units, Spr (Tatum) T 3:15-5:05
258A, B, C. Donald R. Watson Seminar in Construction Engineering and Management — Weekly evening discussions of special topics with speakers from industry and government. Normally taken by construction graduate students each quarter for three quarters. Lecture builds on construction graduate courses.

258A. 1 unit, Aut (Tatum) W 4:15-6:05
258B. 1 unit, Win (Paulson) W 4:15-6:05
258C. 1 unit, Spr (Levitt) W 4:15-6:05

259A, B, C. Construction Problems — Analysis of group-selected problems in construction techniques, equipment, or management, followed by preparation of oral and/or written reports. Students consult specialists from the construction industry and make use of University facilities. See 299 for alternative individual studies. Prerequisites: graduate standing in construction and consent of instructor.

259A. 1-3 units, Aut (Staff) by arrangement
259B. 1-3 units, Win (Staff) by arrangement
259C. 1-3 units, Spr (Staff) by arrangement

260A. Physical Hydrogeology — (Same as Geological and Environmental Sciences 230.) Theory of underground water, analysis of field data and pumping tests, geologic groundwater environments, solution of field problems, groundwater modeling. Unsaturated soil-water characteristics and fluid flow, streamflow generation mechanisms, and evapotranspiration. Prerequisite: elementary calculus.

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

260B. Surface and Near-Surface Hydrologic Response — (Same as Geological and Environmental Sciences 237.) Quantitative introduction to process-based hydrology and geomorphology. Topics: biometeorology, unsaturated and saturated fluid flow, overland and open channel flow, erosion and mass wasting, and physically-based numerical simulation of coupled surface and near-surface hydrologic response and landscape evolution. Links hydrogeology, soil physics, and surface water hydrology. Applications of geostatistics, geographic information systems (GIS), and digital terrain models (DTMs).

4 units, Win (Loague) TTh 10-11:20
lab W 2:15-4:05

260C. Contaminant Hydrogeology — (Same as Geological and Environmental Sciences 231.) For earth scientists and engineers interested in environmental and water resource problems involving contaminated groundwater. Processes affecting contaminant migration through porous media including interactions between dissolved substances and solid media. Conceptual and quantitative treatment of advective-dispersive transport with reacting solutes. Predictive models of contaminant behavior controlled by local equilibrium and kinetics. Modern methods of contaminant transport simulation and optimal aquifer remediation. Recommended: 260A.

4 units, Spr (Gorelick) TTh 10-11:15


4 units, Spr (Freyberg) MWF 11-12:05

262A. Hydrodynamics — The flow of incompressible viscous fluid; emphasis on developing an understanding of fluid dynamics that can be applied to environmental flows. Topics: kinematics of fluid flow; equations of mass and momentum conservation (including density variations); some exact solutions to the Navier-Stokes equations; appropriate analysis of fluid flows including Stokes flows, potential flows, and laminar boundary layers; and an introduction to the effects of rotation and stratification through scaling analysis of fluid flows. Prerequisites: 160N or equivalent, and some knowledge of vector calculus.

4 units, Aut (Rehmann) MWFThF 1:15


3 units, Win (Rehmann) MWF 11

262C. Modeling Environmental Flows — Introduction to turbulence concepts and models, and to basic concepts of numerical simulation and computer modeling of turbulence. Application of models to open channel, estuary, lake, and reservoir simulations. Use of computer models for estuarine hydrodynamics, reservoir dynamics, and stream water quality. Prerequisite: 262A. Recommended: 262B.

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


3 units, Win (Jacobson) MWF 1:15

3 units, Spr (Jacobson) MWF 1:15

264. Climate Theory, Modeling, Applications, and Implications—(Same as Biology 217.) History of the coevolution of climate and life. Theories of climate, external and internal climatic forcings, definitions of climate and the climate system, and rationale for climatic modeling. Hierarchy of climatic models; interactions among atmosphere, biosphere, oceans, hydrosphere, and cryosphere. Climatic predictability; implications of predictions and relevance to current controversies. Prerequisites: Biology core or Civil Engineering 163 and math through differential equations, or consent of instructor.

3 units, Win (Schneider) TTh 11-12:30 alternate years, not given 1996-97

265. Sustainable Water Resources Development—Priority given to Environmental and Water Studies program graduate students. Alternative criteria for judging sustainability of projects. Application of criteria to evaluate sustainability of water resources projects in several countries. Cases illustrate the role of political, social, economic, and environmental factors in decision making. Evaluation of benefit-cost analysis and environmental impact assessment for enhancing sustainability of future projects. Enrollment limited. Prerequisite: graduate standing or consent of instructor.

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

266. Environmental Policy Design and Implementation—Regulation, market incentives, the courts, and negotiation as bases for environmental management programs. Case studies involve implementation of air and water pollution control laws, hazardous waste management programs, and environment impact assessment. Limited enrollment. Prerequisite: 171 or graduate standing in the Environmental and Water Studies program.

4 units, Spr (Ortolano) TTh 3:15-4:30 plus three hours by arrangement


3 units (Kitanidis) given 1996-97


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

269. Water Resources Seminar—Problems in all branches of water resources, with talks by visitors, faculty, and students. Graduate students may register for 1 unit without letter grade.

1 unit, Spr (Koseff) M 12:15

270. Movement, Fate, and Effects of Contaminants in Surface Waters and Groundwater—Transport of chemical constituents in surface and groundwater, including advection, dispersion, sorption, interphase mass transfer, and transformation; water quality requirements for various beneficial uses. Emphasis on the behavior of hazardous waste contaminants. Prerequisites: undergraduate chemistry and calculus. Recommended: 160N.

3 units, Aut (Roberts) MWF 8


3 units, Win (Roberts) MWF 9

271B. Biological Processes—Biological processes for transformation of environmental contaminants. Unit processes for biological treatment including dispersed growth and fixed-film systems. Aerobic and anaerobic process, microbial ecology, and kinetics, with applications to the treatment of municipal and industrial wastewaters, hazardous chemicals, and groundwater. Prerequisites: 270, 274A.

3 units, Win (Staff) MWF 8

271C. Treatment Process Design—Analysis of specialized water pollution control processes such as adsorption, oxidation, and air stripping. Emphasis on physical and chemical processes in treatment
of hazardous wastes, especially contaminated groundwater. Definitions of problems and objectives, evaluation of alternatives for example cases, preliminary process design, and cost evaluations. Design-oriented class project and field trips. Prerequisites: 270, 271A.

3 units (Roberts)
alternate years, given 1996-97

272. Hazardous Waste Management and Remediation — Priority given to Environmental and Water Studies program graduate students. Management of hazardous waste and remediation of contaminated sites. Definition of hazardous waste, characterization of contaminated sites, risk-based decision analysis, and engineering analysis of chemical, thermal, and biological technologies for treatment of hazardous waste, contaminated soil, and groundwater. Hands-on computer software packages for selected treatment technologies. Focus is on the technical options for proper management of hazardous wastes in the context of a high degree of uncertainty. Enrollment limited.

2 units, Spr (Kavanaugh) TTh 8-9:50
alternate years, not given 1996-97

273. Aquatic Chemistry — (Same as Geological and Environmental Sciences 264.) Chemical principles and application of those principles to the analysis and solution of problems in aqueous geochemistry (temperatures near 25°C and atmospheric pressure). Emphasis is on the analysis of natural water systems and to the understanding and solution of specific chemical problems in water purification technology and water pollution control. Prerequisites: Chemistry 31 and 33, or equivalent.

3 units, Aut (Leckie) MWF 9-10:15
3 units, Spr (Spormann) W1 :J5-5:05
alternate years, given 1996-97


3 units, Aut (Spormann) MWF 9
3 units, Spr (Spormann) W 1:15-5:05
alternate years, not given 1996-97


3 units. Win (Spormann) MWF 9-10:15

274C. Environmental Microbiology Laboratory — Microbiological, biochemical, and molecular procedures for characterizing microbes: basic microbiological techniques, enrichment and isolation of microorganisms, metabolic and phylogenetic characterization of isolates, determination of growth parameters (growth rate, growth yield, fermentation balance), enrichment and isolation of microorganisms degrading pollutants, detection of microorganisms in the environment, water quality parameters. Prerequisites: 274A, 274B.

2 units, Spr (Kavanaugh) TTh 8-9:50
alternate years, not given 1996-97

275A. Water Quality Control Processes I — Lab and pilot plant studies of physical and chemical processes for the treatment of water and wastewaters. Prerequisites: 271A, 273, and 273A.

3 units, Spr (Leckie) Th 1:15-5:05
alternate years, not given 1996-97


3 units (McCarty)
alternate years, given 1996-97


3 units, Aut (Hildemann) MWF 10

nucleation, heterogeneous condensation. Prerequisite: Math. 43, or equivalent. Recommended: 160N or equivalent.

3 units, Spr (Hildemann) MWF 10

279. Environmental Engineering Seminar — Exposure to current research, practice, and thinking in environmental engineering and science. Attendance at seminars is self-directed, and may be accrued throughout the school year. See instructor for further information.

1 unit, Spr (Hildemann) by arrangement

281A. Finite Element Structural Analysis I — Introduction to the finite element method for solids and structures. Model problems in one dimension including axial, flexural, torsional, and shear deformations; strong and weak forms; variational equation and relation to a principle of virtual work; finite element approximation based on local interpolation; element stiffness matrices and load vectors; direct assembly procedure. Analysis of complex two- and three-dimensional truss and frame structures, thermal loads, and substructure techniques for large systems. Analysis of two-dimensional problems including the quasi-harmonic equation (deflection of a membrane, heat conduction, etc.) and two-dimensional elasticity. Element families, isoparametric mapping, numerical integration. Practical modeling techniques. Prerequisites: elementary structural analysis and matrix algebra.

4 units, Aut (Pinsky) MW 11-12:15


4 units, Win (Pinsky) TTh 11-12:15

282A. Earthquake Engineering I — Earthquake phenomena, faulting, ground motion, study of past major earthquakes, effects of earthquakes on man-made structures, response spectra, Fourier spectra, power spectra, random vibration analysis of single and multi-degree of freedom systems, soil effects on ground motion and structural damage; methods for structural damage evaluation, current research in earthquake engineering. Prerequisite: 296A. Recommended: 203.

3 units, Win (Kiremidjian) TTh 9:35-10:50

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 10


3 units, Win (Deierlein) MWF 9


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

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 and lateral loads, earthquake resistant design, effects of dynamic loading on strength and ductility of structural elements. Prerequisites: basic courses in design of steel and reinforced concrete structures.

4 units, Spr (Krawinkler) TTh 10 Th 2:15-4:05

287. Structural Performance and Failures — Basic concepts in definition of satisfactory structural performance: key elements in structural performance; types of failures, ranging from reduced serviceability to total collapse; failure sources and their root cause allocation; failure prevention mechanisms; illustration with real life examples.

2 units, Spr (Moncarz) M 3:15-5:05

288. Computer Methods in Structural Engineering — Introduction to basic techniques for the development of structural engineering analysis and design software. Topics: basic data structure; computer representation of engineering systems; implementation of advanced numerical methods; automated conformance checking of design codes and standards; introduction to computer graphics and geometric transformations. Prerequisites: 281A, 285 or equivalent, and Computer Science 106A or equivalent.

3 units, Win (Law) MW 12:50-2:05

289. Computational Soil Mechanics — Steady-state and transient fluid conduction problems in soil mechanics, elliptic, parabolic and hyperbolic sys-

3 units, Spr (Borja) MWF 11
alternate years, not given 1996-97

290. Advanced Soil Mechanics — Theory of particulate media; micromechanics of granular materials; constitutive laws in geomechanics; plasticity; return-mapping algorithms; classical yield models: Mises, Mohr-Coulomb, Drucker-Prager; critical state theory and Cam-clay type models; multi-surface and bounding surface type models; drained and undrained conditions; numerical simulations. Prerequisites: 190, Mechanical Engineering 238A, or equivalents.

3 units, (Borja) alternate years, given 1996-97

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 — Lab determination of stress-strain-strength parameters for soils under drained and undrained loading conditions. Six lab experiments. Prerequisite: 190 or equivalent.

2 units, Win (Borja) by arrangement

294. Issues in Geotechnical and Environmental Failures — Causes and consequences of failure of buildings and high hazard facilities in contact with the geological environment; technical, ethical, economic, legal, and business aspects; failure analysis and forensic problems; prevention, liability, and dispute management. Case history approach based on the instructor’s files including earthquake, flood, and hazardous waste facilities. Student observation, participation in active lawsuits where possible.

3 units, Aut (Meehan) Th 8:20-10:50

296A. Structural Dynamics I — Vibrations and dynamic response of simple structures under time dependent loads, dynamic analysis of single and multiple degrees of freedom systems, support motion, response spectra.

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

296B. Structural Dynamics II — Methods of structural dynamics for discretized and continuous systems in free and forced vibration, formulation and solution of partial differential equations of motion, potential and kinetic energy methods, mode-superposition, Rayleigh quotient, numerical solution to the eigenvalue problem, direct integration methods; frequency domain analysis introduction to nonlinear dynamics. Prerequisite: 296A.

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

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

1 unit, Win (Staff) W 4:15-6

299. Independent Study in Civil Engineering — Directed study for graduate students on subjects of mutual interest to students and faculty. Student must obtain faculty sponsor.

1-3 units, any quarter, by arrangement


Aut, Win, Spr (Staff) by arrangement

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

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

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

2 units, alternate years, not given 1996-97

320A. Integrated Facility Engineering: Research Challenges — Research goals for integrated facility engineering, history of research at the Center for Integrated Facility Engineering, presentations of ongoing research efforts, individual and group case studies.

1 unit, Aut (Fischer, Kunz) M 4:30-5:30

320B. Goals of Integrated Facility Engineering — Lectures, individual and group case studies, and reports on goals and state-of-practice of integrated facility engineering, including objectives for integrated computer systems.

1 unit, Win (Fischer, Kunz) T 4:30-5:30

320C. Virtual Product, Process, and Organization Models in Engineering — Research, development, and implementation of virtual product, process, and organization models.

1 unit, Spr (Fischer, Kunz) T 4:30-5:30

342. Computational Modeling of Organizations — (Formerly 351) For post-M.S. students interested in formal techniques for organization design. Computer simulation of organizations are used to con-
duct “virtual experiments” for developing organization theory or to analyze the performance of “virtual organizations” with different structures and decision support/communication technologies. Goals: introduce research on computational modeling and design of real-world organizations. Paper as research proposal. Prerequisite: 242 or equivalent introductory organization design class.

4-5 units, Spr (Levitt, Jin) TTh 10-11:50
plus hour by arrangement

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

362. Advanced Topics in Subsurface Transport — Mathematical analysis of flow and transport in porous and fractured media. Topics vary each year, including: solution of flow and transport equations, stochastic analysis, homogenization, and estimation methods. Prerequisite: consent of instructor. 4 units, Aut (Kitanidis) MWF 10
additional units by arrangement

4 units, Win (Monismith) MW 10-11:20

371. Kinetics of Environmental Processes — Basic concepts of chemical kinetics, rate laws and mechanisms of environmentally relevant contaminant transformations, consideration of fate processes in natural aqueous systems and during water treatment. Prerequisite: post-M.S. students.
2-3 units, Spr (Reinhard) by arrangement
alternate years, not given 1996-97

372. Mass Transfer Seminar — Student-led discussion of readings. Basic concepts of diffusion and interphase mass transfer, and the role of mass transfer limitations in the fundamental processes that affect water quality. Applications to water treatment and contaminant transport in surface and groundwater, and to hazardous chemical behavior. Prerequisites: 270, 271A, and post-M.S. status.
2 units, Spr (Roberts) by arrangement
alternate years, not given 1996-97

379. Environmental Management and Policy Analysis — (Same as Business 312E.) Priority given to Environmental and Water Studies graduate students. Environmental considerations are increasingly central to business activity and present business opportunities. Managers need to effectively incorporate these considerations into their decision-making processes. Speakers from industry and nonprofits cover the basics of environmental science and economics, show how companies are addressing environmental management. Selected public policy issues identify effective policy and show how managers can affect or anticipate policy changes. Group project (research paper or working with a company or environmental organization). Enrollment limited.
4 units, Spr (Bulow) TF 1:20-3:05

386A.B.C. Intelligent Systems for Organizational Problem Solving — (Same as Engineering-Economic Systems 386A.B.C.) Advanced graduate seminar focuses on the dynamic performance of real-world organizations and organizational participants, and on their dynamic interactions with the social and physical environment. Explores processes (planning, activity management and learning) using computational and mathematical models and using computational tools to support and improve organizational work. Participants select/critically review contributions to organizational analysis and support technology, drawing on social and behavioral science, economics, systems and decision sciences, and computer science and AI. Research topics: organization theory, organizational design, large scale and decentralized organizational planning, group decision-making as a group or organization-wide process, team theory, coordination theory, principal-agent relationships as a basis for modeling organizational structure, and computer-supported collaborative work.
1-4 units, Aut, Win, Spr (Fehling, Levitt) by arrangement

397. Random Vibrations — Concept of random vibrations; description of the vibratory motion of probabilistic summary; concept of stationarity, ergodicity; correlation and autocorrelation; Fourier Analysis; spectral density function; input/output relationship for linear systems; transmission of random vibrations. Prerequisite: post-M.S. standing.
2 units (Staff)
alternate years, not given 1996-97

398. Report on Civil Engineering Training — On-the-job training under the guidance of experienced, on-site supervisors; meets the requirements for Curricular Practical Training for students on F-1 visas. Students submit a concise report detailing work activities, problems worked on, and key results. Prerequisite: written consent of adviser.
1 unit, any quarter (Staff) by arrangement

399. Advanced Engineering Problems — Individual projects on selected topics. Independent graduate work under the direction of a faculty member on a subject of mutual interest. Student must obtain faculty sponsor. Written report usually required.
1-5 units, any quarter (Staff) by arrangement

Aut, Win, Spr (Staff) by arrangement


**COMPUTER SCIENCE**

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

Chair: John Hennessy

Associate Chair for Education: Eric S. Roberts

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


Associate Professors: David Dill, Michael Genesereth, Anoop Gupta, Oussama Khatib, Monica Lam, John Mitchell, Yoav Shoham

Assistant Professors: Mary G. Baker, Daphne Koller, Marc Levoy, Nick McKeown, Rajeev Motwani, Sergei V. Plotkin, Mendel Rosenblum, Andrew M. Stuart, Carlo Tomasi, Jennifer Widom

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

Professor (Teaching): Eric S. Roberts

Courteous Professors: Michael J. Flynn (Electrical Engineering), Martin Kay (Linguistics), Grigorri Mints (Philosophy), David E. Rumelhart (Psychology), Edward A. Shortliffe (Medicine), Fouad A. Tobagi (Electrical Engineering)

Courteous Associate Professors: Giovanni De Micheli (Electrical Engineering), John T. Gill, III (Electrical Engineering), Mark A. Horowitz (Electrical Engineering), Teresa Meng (Electrical Engineering)

Courteous Assistant Professors: Russ B. Altman (Medicine), David Heeger (Psychology), Mark A. Musen (Medicine), Oyekunle Oluokutun (Electrical Engineering)

Affiliated Professor (Research): David Luckham (Electrical Engineering)

Lecturers: Stephen Clausing, Todd Feldman, Margaret Johnson, Nicholas J. Parlante, Julie Zelenski


Consulting Associate Professor: Charles A. Bigelow

Consulting Assistant Professors: Pelle Olsson, Craig Partridge, Ted Selker

Several large computer systems at the Department of Computer Science (CS) play a major role in providing the computing environment for research and administration. Course work and instruction is done on the systems available at ITSS (Information Technology Systems and Services). Students in CS also have access to SUNET, the University-wide ethernet system, or to other systems through the nationwide Internet.

The systems are the following:

**FLAMINGO**, a DECsystem 5000/240, serves the centralized needs of the Robotics Lab.

**HOOKIPA**, a Silicon Graphics multiprocessor (8 CPUs) compute server, 4D380GTX, supports the Scientific Computing and Computational Mathematics group.

**HPP**, a SUN 4/490, supports research on knowledge-based systems and applications of artificial intelligence to biomedicine and engineering. Students doing research in the Knowledge Systems Lab may be granted access to the HPP system.

**PESCADERO**, a DECsystem 5000/240, serves the centralized needs of the Distributed Systems Lab.

**RADON**, a Hewlett-Packard 9000-755 compute server, 256MB memory, 6GB disk. This system is exclusively for student computational use.

**SAIL**, a DECserver 5000/200, supports research in AI and DB2, an IBM POWERserver 6000/570, supports research in databases and is used by one of the research groups.

**SUNBURN**, a SUN4/490 is used for departmental administration.

**XENON**, a SUN 4/670 Multiprocessor (4 CPUs). This system is exclusively for student use as a primary “home base” machine for electronic mail and text processing.

In addition, approximately 25 medium scale Unix operating systems are used by specific research projects at CS.

The department also operates and supports hundreds of workstations, among which are Digital Equipment Corporation, SUN Microsystems, Hewlett-Packard, Silicon Graphics, NeXT, and IBM. There are approximately 20 laser printers for research and administration use. In addition, the department operates a Graphics Lab that consists of 14 SGI 4D/35TG Color Workstations. These systems are reserved for graduate course work only.

At present, students supported by research can receive an account on their sponsored machine. All CS students and alumni receive an account on XENON/RADON.

**UNDERGRADUATE PROGRAMS**

The department offers a degree in Computer Science, as outlined in the “School of Engineering” section of this bulletin. In addition, there
are several interdisciplinary degrees with a substantial computer science component. The Computer Systems Engineering major (also in Engineering) allows the study of issues of both computer hardware and software, bridging the gap between traditional CS and Electrical Engineering majors. The Symbolic Systems major (in the School of Humanities and Sciences) offers a chance to explore computer science and its relation to linguistics, philosophy, and psychology. Finally, the Mathematical and Computational Sciences major (also Humanities and Sciences) allows students to explore computer science along with more mathematics, statistics, and operations research.

GRADUATE PROGRAMS
MASTER OF SCIENCE

The University's basic requirements for the M.S. degree are discussed in the "Graduate Degrees" section of this bulletin.

The M.S. degree in Computer Science is intended as a terminal professional degree and does not lead to the Ph.D. degree. Students planning to obtain the Ph.D. degree should apply directly for admission to the Ph.D. program.

Applications for admission to the M.S. program, and all of the required supporting documents, must be received before December 31, 1995. Exceptions are made for applicants who are either Honors Co-op applicants or who are already students at Stanford (including coterminal applicants). Information on these deadlines is available from the department.

REQUIREMENTS

A candidate is required to complete a program of 45 units. At least 36 of these must be graded units, passed with an average 3.0 (B) letter grade indicator (LGI) or better. The 45 units may include no more than 21 units of courses from those listed in Requirements 1 and 2. Thus, students needing to take more than seven of the courses listed in Requirements 1 and 2 actually complete more than 45 units of course work in this program. Only extremely well-prepared students may expect to finish the program in one year; most complete the program in six quarters. It is expected that an adequately prepared student admitted to the M.S. program will have taken a number of the core courses as an undergraduate. Students hoping to complete the program with 45 units should already have a substantial background in computer science, including course work or experience equivalent to all of Requirement 1 and some of the courses in Requirement 2.

Requirement 1 —The following courses may be needed as prerequisites for other courses in the program: CS 107, 108, 109A, 109B. 195L (for specialization 5 only); Electrical Engineering 182; Math. 109 or 120.

Requirement 2 —The following core courses or their equivalent must be completed: CS 137 or 237A, 143, 221 (required for specialization 5) or 145 or 245A, 154 or 254, 157, 161, 240A; Electrical Engineering 282; Statistics 116. Courses are waived only if evidence is provided that a similar course has been taken elsewhere. Courses that are waived rather than taken may not be counted toward the M.S. degree. Core courses may be taken on a Satisfactory/No Credit basis provided that a minimum of 36 graded units is presented within the 45-unit program.

Requirement 3 —At least 1 but no more than 3 units of 500-level seminars must be taken.

Requirement 4 —A program of 21 units in an area of specialization must be completed. All courses in this area must be taken for letter grades. Eight approved programs are listed below. Students may propose to the M.S. program committee other coherent programs that meet their goals and satisfy the basic requirements. Students who want to include a substantial research project as part of their degree program can arrange with their adviser to replace units in their specialization with a CS 393 (Computer Laboratory) project.

1. Numerical Analysis/Scientific Computation
   a) CS 237A, 237B, 237C

2. Systems
   a) CS 240B, 242
   b) At least three of: CS 243, 244A, 245A, 248, 348B; Elect. Engr. 271, 381, 382
   c) At least 6 more units selected from '2b' and: CS 194, 244B, 244C, 245B, 249, 315A, 315B, 341, 342, 343, 345A, 345B, 346, 347, 348A, 348C, 349; Elect. Engr. 183, 272A, 272B, 271, 281, 374, 482, 484, 487, 488, 489; Psych. 267

3. Software Theory
   a) CS 242, 243, 258, 260
   b) At least one of: CS 244A, 245A, 342, 343, 345A
   c) At least one course from the following: CS 254, 363, 367A, 367B
   d) At least one additional course selected from '3b'-'3c'; CS 245B, 345B, 441; Elec. Engr. 418

4. Theoretical Computer Science
   a) CS 254 or 256, 257 or 258, 260
   b) At least 12 more units from CS 254, 256, 261, 264, 345A, 345B, 351, 353, 355, 356A,
5. Artificial Intelligence
   a) At least four of: CS 222, 227, 229, 257, 306, 321, 323, 324, 325

6. Database
   a) CS 245A
   b) Two of: CS 245B, 345A, 345B, 346, 347
   c) Four additional courses selected from ‘6b’ and: 240B, 244A, 244B, 249, 271, 395; Med Info. Sci. 212

7. Human-Computer Interaction
   a) CS 147, 247A, 247B
   b) At least 6 units from: CS 248, 273, 377 (may be taken repeatedly), 378

8. Real-World Computing
   a) At least two of: CS 223A, 223B, 248
   c) A total of 21 units from the above and: CS 222, 224, 225, 247A, 326B, 327A, 328B, 336, 348C, 399, 427; Psych. 267

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

**DOCTOR OF PHILOSOPHY**

The University’s basic requirements for the Ph.D. are discussed in the “Graduate Degrees” section of this bulletin. Applications to the Ph.D. program and all supporting documents must be received before December 31, 1995. The following are department requirements (see the Computer Science graduate programs administrator for further details):

1. A student should plan and successfully complete a coherent program of study covering the basic areas of computer science and related disciplines. The student’s adviser has primary responsibility for the adequacy of the program, which is subject to review by the Ph.D. program committee.
2. Each student, to remain in the Ph.D. program, must satisfy the breadth requirement covering introductory level graduate material in major areas of computer science. Once a student fulfills five of the seven whole areas of the breadth requirement, he or she may apply for admission to candidacy for the Ph.D. This must be done by the end of the second year in the program. The student must completely satisfy the breadth requirement by the end of nine quarters (excluding summers), and must pass a qualifying exam in the general area of the expected dissertation.
3. As part of the training for the Ph.D., the student is required to complete at least 4 units (a unit is 10 hours per week for one quarter) as a teaching assistant or instructor for courses in Computer Science numbered 100 or above.
4. The most important requirement is the dissertation. After passing the qualifying examination, each student must secure the agreement of a member of the department faculty to act as the dissertation adviser. (In some cases, the dissertation adviser may be in another department.)
5. The student must pass a University oral examination in the form of a defense of the dissertation. It is usually held after all or a substantial portion of the dissertation research has been completed.
6. The student is expected to demonstrate the ability to present scholarly material orally, both in the dissertation defense and by a lecture in a department seminar.
7. The dissertation must be accepted by a reading committee composed of the principal dissertation adviser, a second member from within the department, and a third member chosen from within the University. The principal adviser and at least one of the other committee members must be Academic Council members.

**Ph.D. MINOR**

For a minor in Computer Science, a candidate must complete 20 units of computer science course work, including at least three of the master’s core courses to provide breadth, and one course numbered 300 to provide depth. The remaining courses must be numbered 200 or above. One of the courses taken must include a significant programming project to demonstrate programming proficiency. A letter grade indicator (LGI) of 3.0 or better must be maintained.

**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, con-
sulting with students, grading examinations, and so on. Research assistants (RAs) help faculty and senior staff members with research in computer science. Most teaching and research assistantships are held by Ph.D. students in the Department of Computer Science. If there is an insufficient number of Ph.D. students to staff teaching and research assistantships, then these positions are open to a limited number of master’s students in the department. However, master’s students should not plan on being appointed to an assistantship.

Students with fellowships may have the opportunity to supplement their stipends by serving as graduate student assistants.

COURSES

GUIDE TO SELECTING INTRODUCTORY COURSES

Students arriving at Stanford have widely differing backgrounds and goals, but most find that the ability to use computers effectively is beneficial to their education. The department offers many introductory courses to meet the needs of these students.

For students whose principal interest is an exposure to the fundamental ideas behind computer science and programming, 105A is the most appropriate course. It is intended for students in nontechnical disciplines who expect to make some use of computers, but who do not expect to go on to more advanced courses. CS 105A meets the Area 6 University distribution requirement and includes an introduction to programming, the discipline of computer science, and the social implications of computing. Students interested in learning to use the computer as a tool should consider 1C (Using the Macintosh) or 1U (Introduction to Unix).

Students who intend to pursue a serious course of study in computer science may enter the program at a variety of levels, depending on their background. Students with little prior experience or who wish to take more time to study the fundamentals of programming should take 106A followed by 106B. Students in 106A need not have prior programming experience. Students with significant prior exposure to programming or who want an intensive introduction to the field should take 106X, which covers most of the material in 106A,B in a single quarter. All instruction in CS 106 uses ANSI C, although the prior programming experience required for 106X may be in any language. In all cases, students are encouraged to discuss their background with the instructors responsible for these courses.

After the introductory sequence, Computer Science majors and those who need a significant background in computer science for related majors in engineering should take 107, 108, and 109A,B. CS 107 exposes students to a variety of programming paradigms that illustrate critical strategies used in systems development; 108 builds on this material, focusing on the development of large interactive programs based on the object-oriented programming paradigm. The 109A,B sequence constitutes a broad introduction to the underlying theory and conceptual structures used in computer science.

In summary:
For exposure — 1C or 1U.
For nontechnical use — 105A. For scientific use — 106A.
For a technical introduction — 106A.
For significant use — 106A,B or 106X, followed by 107, 108, and 109A,B.

NUMBERING SYSTEM

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

- 0-99 service courses for nontechnical majors
- 100-199 other service courses, basic undergraduate
- 200-299 advanced undergraduate/beginning graduate
- 300-399 advanced graduate
- 400-499 experimental
- 500-599 graduate seminars

The tens digit indicates the area of Computer Science it addresses:

- 00-09 Introductory, miscellaneous
- 10-19 Hardware Systems
- 20-29 Artificial Language
- 30-39 Numerical Analysis
- 40-49 Software Systems
- 50-59 Mathematical Foundations of Computing
- 60-69 Analysis of Algorithms
- 70-79 Typographical and Computational Models of Language
- 90-99 Independent Study and Practicum

NONMAJOR

1C. Using the Macintosh — Introduction to using the Apple Macintosh, including exposure to a word processor, communications facilities, spreadsheets, and other software packages. Weekly one hour lecture/demonstration with demonstrated software package. No exams or problem sets. Not a programming course.

1 unit, Aut, Win, Sum (Staff)

1U. Introduction to Unix — Tutorial on using the Unix operating system. Topics: the emacs editor, the file system, the C and Bourne shells, and standard Unix utilities (make, awk, sed, grep, etc.). Includes simple shell programming, but it is not a programming course and assumes no prior exposure to programming.

1-2 units, Win (Staff) MW 12
50. Problem Solving with Mathematica — For engineers, physicists, mathematicians, and others who frequently need to solve mathematical or quantitative problems. Comprehensive introduction to Mathematica, an interactive mathematical software which incorporates a high-level programming language. Use of Mathematica to manipulate expressions, find roots, solve differential equations, visualize functions and data, import and export data, and to write functions.

2 units, Spr (Blachman) F 12-1

UNDERGRADUATE

104. History of Computers — (Enroll in Science, Technology, and Society 161.)
4-5 units, Win

105A. Introduction to Computers — For non-technical majors. Develops an understanding of what computers are and how they work. The great ideas of computer science. Some programming provides practical experience in construction of computer algorithms and illustrates design techniques for managing complexity. Methods are shown to be valid as general problem-solving tools. The capabilities and limitations of computers. Artificial intelligence and the philosophical implications of computer intelligence. No previous knowledge of computer science is assumed. Students in technical fields and students looking to acquire programming skills are encouraged to take 106A or 106X. Prerequisite: minimal math skills. DR:6(8)

*5 units, Aut (Clausing) MWF 11
Spr (Johnso.i) MWF 10

106A. Programming Methodology — For students in technical disciplines; no prior experience is assumed. Broad introduction to the engineering of computer applications. Software engineering principles are stressed: design, decomposition, information hiding, procedural abstraction, testing, and reusable software components. Uses the programming language C and concentrates on the development of good programming style and on understanding the basic facilities provided by the language. Alternatives: 105A, 106X. DR:6(8)

*5 units, Aut (Roberts) MWF 1:15
Win (Feldman) MWF 11
Spr (Sahami) MWF 11

106B. Programming Abstractions — Abstraction and its relation to programming. Software engineering principles of data abstraction, modules, certain fundamental data structures (e.g., stacks and queues), and data-directed design. Recursion and recursive data structures (linked lists and binary trees). Brief introduction to time and space complexity analysis. Prerequisite: 106A or consent of the instructor, based on prior exposure to ANSI C. DR:6(8)

*5 units, Aut (Feldman) MWF 11
Win (Roberts) MWF 1:15
Spr (Feldman) MWF 1:15

106X. Programming Methodology and Abstractions (Accelerated) — Covers most of the material in 106A,B. Students are expected to have previous programming experience at a level that allows them to understand the concepts presented in 106A, usually in a language other than C. First two weeks focus on understanding how the concepts are expressed in ANSI C. 106B material is covered for the balance. DR:6(8)

*5 units, Aut (Clausing) MWF 10
Win (Feldman) MWF 3:15
Spr (Clausing) MWF 10

107. Programming Paradigms — Introduces a variety of programming language paradigms and their implementations. Topics: structure and implementation of compiled languages, basic concurrent programming, the functional paradigm, and the object-oriented paradigm. Languages include C++ and Lisp. Small programming projects. Prerequisite: 106B or 106X.

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

108. Object-Oriented Systems Design — The implementation of modern software based on large OOP libraries. Topics: review of C++, the structure of object-oriented Graphical User Interface (GUI) class libraries, GUI application design and construction, OOP software engineering strategies, approaches to programming in teams. Prerequisite: 107.

*4 units, Aut (Parlante) MWF 3:15
Win (Parlante) MWF 1:15

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; counting and discrete probability; 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 sequence themes. 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 (Dill) MWF 10
Win (Ullman) MWF 3:15

109B. *4 units, Win (Johnson) MWF 10
Spr (Ullman) MWF 2:15

110. Introduction to Computer Systems and Assembly Language Programming — Organization of digital computers, buses, registers, processors, I/O, memory systems, and paged memory. Data representation, data structures, and computer arith-
112. Computer Organization and Design — (Enroll in Electrical Engineering 182.)
4 units, Win, Spr

137. Introduction to Scientific Computing — The fundamental issues of numerical computation for the mathematical, computational, and physical sciences, and engineering. Emphasis from the perspective of the computer scientist. Use of numerical algorithms in engineering practice. Problems of accurately computing solutions in the presence of rounding errors and of computing discrete approximations of solutions which are defined on the continuum. The taxonomy of problem classes with methods for their solution and principles useful for analysis of performance and algorithmic development. Topics: error analysis, the solution of linear and nonlinear equations, interpolation and numerical differentiation, the approximation of integrals, and the solution of differential equations. Prerequisites: 106A; Math. 103 or 113 or equivalents.
*4 units, Aut (Chou) MW 12:50-2:05

138. Introduction to Numerical Analysis — Two-quarter sequence introducing the fundamental issues in the design and analysis of algorithms for numerical computation. Emphasis on the mathematical analysis of such problems.

138A. Numerical Analysis — The solution of linear equations by direct and iterative methods; the solution of nonlinear equations; interpolation and numerical differentiation; basic approximation theory; data fitting methods, quadrature. Prerequisites: 106A; Math. 103 or 113 or equivalents.
3 units, Win (Golub) TTh 11-12:15

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

140. Concurrent Programming — Principles of concurrent programming focusing on low-level, semaphore, monitor, and message-passing approaches to process communication and synchronization. Emphasis on principles and algorithms, rather than on implementation. Prerequisites: 107, 109A.
3 units (Staff) not given 1995-96

143. Compilers — Principles and practices in the design of programming language compilers. Topics: lexical analysis, parsing theory (LL, LR, and LALR parsing), symbol tables, type checking, common representations for records, arrays, and pointers, runtime conventions for procedure calls, storage allocation for variables, and generation of unoptimized code. Students construct simple compiler as programming project. Prerequisites: 107, 109B.
*4 units, Aut (Johnson) MW 9
Spr (Dill) MW 10

145. Introduction to Databases — Data models: entity-relationship, relational, network, hierarchical, object-oriented. Relational algebra and calculus, relational database query languages. Dependencies, constraints, and normal forms. Role of databases in application environments. Designing a database for an application. Interactive and programming interfaces to database systems. Database transactions from the application perspective. Database application implementation project using a database management system. Prerequisites: 107, 109B.
*4 units, Aut (Ullman) TTh 9:30-10:45

147. Introduction to Human-Computer Interaction Design — Introduction to the concepts underlying the design of human-computer interaction: usability and affordances, direct manipulation, systematic design methods, user conceptual models and interface metaphors, design languages and genres, human cognitive and physical ergonomics, information and interactivity structures, design tools and environments. Structured around a set of case studies in which notable interface designs and/or projects are analyzed as illustrative of underlying principles. Students participate in discussions of cases and do weekly interface analysis and design exercises which do not require programming. Enrollment limited. Class sign-up required.
3-4 units, Aut (Winograd, Liddle) MW 8:15-9:45

154. Introduction to Automata and Complexity Theory — Regular sets: finite automata, regular expressions, equivalences among notations, methods of proving a language not to be regular. Context free languages; grammars, pushdown automata, normal forms for grammars, proving languages non-context free. Turing machines; equivalent forms, undecidability. Nondeterministic Turing machines: properties, the class NP, complete problems for NP, Cook's theorem, reducibilities among problems. Alternate: 254. Prerequisite: 109B.
*4 units, Win (van Glabbeek) MW 3:15-4:30
Spr (Motwani) MW 3:15
154N. Introduction to NP Completeness — Turing machines: equivalent forms, undecidability. Nondeterministic Turing machines: properties, the class NP, complete problems for NP, Cook's theorem, reducibilities among problems. Students participate in approximately the last half of 154. Prerequisite: a knowledge of formal languages and automata as in the first part of 154.
  2 units, Win (van Glabbeek) MW 3:15-4:30
  Spr (Motwani) MW 3:15

  *4 units, Aut (Manna) TTh 11-12:15
  Spr (Genesereth) TTh 1:15-2:30

157L. Logic and Automated Reasoning Laboratory
  1 unit, Aut (Manna)

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

191. Senior Project — Group projects under faculty direction. Register using the section number associated with the instructor.
  1-6 units, any quarter (Staff) by arrangement

192. Programming Service Project — Restricted to Computer Science students. Appropriate academic credit (without financial support) is given for volunteer computer programming work of public benefit and educational value.
  1-3 units, any quarter (Staff) by arrangement

193D. C++ and Object-Oriented Programming — C++ programming language and object-oriented programming paradigm. Covers all the major features of C++ 3.0 and object design principles which apply generally in Object Oriented Languages. Intensive programming assignments. Prerequisites: knowledge of C and basic programming methodology as developed in 106B or 106X.
  *4 units, Win (Clausing) MWF 11

193L. Internet Technologies — Survey of contemporary Internet technologies. The role, use, and implementation of current Internet tools. Basic TCP/IP: namespace, connections, and protocols. World Wide Web/HTML techniques for text, images, links, and forms. Indexing methods: gopher, WAIS. Server side programming, CGI scripts. Security issues. Programming projects cover client and server side projects and may include UNIX scripts, C, Perl, and Java. Emphasis on understanding, exploiting, and extending Internet technologies. Prerequisites: programming fundamentals at the level of 106B or 106X, and UNIX at the level of 1U.
  3 units, Spr (Parlante) MW 3:15-4:30

193U. Software Engineering in C — C programming language and UNIX/C programming environment. C programming language issues: data types, control structures, pointers, dynamic memory allocation, libraries, performance, bit operations, and the interface to the UNIX shell. UNIX systems programming issues: file system, processes, signals, interprocess communication, and C interfaces to these capabilities. Includes a significant programming project. Previous experience in a high-level language other than BASIC and experience as a UNIX user required. Prerequisite: knowledge of programming at the level of 106B.
  3 units, Aut (Staff) MW 3:15
  Spr (Staff) MW 1:15

193X. X Window System Programming — Develop user interfaces using the X library (Xlib) and the X toolkit intrinsics (Xt). OSF/Motif is used in the examples and programming assignments; emphasis is on general Xlib and Xt techniques. Progressive exercises develop skills in using the X client/server event model, an Xt-based widget set, and more advanced Xlib operators. Prerequisites: experience with C development in a Unix environment.
  2 units, Aut (Yang) MW 11

194. Software Project — Student teams complete a significant programming project through the phases of specification, coding and testing under faculty supervision. Lectures provide additional background on software engineering methodologies. Prerequisite: 108.
  3 units, Spr (Clausing) TTh 9:30-10:45

* May be taken for 3 units by graduate students.
196. Microcomputer Consulting — Consulting in a microcomputer environment, focusing on the Apple Macintosh and DOS operating systems. Biweekly lectures outline the microcomputer environment on campus and demonstrate the skills needed to consult in such an environment. Students also work as the on-duty consultant at a campus cluster. Pre- or corequisite: 1C.

2 units, Aut, Spr (Staff) TTh 7 p.m.

197. Mainframe and Workstation Computer Consulting — Computer consulting in a mainframe and workstation environment, focusing on the UNIX operating system under the SUN and DEC hardware systems. Topics: UNIX fundamentals, systems administration, shell scripting, VI, Emacs, networking, e-mail, and X-windows. Students work as on-duty consultants at the Sweet Hall computer cluster. Pre- or corequisite: 1U.

2 units, Win, Spr (Staff) MW 7 p.m.

198. Teaching of Computer Science — Teach a small discussion section of 106A while learning the fundamentals of teaching a programming language at the introductory level. Two workshops/one general meeting weekly on introductory material in general, 106 specifically, and teaching techniques. Application and interview required; see the 198 coordinator in CS for information. Prerequisite: 106B or 106X.

4 units, Aut, Win, Spr (Roberts, Maag, Sahami) M 4:15-6

199. Independent Work — Special study under faculty direction, usually leading to a written report. Letter grade given; if this is not appropriate, enroll in 199P. Register using the section number associated with the instructor.

any quarter (Staff) by arrangement

199P. Independent Work — Like 199, but graded Satisfactory/No Credit.

any quarter (Staff) by arrangement

UNDERGRADUATE AND GRADUATE

200. Undergraduate Colloquium — Strongly recommended for junior-year CS majors as a way to build contacts with faculty. Weekly presentations by faculty and people from industry who informally describe their views of computer science as a field and their experience as computer scientists.

1 unit, Aut, Spr (Staff) Th 3:15-4:45

201. Computers, Ethics, and Social Responsibility — Primarily for majors entering computer-related fields. Analysis of ethical and social issues related to the development and use of computer technology. Introduction to relevant background in ethical theory, and social, political, and legal considerations. Analysis of scenarios in specific problem areas: privacy, reliability and risks of complex systems, and the responsibility of professionals for the applications and consequences of their work. Prerequisite: 106B or 106X.

3 units, Spr (Roberts) MWF 11

202. Law for Computer Science Professionals — Equips computer science professionals with the information and framework to make law-related decisions affecting their work while remaining full participants in design or development decision-making when these legal issues arise. Problem-oriented. Topics: signing invention assignment and nondisclosure agreements, protecting intellectual property, distinguishing between independent contractors and employees, and negotiating software development and publishing agreements.

1 unit, Win (Heckman) T 4:15-5:30

203. Self-Directed Research — Students discuss, learn about, and perform self-directed research. Defining criteria for success, leveraging off of existing work, finding sponsors, maintaining motivation, obtaining feedback, dealing with procrastination, and individually determining the best strategy for successful research.

3 units, not given 1995-96

205. Mathematical Methods for Robotics and Vision — Overview of some of the mathematical background necessary for research in robotics and vision. Topics: geometric meaning of linear algebra concepts; dynamic systems and stochastic estimation (Kalman filtering); calculus of variations; overview of numerical methods for partial differential equations. Additional topics depending on interest. Prerequisites: 106B or X, Math. 43 and 113, or equivalents.

3 units, Aut (Tomasi) MW 11-12:15

211. Logic Design — (Enroll in Electrical Engineering 381.)

3 units, Aut, Win

212. Computer Architecture and Organization — (Enroll in Electrical Engineering 282.)

3 units, Spr

212H. Computer Architecture and Organization (Honors) — (Enroll in Electrical Engineering 282H.)

3 units, Aut

221. Introduction to Artificial Intelligence — Broad technical introduction to core concepts. Topics: neural networks, production-rule systems, learning, vision, search, knowledge representation, deduction, uncertain reasoning, expert systems, planning, intelligent agent architectures, and natural language understanding. Prerequisites: 109A and B, knowledge of propositional and predicate logic, working knowledge of Lisp at the level of 107.

3 units, Aut (Latombe) MW 11-12:15

Spr (Staff) TTh 11-12:15
222. Discrete Systems — Required for 224 and strongly recommended for students planning to concentrate in robotics and/or artificial intelligence. General introduction to the theory of discrete systems. Overview of the theory of discrete systems (state machines, behavior graphs, Petri nets, etc.) Detailed treatment of the principal topics in discrete system architecture (reactivity, representation, programmability, planning, and communication). Theoretical analysis of various pragmatic tradeoffs in discrete system design (e.g., cost, quality, time to market).

3 units (Genesereth) not given 1995-96

223A. Introduction to Robotics — Basics, and a review of current applications. Topics: manipulator kinematics and inverse kinematics; manipulator dynamics, motion, and force control; motion planning and robot programming. Recommended: knowledge of matrix algebra and some familiarity with basic control theory and rigid body mechanics.

3 units, Win (Khatib) MW 3:15-4:30

223B. Introduction to Computer Vision — Fundamental issues and techniques of computer vision. Image formation, edge detection and image segmentation, shading, texture, stereo, motion, shape representation. Project. Prerequisites: 106B or X, Math. 43 and 113, or equivalents.

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

224. Robot Programming Laboratory — Hands-on introduction to the techniques of robot programming for robotics and non-robotics students. Series of guided exercises in which students program mobile robots to exhibit increasingly complex behavior (simple dead reckoning and reactivity, planning and map building, communication and cooperation). Student programmed robot contest. Programming is in Common Lisp on the Macintosh; course work is done in teams. Prerequisites: Lisp programming ability, and familiarity with the Macintosh computer.

3-5 units, Aut (Genesereth) TTh 2:45-4

225. Experimental Robotics — Hands-on experience with robotic manipulation and navigation systems. Topics: kinematic and dynamic control of motion, compliant motion and force control, sensor-based collision avoidance, motion planning, assembly planning, task specifications, and robot-human interfaces. Limited enrollment. Prerequisite: 223.

3 units, Spr (Khatib) TTh 2:15-3:30

226. Expert System Applications — For technically or business-oriented students. Expert systems technology is the most important application technology to emerge from the science of Artificial Intelligence. Topics: definition of expert systems, transition from research in AI laboratories to startup companies and corporate R&D; knowledge engineering, knowledge-based programming, knowledge acquisition methodology, technology transfer issues, evolution of the technology as applied to business and government problems, current and future impact. Case studies, readings, guest lectures.

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

227. Algorithmic Techniques in AI — AI algorithmic techniques explained in detail, and implemented in Prolog. Topics: search, backward and forward chaining, production systems, truth maintenance, reasoning with uncertainty, constraint satisfaction. Application areas: temporal reasoning, learning and natural language. Students with no prior Prolog experience may take additional 1-unit tutorial. Prerequisites: programming experience, familiarity with basic notions in data structures and algorithms. Recommended: previous or concurrent course in AI.

3 units (Shoham) not given 1995-96

227L. Algorithmic Techniques in AI Laboratory 1 unit (Shoham) not given 1995-96

229. Machine Learning — Survey of major research areas: inductive learning, explanation-based learning, and genetic algorithms. Topics: neural networks, decision trees and graphs, delayed-reinforcement and temporal-difference learning, and computational learning theory. Focuses on the underlying concepts and the role of machine learning in AI. Representative systems described. Prerequisites: 221 or consent of instructor, and ability to write computer programs in one or more commonly used languages.

3 units, Win (Staff) MW 11-12:15

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

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

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


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

237C. Numerical Solution of Initial Value Problems — Linear multistep methods and Runge-Kutta methods for ordinary differen-

3 units, Aut (Olsson) MW 11-12:15

240A. Operating Systems and Systems Programming — Fundamentals of operating systems design and implementation. Basic structure; synchronization and communication mechanisms; implementation of processes, process management, scheduling, and protection; memory organization and management, including virtual memory; I/O device management, secondary storage, and file systems. Prerequisite: 108. Recommended: Electrical Engineering 182.

*4 units, Aut (Rosenblum) MWF 1:15
Win (Rosenblum) MWF 10

240B. Advanced Topics in Operating Systems — Advanced study in OS topics and exposure to recent developments in OS research. Readings/lectures on classic and new papers. Topics: virtual memory management, synchronization and communication, file systems, protection and security, operating system extension techniques, fault tolerance, and history and experience of systems programming. Prerequisite: 240A or equivalent.

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

242. Programming Languages — Basic elements of programming languages and programming paradigms: functional, imperative, and object-oriented. Introduction to formal semantic methods. Modern type systems, higher-order functions and closure, exceptions and continuations. Runtime support for different language features. Emphasis is on separating the different elements of programming languages and styles. First half uses Lisp and ML to illustrate concepts; second half a selection of object-oriented languages. Prerequisite: 107, or experience with Lisp, C and some object-oriented language.

3 units, Aut (Fisher) TTh 1:15-2:30

243. Advanced Compiling Techniques — Theoretical and practical aspects of building modern compilers. Topics: intermediate representations, basic blocks and flow-graphs, dataflow analysis, register allocation, global code optimizations, and interprocedural analysis. Prerequisite: 143 or equivalent.

*4 units, Win (Lam) MW 11-12:15

244A. Computer Networks: Architectures and Protocols — Objectives of computer networks; network structure and components; switching techniques (circuit switching and packet switching); network functions; layered network architectures (the ISO reference model); data link protocols (character- and 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 (McKeown) (Enroll in Electrical Engineering 384)
Win (McKeown) TTh 2:45-4

244B. Distributed Systems — Overview of distributed systems, primarily as an extension of uniprocessor operating systems to span networks. The impact of networking on each of the subsystems and issues discussed in 240A,B, including basic architectural models; network-transparent message-passing and remote procedure call; network-wide virtual memory; distributed file systems; encryption, and multi-site concurrency control, replication, and error recovery. Prerequisites: 240B, 244A.

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

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

3-6 units, Spr (Cheriton)


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

245B. Database System Project Course — A major database system implementation project realizes the principles and techniques covered in 245A. Each student builds a complete prototype database management system, from file structures through query processing, and an individually designed feature or extension. Lecture on project requirements, advanced techniques, and research projects in database system implementation. Guest speakers from industry on commercial DBMS implementation techniques. Prerequisites: 145, 245A. Recommended: prior programming experience in C++.

3-5 units, Spr (Widom) TTh 9:30-10:45

246. Cognitive Science Principles for Human-Computer Interaction — Results and methodologies in the cognitive sciences can be applied to understand the ways people think about activities, reason and solve problems, and perceive auditory and visual stimuli. Surveys practical aspects of the cognitive sciences and applies them to problems in Human-Computer Interaction. Readings/assignments highlight the literature and methodologies with high “bang for the buck” for HCI. When and
how different areas of the cognitive sciences are likely to be useful (or not be useful) in design. Prerequisite: graduate standing or consent of instructor. Recommended: 147.
3 units, Win (Strub)

247A. Human-Computer Interaction: Interaction Design Studio — Students work individually and in small teams to design and prototype artifacts in a prototyping system such as HyperCard. Mutual analysis of these different designs by students, developing design skills and judgment. Project includes substantial user-interface prototypes of systems for situations of actual use, applying concepts from readings and interacting in project reviews with faculty and experienced system designers. Topics: functionality and useability, visual design and aesthetics, metaphors and scenarios, brainstorming and rapid prototyping. Enrollment limited. Prerequisite: 147.
3 units, Win (Singer, Verplank) MW 2:15-4:45

247B. Human-Computer Interaction: Contextual and Organizational Issues — Analysis and design of human-computer interaction from a situated perspective, including the interpersonal, social, and organizational contexts that shape the process and effectiveness of designing, implementing, and using computer systems. Instructor and guest lecturing, materials from multiple disciplines concerning computer systems design, implementation, use, and organizational design. In-class exercises, and presentations, and individual and group fieldwork on extended field project. Enrollment limited. Prerequisite: 147.
3 units, Spr (Winograd) MW 1:15-2:45

248. Introduction to Computer Graphics — Fundamentals of input, display, and hardcopy devices, scan conversion of geometric primitives, 2D and 3D geometric transformations, clipping and windowing, scene modeling and animation, algorithms for visible surface determination, introduction to local and global shading models, color, and photorealistic image synthesis. Written assignments and programming projects. Prerequisites: 108, Math. 103.
4 units, Win (Hanrahan) TTh 9:30-10:45

249. Object-Oriented Programming from a Modeling and Simulation Perspective — Object-oriented programming techniques and issues, emphasizing programming as modeling and simulation. Topics: encapsulation, use of inheritance (including multiple inheritance), collections, run-time typing identification, exception handling (and possibly persistence), some aspects of distributed and parallel object-oriented systems. Role of programming conventions/style/restrictions in surviving object-oriented programming for class libraries and programming-in-the-large; general techniques for object-oriented programming. Prerequisites: knowledge of C and basic programming methodology as developed in 106B or 106X; 107; basic knowledge of C++ (may be taken concurrently). Recommended: 193D.
3-5 units, Win (Cheriton) TTh 9:30-10:45

254. Automata, Languages, and Computability — Enriched version of 154, recommended for graduate students and for undergraduates strong in math. Alternate 154. Prerequisite: 109B.
4 units (Pratt) not given 1995-96

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

256L. Formal Methods for Concurrent and Reactive Systems Laboratory
2 units, Win (Manna)

257. Automated Deduction and Its Applications — Proving theorems and extracting information from proofs. Uses in software engineering (program specification, synthesis, and verification) and artificial intelligence (commonsense and robotic planning, natural-language understanding). Foundations of logic programming. Deductive tableaux, nonclausal resolution, skolemization, building theories into unification and inference rules, term rewriting, inductive theorem proving. The design of theorem provers. Prerequisite: 157.
3 units (Staff) not given 1995-96

258. Introduction to Programming Language Theory — Syntactic, operational, and semantic issues in the mathematical analysis of programming languages. Type systems and non-context-free syntax. Universal algebra and algebraic data types. Operational semantics given by rewrite rules; confluence and termination. Scott-semantics for languages with higher-type functions and recursion. Treatment of side-effects. Prerequisites: 154, 157 or Philosophy 160A.
3 units (Staff) not given 1995-96

3 units, Win (Staff) MWF 10

261. Algorithmic Paradigms — Design and analysis of algorithms for sequential and parallel archi-
tectures. Topics: parallel algorithms and circuits, on-line algorithms, graph algorithms, approximation algorithms, number-theoretic algorithms and cryptography, advanced data structures such as B-trees and union-find. Prerequisite: 161.

3 units (Staff) not given 1995-96

264. Introduction to Combinatorial Theory — Elementary combinatorics. Topics: permutations, combinations, partitions; the principle of inclusion and exclusion; Ramsey’s theorem; Burnside’s lemma; Polya’s counting theorem; the elementary theory of graphs and trees; flow in networks; matching problems; an introduction to matroids. Prerequisites: 109B, Math. 44, or equivalents.

3 units (Staff) not given 1995-96

265. Basic Tools in Computer Systems Modeling — (Enroll in Electrical Engineering 284.)

3 units, Win

270. Computer Applications in Medicine — (Same as Medical Information Sciences 210.) Survey of use of computers in the medical field, including a variety of research and applied environments and factors which influence the acceptance of these applications. Topics: integration of computer systems in the medical center, hospital information systems, ambulatory care systems, medical databases and networking, bibliographic search, applications to molecular biology, aids for disabled patients, image processing, computer-aided instruction, decision support systems.

3 units, Aut (Fagan, Shortliffe) TTh 1:15-2:30

271. Computer-Based Medical Decision Making — (Same as Medical Information Sciences 211.) For undergraduates or graduate students. Overview of concepts in medical decision making and survey of methods for the implementation of such concepts in computer-based clinical decision-support tools. Emphasis on Bayesian statistics, decision analysis, neural networks, artificial intelligence/expert systems, belief networks, and the synergies among such approaches. No medical background required. Prerequisite: at least one programming course.

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

272. Medical Informatics Project Course — (Enroll in Medical Information Sciences 212.)

3 units, Spr

273. Concepts of Text for Human-Computer Interfaces — (Same as Art 281.) Fundamentals of typographic design for computer-user interfaces. Topics: font aesthetics and technology; perception, reading, and legibility; form, pattern, and texture in the typographic image; text organization; integration of text and image; semiology and semiotics of writing systems.

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

290. Research Seminar on the Software Industry — Graduate students given priority. The present state and dynamics of the worldwide software industry, its growth and current structure, key companies, important trends shaping its development, and issues in the future (human resources, government regulation, intellectual property rights, software development and quality, international competitiveness, new technologies and markets, etc.) Research of the past year in the Japanese and the American software industries. Students participate in research, literature reviews and interviews with industry experts. Research paper. Enrollment limited to 20. Prerequisite: consent of instructor.

3 units (Staff) not given 1995-96

298. Seminar on Teaching Introductory Computer Science — Opportunity for faculty and undergraduate and graduate students who are interested in teaching to discuss the strategy and tactics of teaching computer science at the introductory level. Enrollment limited to 15. Prerequisite: consent of instructor.

1-3 units, Aut (Roberts) M 7-8:30 p.m.

PRIMARILY FOR GRADUATE STUDENTS

300. Departmental Lecture Series — For first-year Computer Science Ph.D. students. Weekly presentations by members of the department faculty, each describing informally his or her current research interests and views of computer science as a whole.

1 unit, Aut (Staff) MW 4:15-5:30

306. Recursive Programming and Proving — Uses LISP language and techniques for providing the correctness of recursive programs. Computing with symbolic expressions rather than numbers, e.g., algebraic expressions, logical expressions, patterns, graphs, and computer programs. Pattern matching and syntax directed computation. Emphasis on computer checked proofs assuring programs meet their specifications. Prerequisite: 157.

3 units (McCarthy) not given 1995-96

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

3 units, by arrangement

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

3 units, Win

Programming assignments on one or more commercial multiprocessors. Prerequisites: 140, 212, reasonable programming experience.
3 units, Spr (Gupta) TTh 11-12:15

315B. Parallel Programming Project — Continuation of 315A. A significant parallel programming project is required. Several different shared-memory, message-passing, and data-parallel machines are available for use in projects. Lectures on parallel programming languages and their implementation, performance debugging of parallel programs, parallel data structures and algorithms. Prerequisite: 315A or consent of instructor.
3 units (Gupta) not given 1995-96

317. Fault Tolerant Computer Systems — (Enroll in Electrical Engineering 489.)
3 units, alternate years, given 1996-97

318. Testing Aspects of Computer Systems — (Enroll in Electrical Engineering 488.)
3 units, alternate years, not given 1996-97

319. Topics in Digital Systems — Advanced material is often taught for the first time as a “topics” course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See Time Schedule for topics currently being offered.
by arrangement

320. Interactive Narrative and Artificial Intelligence — (Same as English 295.) Theory of and approaches to interactive narrative systems, especially those that incorporate artificial intelligence techniques. Weekly meetings include: invited lecturers, discussion readings, critical review of CD ROM titles and other implemented systems. Students create prototypes of AI-based interactive story systems.
2 units, Win (Hayes-Roth, Friedlander) W 2:30-5

321. Representing Large Bodies of Knowledge: Issues in Representation, Inference, and Ontology — Representation “thorns” such as time, space, belief, desire, hypotheticals, plus specific topics drawn from everyday experience. The CYC project anchors discussions, and students construct running applications as term projects.
3 units (Staff)

322. Philosophy of Computation — (Enroll in Philosophy 395A.)
3 units, not given 1995-96

323. Nonmonotonic Common Sense Reasoning — Formalizing common sense knowledge and reasoning using situation calculus with nonmonotonic logics, especially circumscription. Variations of situation calculus. Formalizing context. Formalizing facts about knowledge. Prerequisite: basic knowledge of logic such as 157, or Philosophy 160A.
3 units, Win (McCarthy) TTh 11:15-2:30

324. Foundations of Knowledge Representation — Formal treatment of reasoning about time, action, knowledge, and uncertainty; emphasis on epistemological questions and their relevance to AI. Topics: logics of time and action, logics of knowledge and belief, nonmonotonic logics, fuzzy logics, and probabilistic logic. Prerequisites: an understanding of logic and basic model theory.
3 units (Shoham) not given 1995-96

325. Planning Methods in Artificial Intelligence — Introduction to AI methods for planning actions to achieve a specified goal from an initial state of the world. Linear planning (means-ends analysis, goal regression), non-linear planning, hierarchical planning, and compromise-based planning. Planning with temporal constraints. Reactive planning and deliberative architectures. Interaction with execution and learning. Underlying problems — frame, qualification, prediction, and persistence; notions, e.g., interdependent subgoals, reviewed and analyzed. Two parts: the basics illustrated with simple examples, and applications in various domains (robotics, process planning, etc.). Prerequisite: 221.
3 units (Latombe) not given 1995-96

326A. Motion Planning — For students interested in computer graphics, geometrical computing, robotics, and/or artificial intelligence. Computing object motions is central to many application domains (e.g., design, manufacturing, robotics, animated graphics, medical surgery, drug design). Basic path planning methods generate collision-free paths among static obstacles. Extensions include uncertainty, mobile obstacles, manipulating movable objects, and maneuvering with kinematic constraints. Configuration space is a unifying concept, geometric arrangements are a basic combinatorial structure. Theoretical methods with applications in various domains: assembly planning, radiosurgery, graphic animation of human figures.
3-6 units, Win (Latombe) MW 11-12:15

326B. Computational Methods for Automatic Movie Generation — Methods to generate movies from high-level goals, emphasizing motion generation. Topics: interpolation between key frames; automatic generation of movie sequences from high-level goals; general concepts about motions (kinematics, dynamics, behavioral). Representation of motions and related concepts (velocity, acceleration, force) in configuration space, configuration x-time space, and tangent space. Constraints applying to a motion: collision with obstacles, dynamic constraints, friction, nonholonomy. Modeling impacts between objects. Models of human and animal characters. Motion planning as a tool to compute motions from geometric goals. Manipulation tasks. Locomotion tasks: examples of human and animal gaits. Naturalness of motions. Role of sensing and reactive planning in movie generation. Facial ex-
expressions and facial animation. Capture of character’s, models and motion styles.

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

327A. Advanced Robotic Manipulation — Topics: redundant manipulators, control architectures, operational space framework, robot motion/force control, control at kinematic singularities, control of multiple manipulators, dextrous dynamic coordination of macro/mini-manipulator systems, effective inertia, sensor-based primitives, artificial potential field and force strategies, robot design. Prerequisites: 223, consent of instructor.

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

327B. Real-World Autonomous Systems — Complement to CS 222 and 224. Hands-on theory and lab using small mobile robot platforms operating in real-world environments. Topics: basics of microcontroller technology, sensor characteristics, and motor control; sensor fusion, model construction, and robust estimation; control regimes (fuzzy control and potential fields); active perception; various topics in sensor-based navigation. Prerequisites: 106B or X or equivalent, Math. 43 and 113 or equivalents, and a knowledge of simple probability theory.

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

328A. Principles of Experimentation for Computer Vision — Vision is essentially a measuring process. Introduction to the theoretical and practical aspects of quantitative experimentation in computer vision. Topics: statistical elements of measurement theory, image acquisition devices and techniques, camera calibration, experiment design and setup, and presentation of experimental data. Lab project. Limited enrollment. Prerequisite: 205 or consent of instructor.

3 units (Tomasi) alternate years, given 1996-97

328B. Topics in Computer Vision — Fundamental issues and mathematical models for computer vision. Possible topics: image formation, edge detection and image segmentation, shading, texture, stereo, motion, shape representation. Student papers and project. Prerequisites: 106B or X, Math. 43 and 113, or equivalents.

3 units, Spr (Tomasi) TTh 1:15-2:30 alternate years, not given 1996-97

329. Topics in Artificial Intelligence — Advanced material is often taught for the first time as a “topics” course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See Time Schedule for topics currently being offered.

1-3 units

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

3 units (Staff) not given 1995-96


3 units (Golub) not given 1995-96

337. Numerical Methods for Initial Boundary Value Problems — Initial boundary value problems are solved in different areas of engineering and science modeling phenomena, e.g., wave propagation and vibration, fluid flow, etc. Numerical techniques for such simulations are discussed in the context of applications. Emphasis is on stability and convergence theory for methods for hyperbolic and parabolic initial boundary value problems, and the development of efficient methods for these problems.

3 units (Oliger) given 1996-97

338. Numerical Analysis of Dynamic Systems — (Enroll in Mechanical Engineering 233B.)

3 units (Staff) not given 1995-96

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

Parallel Methods in Numerical Analysis — Recent developments in parallel computer technology have made it necessary to reformulate numerical algorithms to exploit the full potential of this technology. Emphasis is on different techniques for obtaining maximum parallelism in various numerical algorithms, especially those occurring when solving matrix problems and partial differential equations, and the subsequent mapping onto the computer. Implementation issues on parallel computers. Prerequisite: familiarity with linear algebra, ordinary differential equations, and partial differential equations.

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

341. Advanced Topics in Data Communication — Readings/discussion are combined with topical lectures to familiarize students with a core of classic and new papers in the field of data networking. Emphasis is on understanding and applying existing work to new problems in the field, especially high-speed networking. Classes alternate between discussion sections and lectures. Topics: network theory (the end-to-end argument), transport protocol performance (header prediction, checksum efficiency), cell relay (e.g., ATM and SONET), congestion control (Parekh’s thesis, leaky bucket, fair queueing) and high-speed switching (input vs. output queuing, crossbars and banyans). Prerequisite: 244A.

3 units, Spr (Partridge) TTh 2:45-4
342. Programming Language Design — (Same as 358.) Problems of programming language design and comparison of traditional solutions. Possible topics: formal semantics, implementation considerations, extensibility, very high level languages, evaluation of language designs, the innovative features of a variety of modern programming languages. Prerequisites: 242, 243.

3 units, Spr (Mitchell) MW 12:50-2:05

343. Topics in Compilers — Compilation techniques for modern machines. Topics: data dependence analysis, interprocedural analysis, instruction scheduling for superscalar machines, loop transformations for parallelism and locality, compilation techniques for distributed memory machines. Prerequisite: 243 or equivalent.

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

344. Computer Networks: Modeling and Analysis — (Enroll in Electrical Engineering 484.)

3 units, Spr


3 units

345B. Advanced Topics in Database Systems — Relational database systems extended with complex types and objects; object-oriented database systems. Active database systems and constraint management, heterogeneous databases, temporal and real-time database systems. Advanced database applications: geographic, multimedia, and scientific databases, database mining. Prerequisites: 145, 245A.

3 units


3 units, Aut (Garcia-Molina) TTh 11-12:15

347. Distributed Databases — Principles and system organization of distributed databases. Data fragmentation and distribution, distributed database design, query processing and optimization, distributed concurrency control, reliability and commit protocols, and replicated data management. Distributed algorithms for data management: clocks, deadlock detection, and mutual exclusion. Heterogeneous and federated distributed database systems. Overview of commercial systems and research prototypes. Prerequisites: 145, 245A.

3 units, Spr (Staff) MW 12:50-2:05

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. Prerequisites: solid foundation in linear algebra and discrete algorithms.

*4 units (Guibas) not given 1995-96

348B. Computer Graphics: Image Synthesis Techniques — Intermediate level, emphasizing sampling, shading, and display aspects of computer graphics. Topics: local and global illumination methods including radiosity and distributed ray tracing, texture generation and rendering, volume rendering, strategies for anti-aliasing and photorealism, human vision and color science as they relate to computer displays, and high-performance architectures for graphics. Written assignments and programming projects. Prerequisite: 248 or equivalent. Recommended: exposure to Fourier analysis or digital signal processing.

*4 units (Levoy) TTh 9:30-10:45

348C. Topics in Computer Graphics — In-depth study of an active research topic in computer graphics. Topic changes each quarter. Previous topics: exotic input and display technologies, modeling of natural phenomena, digital film making, media technologies for graphics and graphics architectures. Readings from literature and a project. Course may be taken repeatedly for credit. Prerequisites: 248 or consent of instructor.

3 units, Win (Levoy) TTh 2:45-4
Spr (Hanrahan) TTh 2:45-4

348D. Vision and Image Processing Laboratory — (Enroll in Psychology 267.)

1-3 units, not given 1995-96

349. Topics in Programming Systems — Advanced material is often taught for the first time as a "topics" course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See Time Schedule for topics currently being offered.

by arrangement

351. Topics in Complexity Theory and Lower Bounds — Focus is on one of four broad topics: basic machine models and complexity measures —
their properties and relationships, complexity classes and their properties, reductions and complete problems, concrete representative problems from important complexity classes. Techniques for establishing limits on the possible efficiency of algorithms, and concrete lower bounds based on the following models of computation: decision trees, straight line programs, communication games, branching programs, PRAMs, boolean circuits. Approximation algorithms and the complexity of approximations. Pseudo-randomness and cryptography. Prerequisites: 154, 264, or equivalent.

3 units (Staff) not given 1995-96


3 units (Pratt) alternate years, given 1996-97


3 units (Pratt) not given 1995-96

354. Probabilistic Reasoning in Computing — Basics of (Bayesian) probability theory as applied to computing and intelligence systems. Emphasis on working through applications and understanding their properties and relationships. Relevant probability theory and techniques: interpretations, graphical and network models, information theory, decision theory, inference, and “alternative” approaches. Probabilistic aspects of computational problems in learning, search, data analysis, neural, and dynamic systems. Some topics by guest lecturers. Prerequisites: 106B or X, 221, a knowledge of basic statistical measures as in Psychology 60, and basic math.

3 units, Aut (Buntine, Cheeseman)

TTH 2:45-4

alternate years, not given 1996-97


3 units (Dill) not given 1995-96

356A. Reasoning about Knowledge — Knowledge plays a crucial role in distributed systems, game theory, and artificial intelligence. Material examines formalizing reasoning about knowledge and the extent to which knowledge is applicable to those areas. Issues: common knowledge, knowledge-based programs, applying knowledge to analyzing distributed systems, attainable states of knowledge, and modeling resource-bounded reasoning. Prerequisites: mathematical maturity, an acquaintance with propositional logic.

1-3 units, Win (Halpern) F 2:15-4:05

alternate years, not given 1996-97

356B. Reasoning about Uncertainty — Uncertainty must be confronted when designing computer systems. Examines formalizing reasoning about uncertainty in particular approaches based on logics involving probability. Topics: logics of probability, combining knowledge and probability, probability and adversarial, conditional logics of normality, causality, going from statistical information to degrees of belief. Prerequisites: mathematical maturity and an acquaintance with propositional logic.

1-3 units (Halpern)

alternate years, given 1996-97


3-5 units, Spr (Manna) MW 11-12:15

358. Topics in Programming Language Theory — (Same as 342.) Possible topics of current research interest in the mathematical analysis of programming languages: structured operational semantics, domain theory, semantics of concurrency, rich type
disciplines, problems of representation independence, and full abstraction. May be repeated for credit. Prerequisites: 154, 157, 258, or equivalents.

3 units, Spr (Mitchell) MW 12:50-2:05

359. Topics in Theory of Computation — Advanced material is often taught for the first time as a "topics" course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See Time Schedule for topics currently being offered.

Adaptive Computation — Fundamental concepts and approaches underlying adaptive computation, emphasizing their relevance for machine learning and pattern recognition. Basic methodology underlying neural networks, stochastic methods (e.g., Boltzmann machines), genetic algorithms and programming, fuzzy logic, etc.; their relative strengths, weaknesses, on-line vs. off-line adaptation, domains of applicability, and hybrid systems through analyses of computational complexity, convergence, and related measures. Adaptive hardware (e.g., field-programmable gate arrays and adaptive analog VLSI) presented to explore design principles and tradeoffs. Goal: provide an understanding of the central issues in adaptive computation, and sufficient background and pointers to the literature so students can begin exploring research topics. Recommended: 254.

1-2 units, Spr (Stork)

361A. Advanced Algorithms — Advanced data structures: union-find, self-adjusting data structures and amortized analysis, dynamic trees, Fibonacci heaps, universal hash function and sparse hash tables, persistent data structures. Advanced combinatorial algorithms: algebraic (matrix and polynomial) algorithms, number theoretic algorithms, group theoretic algorithms and graph isomorphism, online algorithms and competitive analysis, strings and pattern matching, heuristic and probabilistic analysis (TSP, satisfiability, cliques, colorings), local search algorithms.

3 units, Win (Motwani) F 2:15-4:05
alternate years, not given 1996-97

361B. Advanced Algorithms — Topics: linear programming; LP duality, ellipsoid algorithm and its applications, interior-point algorithms. LP in fixed dimension. Exact and approximate algorithms for various combinatorial optimization problems, particularly algorithms for multicommodity flow. Introduction to submodularity. Lattice reduction and strongly-polynomial algorithms for special classes of linear programs.

3 units (Plotkin)
alternate years, given 1996-97

363. Network Optimization — Algorithms for network optimization problems, e.g., shortest paths, maximum flows, minimum-cost flows, multicommodity flows, dynamic flows, minimum cuts, matching, and assignment problem. Applications to problems, e.g., transportation, production and project planning, distribution, and open-pit mining.

3 units, Win (Plotkin)
alternate years, not given 1996-97

365. Randomized Algorithms — Design and analysis of algorithms that use randomness to guide their computations. Basic tools from probability theory and probabilistic analysis that are recurrent in algorithmic applications. Randomized complexity theory and game-theoretic techniques. Algebraic techniques. Probability amplification and derandomization. Applications: sorting and searching, data structures, combinatorial optimization and graph algorithms, geometric algorithms and linear programming, approximation and counting problems, parallel and distributed algorithms, on-line algorithms, number-theoretic algorithms. Prerequisites: 161 or 261, Statistics 116, or equivalents.

3 units (Motwani)
alternate years, given 1996-97

367A. Parallel Computation — Introduction to theoretical issues in parallel computation. Properties of parallel computation models and algorithm design techniques specific to each model, including systolic arrays, mesh-connected computers, hypercube-related networks, and PRAM. Topics: algorithms for sorting, connected components, shortest paths, and other basic problems. Upper and lower bounds for randomized and deterministic routing on hypercubes and related networks. Techniques for reducing the processor-time product for PRAM algorithms.

3 units (Plotkin) not given 1995-96


3 units (Plotkin) not given 1995-96

368. Geometric Algorithms — Graduate-level introduction to basic techniques used in the design and analysis of efficient geometric algorithms including: convexity, triangulation, sweeping, partitioning, and point location. Recent developments using random sampling methods. Emphasizes data structures of general usefulness in geometric computing and the conceptual primitives appropriate for manipulating them. Impact of numerical issues in geometric computation. Applications to robotics, vi-
sion, and CAGD. No prior knowledge of geometric techniques is assumed. Prerequisite: 161.
3 units, Spr (Guibas) TTh 1:15-2:30

369. Topics in Analysis of Algorithms — Advanced material is often taught for the first time as a "topics" course, perhaps by a faculty member visiting from another institution. Students may therefore enroll repeatedly in a course with this number. See Time Schedule for topics currently being offered.
3 units, Aut (Motwani)
Spr (Plotkin)

371. Medical Decision Analysis — (Enroll in Engineering-Economic Systems 235.)
4 units, Spr

377. Topics in Human-Computer Interaction — Topics of current research interest in human-computer interaction. Contents change each quarter. May be repeated for credit. 1994-95 topics were: principles from the cognitive sciences for human-computer interaction, reactive and proactive computer agents, filmcraft in user interface design, multimedia.
3 units, Win (Clanton, Selker)

3-4 units, Win (Winograd, Davis)
TTh 2:45-4:45

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 currently being offered.
by arrangement

390. Industrial Practical Training — Provides educational opportunities in high-technology research and development labs in the computing industry. Qualified graduate students engage in internship work and integrate that work into their academic program. Students register in the quarter following internship work, and complete a research report outlining their work activity, problems investigated, key results, and any follow-on projects they expect to perform. Meets the requirements for Curricular Practical Training for students on F-1 visas. Sign up for section number corresponding to your academic adviser.
1 unit, Aut (Staff) by arrangement

393. Computer Laboratory — For graduate students of Computer Science. A substantial computer program is designed and implemented, written report required. Recommended as a preparation for dissertation research. Prerequisite: consent of instructor; register using the section number associated with the instructor.
any quarter (Staff) by arrangement

394. Business Management for Computer Scientists and Electrical Engineers — Focuses on issues involved in business decision making; case method examines real situations and companies. Special problems of the software industry isolated and examined. Strategic planning. Issues in management of new product development, marketing, and manufacturing. Basics of accounting and financial analysis. Provides an understanding of typical issues, functional areas of an enterprise, fundamental management principles, and an ability to pursue areas of further interest independently. Enrollment limited to 60. No auditors. Prerequisite: graduate student in CS or Electrical Engineering.
4 units, Win (Liddle) MF 8-9:45
Spr (Liddle) (Enroll in Electrical Engineering 353)

395. Independent Database Project — For graduate students in Computer Science. Use of database management or file systems for a substantial application or implementation of components of database management system. Written analysis and evaluation required. Prerequisite: consent of instructor; register using the section number associated with the instructor.
any quarter (Staff) by arrangement

399. Independent Project
any quarter (Staff) by arrangement

399P. Independent Project — Graded Satisfactory/No Credit.
any quarter (Staff) by arrangement

EXPERIMENTAL

409. Automated Algorithm Design — Focuses on formal tools for synthesizing correct and efficient algorithms from specifications. Topics: application domain theories, formal specifications, correctness-preserving transformation rules, representation and use of programming knowledge, algorithm and data structure design, program optimization, datatype refinement, performance analysis, and system support for program synthesis. Demonstrations of interactive development of fast algorithms, and hands-on individual projects.
3 units, Spr (Smith, Green) TTh 9:30-10:45
425. Artificial Life — Computational forms of artificial life exploit computer time to organize computer memory in order to survive, reproduce, evolve, and learn. Artificial life from the perspective of various tools (cellular automata, Lindenmayer systems, Turing gases, genetic algorithms, genetic programming, neural nets, and dynamical systems) and issues (evolution, learning, development, emergent behavior, spontaneous emergence of self-replicating and self-improving entities, programmable matter, algorithmic chemistry, evolutionary dynamics, universal computation at the edge of chaos, evolution of diversity, and evolution of complexity). Introductory information on molecular biology.

3 units (Koza) given 1996-97

426. Genetic Algorithms and Genetic Programming — The genetic algorithm is a mathematical algorithm for search, optimization, and machine learning patterned after the evolutionary processes of reproduction, Darwinian survival of the fittest, and genetic recombination. Genetic programming extends genetic algorithms to the evolution of computer programs capable of solving problems. Topics: introduction to genetic algorithms and programming; mathematical basis for genetic algorithms; applications to function optimization, system identification, robotics, control, games, economics, neural network design, pattern recognition, design, genome and protein sequence analysis; genetic classifier systems; implementation on parallel computer architectures; genetic classifier systems; cellular encoding; evolving assembly code.

3 units, Aut (Koza) TTh 1:15-2:30 alternate years, not given 1996-97

427. Algorithms and Representations for Molecular Biology — (Same as Medical Information Sciences 214.) Introduction to basic computational issues and methods used in molecular biology. Use of biological data sources on World-Wide-Web and CD-ROM. Topics: basic algorithms for alignment of biological sequences and structures and advanced representational and algorithmic issues in structure and sequence computation (e.g., dynamic programming algorithms for alignment, structural superposition algorithms, simplified representations, probabilistic representations of structural uncertainty, hidden Markov models, Bayesian networks, statistical feature detection, genetic algorithms, constraint satisfaction, and minimum description length encoding.) Guest lectures on computational approaches pursued by research groups at Stanford. Prerequisites: 109B and Math. 103 or equivalents. Recommended: familiarity with biology.

3 units, Spr (Altman, Koza) TTh 1:15-2:45

441. Topics in ADA Programming — The ADA language is used as an example for discussing current research in high-level languages for programming large and distributed systems. Related developments in specification languages. Part 1 (ADA language design and programming techniques): multi-task programming, compilation algorithms for tasking, runtime supervisors for distributed systems in ADA, detection of concurrency error: 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

443. Design and Prototyping Languages — (Enroll in Electrical Engineering 418.)

3-4 units, Win alternate years, not given 1996-97

446. Tools and Processes for Software — Specification, design, coding and acquisition, integration, operational test, maintenance, adaptation, and reuse. Allocation of system functions and responsibilities. Waterfall, spiral, object, domain-specific, mega, and formal design and maintenance models. Evaluation and metrics. Future directions. Prerequisites: prior software experience; graduate standing or consent of instructor.

3 units, Aut (Wiederhold) MW 3:15-4:30

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.)

1-4 units, Aut, Win, Spr

522. Artificial Intelligence Seminar — Weekly series of informal talks on a variety of AI-related topics: new ideas, research in progress, project overviews, technology transfer, business implication, social issues.

1 unit, Win (Staff) F 12:05-1:15

523. Readings in Artificial Intelligence — Primarily intended for students planning to take the AI qualifying exam. A series of lectures and discussions on readings in all areas of artificial intelligence research. Prerequisite: 221.

3 units, Win (Staff)

525. Seminar on Knowledge Acquisition for Expert Systems — (Enroll in Medical Information Sciences 230)

2 units, Spr (Musen)

526. Topics in Perception — (Enroll in Psychology 266.)

1-2 units, not given 1995-96

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.
1-2 units, Aut (Khatib) M 4:15

530. Applied Mathematics/Scientific Computing Seminar
   1-3 units, Aut, Win, Spr (Staff) F 3:30-4:30

531. Numerical Analysis/Scientific Computing Seminar
   1-2 units, Aut, Win, Spr (Staff) MT 4:15-5:30

540. Seminar on Computer Systems — (Enroll in Electrical Engineering 380.)
   1 unit, Aut, Win, Spr

544. Mobile Computing Seminar — Weekly readings and informal discussions on current research in mobile and wireless computing. Students present recent papers to the group and give their opinions about research material. Invited speakers from Stanford and elsewhere lecture on topics of current interest. Prerequisites: 240B, 244B.
   1-2 units (Baker) not given 1995-96

545. Database Research Seminar — Presentations of current research and industrial innovation. Emphasis on discussion and evaluation. Topics: database models, knowledge bases, high performance algorithms, large and distributed databases, application of artificial intelligence techniques to databases, and architecture of future information systems.
   1 unit, Aut, Spr (Staff) F 3:15

547. Human-Computer Interaction Seminar — Weekly speakers on topics related to human-computer interaction design.
   1 unit, Aut, Win, Spr (Winograd) F 12:30-2

548. Distributed Systems Research Seminar — Primarily for Ph.D. students and other researchers in these areas. Recent research in distributed operating systems, computer communications, parallel machines, parallel programming, and distributed applications. Invited speakers from Stanford and elsewhere present topics and results of current interest.
   1 unit, Spr (Cheriton) Th 4:15

559. Seminar on Mathematical Theory of Computation — Possible topics (vary each year): logic and its relation to computation, programming language analysis and design, specification and verification of software and hardware systems, theories of concurrency, approaches to static analysis and program state. Invited speakers present recent results and summaries of articles from the current literature.
   1 unit, Spr (Mitchell) by arrangement
Consulting Professors: Shojiro Asai, Charlie C. Bass, Timothy Bell, Bruce Delagi, Abbas Emami-Naeini, Dale Harris, Else Kooi, Robert L. Kosut, Franklin Kuo, David Leeson, David Liddle, Roger D. Melen, Madhav Narasimha, Yoshio Nishi, Kurt Petersen, Richard Reis, Donald Scharfetter, Arden Sher, Martin Walt

Consulting Associate Professors: Norman P. Jouppi, Mark Linton, Stephen Lundstrom, Praghatkar Raghaven, Noel P. Thompson, Brent Townshend, David B. Tuckerman, David Ungar

Consulting Assistant Professors: Fung Fung Lee, Nadim Maluf, Yi-Ching Pao, Nirmal Saxena, Yuri Taranenko

Visiting Professors: Carl N. Berglund, Sigurd Meldal, Martin Morf

Visiting Associate Professors: Yuval Bistritz, Hiroaki Kobayashi, Samiha Mourad, Costas Spanos

Visiting Assistant Professor: Yoshitaka Okada

* On leave one or more quarters.

UNDERGRADUATE PROGRAMS

To specialize in Electrical Engineering (EE), undergraduate students should follow the depth sequence given in the discussion of undergraduate programs in the “School of Engineering” section of this bulletin.

Majors must receive at least a 2.0 average letter grade indicator (LGI) in courses taken for the EE depth requirement.

Note that a Stanford undergraduate may work simultaneously toward the B.S. and M.S. degrees. See the “School of Engineering” coterminal section of this bulletin.

GRADUATE PROGRAMS

The profession of electrical engineering demands a strong foundation in physical science and mathematics, a broad knowledge of engineering techniques, and an understanding of the relation between technology and man. Curricula at Stanford are planned to offer the breadth of education and depth of training necessary for leadership in the profession. To engage in this profession with competence, four years of undergraduate study and at least one year of postgraduate study are recommended. For those who plan to work in highly technical development or fundamental research, additional graduate study is desirable.

A one-year program of graduate study in electrical engineering may lead to the degree of Master of Science. A two-year program, offering a wider selection of engineering course work, more opportunity for study in the related fields of physics, mathematics, and engineering, and in particular, more independent work and individual guidance, may lead to the degree of Engineer.

The degree of Doctor of Philosophy is offered under the general regulations of the University. The doctoral program, requiring a minimum of three years (nine quarters) of graduate study, should be considered by those with the ability and desire to make a life work of research or teaching.

APPLICATION FOR ADMISSION

Applications for admission with graduate standing in Electrical Engineering (EE) may be obtained by writing to Graduate Admissions, the Registrar’s Office, Old Union, Stanford, CA 94305 or by calling 415-723-4291. Applications are submitted to and reviewed by the Department of Electrical Engineering. Applications for full time study are considered for the Autumn Quarter only. The application deadline is January 7.

Applicants who have not yet earned the equivalent of an M.S. degree should apply for admission to study first toward the master’s degree, indicating any intention of later working toward a more advanced degree. Admission for either the Engineer or Ph.D. degree is normally available only to students who have completed a master’s degree. In addition, candidacy to the Ph.D or Engineer degree also requires that the department Committee on Graduate Admissions identify a tentative faculty research supervisor.

MASTER OF SCIENCE

University regulations governing the M.S. degree are described in the “Graduate Degrees” section of this bulletin.

Modern electrical engineering is a broad and diverse field, and graduate education in this department may satisfy a variety of objectives. Students with undergraduate degrees in physics, mathematics, or related sciences, as well as in various branches of engineering, are invited to apply for admission. They will ordinarily be able to complete the master’s degree in one calendar year. Students with undergraduate degrees in other fields may also be admitted for graduate study (see below).

The master’s degree program may provide advanced preparation for professional practice or for teaching on the junior college level, or it may serve as the first step in graduate work leading to the degree of Engineer or Ph.D. The faculty does not prescribe specific courses to be taken. Each student, with the help of a program adviser, prepares an individual program and submits it to the faculty for approval. The master’s program proposal must be submitted to the department office during the first quarter of graduate study; modifications may be made later. Supplementary information sheets of detailed requirements,
programs of at least 45 quarter units that meet the following guidelines are normally approved:

1. A sequence of three or more graded electrical engineering courses numbered above 200, to provide depth in one area. The student must maintain an average 3.0 letter grade indicator (LGI) or better in both the depth area and overall.

2. At least one EE course numbered above 200 in each of three additional course areas, outside of the area selected under item 1 to provide breadth.

3. Enough additional units of electrical engineering courses so that 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 conflicts, tapes of these classes can be viewed in the Terman Library.

Capable students without formal undergraduate preparation in electrical engineering may also be admitted for graduate study. Such students may have graduated in any field and may hold either the B.S. or A.B. degree. Each student, with the help of an adviser, prepares a program of study to meet his or her particular needs and submits it to the faculty for approval. A student with adequate preparation in mathematics through calculus and college physics including electricity can usually complete the M.S. degree requirements within two academic years. A student with some additional preparation in electrical engineering may be able to complete the M.S. requirements in only one academic year.

Graduate study in electrical engineering demands that students be adequately prepared in circuits, digital systems, electronics, fields, laboratory work, mathematics, and physics. Skill in using modern computing facilities is essential for electrical engineers, and an increasing number of our courses routinely require it. Skill should be acquired early in the program, either by taking one of the regular computer science courses or one of the special "short courses" given by the Computation Center or by self-study.

It is the student's responsibility, in consultation with an adviser, to determine whether the prerequisites for advanced courses have been met. Prerequisite courses ordinarily taken by undergraduates may be included as part of the graduate program of study. However, if the number of these is large, the proposed program should contain more than the typical 45 units, and the time required to meet the degree requirements may be increased.

Permission to study beyond the M.S. degree must be obtained from the department (if possible, well before the M.S. degree is received). The student needs to file a Graduate Program Authorization Petition. Permission is predicated on the applicant's academic record, performance in independent work, potential for advanced study, and on the ability of the faculty to supervise such study.

ENGINEER

The degree of Engineer requires a minimum of two academic years (90 quarter units) of study beyond the B.S. degree (three academic quarters beyond the M.S.) including six full-time quarters of approved work as a graduate student (of which a minimum of three quarters and 36 quarter units must be in residence at Stanford).

Work toward the degree of Engineer in Electrical Engineering normally includes the requirements for work toward the master's degree in Electrical Engineering, including qualifications for admission.

An additional year allows time for a broader program, or a more concentrated program, or whatever arrangement may seem suitable to the candidate, his adviser, and the department. Advanced study at other universities, or in other departments at Stanford, may be allowed within the foregoing consideration. The equivalent of approximately one quarter is devoted to independent study and thesis work with faculty guidance. The thesis is often of the nature of a professional report on the solution of a design problem. The degree of Engineer differs from the Ph.D. in that it prepares for professional engineering work rather than theoretical research. The candidate may select courses that are suitable for either the degree of Engineer or the Ph.D. degree and decide later which program to pursue.

The best procedure for the applicant to follow is (1) if now working toward the Stanford M.S. degree in Electrical Engineering, request permission to continue graduate studies beyond the master's degree, using the Graduate Program Authorization Petition form obtained from the Department of Electrical Engineering office, or (2) if not planning to receive the Stanford M.S. degree in Electrical Engineering, apply for admission to the Department of Electrical Engineering as a candidate for the degree of Engineer.
During the first quarter of work beyond the M.S. degree, formal application for admission to candidacy for the degree of Engineer is made on a form that can be obtained from the department office. The program of study is prepared by the student with the help of the thesis adviser and submitted to the academic secretary for approval. The form should contain a list of all graduate courses completed at Stanford and elsewhere and all courses yet to be completed.

DOCTOR OF PHILOSOPHY

A complete statement regarding the Ph.D. degree is found in the "Graduate Degrees" section of this bulletin.

Admission to a graduate program does not imply that the student is a candidate for the Ph.D. degree. Advancement to candidacy requires superior academic achievement, satisfactory performance on a qualifying examination, and sponsorship by two faculty members. Enrollment in Electrical Engineering 391, Special Studies, is recommended as a means for getting acquainted with a faculty member who might be willing to serve as a supervisor.

Not later than the first Autumn Quarter after receiving the M.S. degree, the applicant should submit an application to take the department qualifying examination (given each Winter Quarter). Upon successful completion of the qualifying examination and after securing agreement by two faculty members to serve as dissertation advisors, the student should file an Application for Doctoral Candidacy. Only after receiving department approval to that application does the student become a candidate for the Ph.D. degree.

Requirements may be summarized as follows. The student must complete successfully (1) a minimum of three years of residence with graduate standing, two years of which must be in residence at Stanford; (2) one or more qualifying examinations given by the faculty of the Department of Electrical Engineering; (3) an approved program of courses in electrical engineering and allied subjects; (4) an approved topic of research and a written dissertation, based on research, which must be a contribution to knowledge; (5) an oral examination that is a defense of dissertation research and is taken near the completion of the doctoral program.

About one-fourth of the program of graduate study should be in departments other than Electrical Engineering. Courses shall be selected to form an integrated program, to be approved by the department. A student wishing to fulfill the requirements for a formal minor may elect to do so.

Ph.D. MINOR

For a minor in Electrical Engineering, the student must fulfill the M.S. depth requirement, complete a total of at least 20 units of course work at the 200-plus level in electrical engineering (of which 15 units must be graded) and be approved by the department’s Ph.D. Degree Committee. A letter grade indicator (LGI) of at least 3.35 on these courses is required.

FINANCIAL ASSISTANCE

The department annually awards a limited number of fellowships and teaching and research assistantships to incoming graduate students. The fellowships are usually awarded only to first-year graduate students in the EE Master of Science program. Most awards to Engineer and Ph.D. candidates are research assistantships, which are awarded by individual faculty research supervisors working in conjunction with the department Committee on Graduate Admissions. Research assistants are normally able to write their theses as an integral part of the assistantship.

THE HONORS COOPERATIVE PROGRAM

Many of the department’s graduate students are supported by the Honors Cooperative Program, which makes it possible for academically qualified engineers and scientists in nearby companies to be part-time graduate students in Electrical Engineering while continuing nearly full-time professional employment. See the “School of Engineering” section of this bulletin.

AREAS OF RESEARCH

Candidates for advanced degrees participate in the research activities of the department as paid research assistants or as students of individual faculty members. At any one time, certain areas of research have more openings than others. A new applicant should express a second choice of research interest in the event that there are no vacancies in the primary area of interest. At present, faculty members and students are actively engaged in research in the areas listed below.

COMPUTER SYSTEMS

Asynchronous Circuits
Compilers
Computer-Aided Design
Computer Architecture
Computer Graphics
Computer Networks
Computer Organization
Computer Reliability
Concurrent Languages
Concurrent Processes and Processors
Database and Information Systems
Distributed Systems
Hardware Verification
Human Computer Interaction
Multimedia Systems
Operating Systems
Performance Measurement and Modeling
Programming Languages
Program Verification
Software Engineering
VLSI Design

INFORMATION SYSTEMS
Adaptive Control and Signal Processing
Adaptive Neural Networks
Biomedical Signal Analysis
Computer-Aided Design and Analysis of Systems
Cryptography and Data Security
Data Communications
Digital Signal Processing
Estimation Theory and Applications
Fourier and Statistical Optics
Information and Coding Theory
Medical Imaging and Image Processing
Multivariable Control
Optical Communications
Optimization-Based Design
Pattern Recognition and Complexity
Quantization and Data Compression
Real-Time Computer Applications
Signal Processing Algorithms and Architectures
Speech and Image Coding

INTEGRATED CIRCUITS
Analog Integrated Circuits
Bipolar, MOS, and Other Device and Circuit Technologies
CAD of Processes, Devices, and Equipment
Custom Integrated Circuits for Computers and Telecommunications
Digital Integrated Circuits
Integrated Sensors and Actuators
Mixed Signal Integrated Circuits
Nanostructures
Optoelectronic Integrated Circuits
Process, Device, Circuit, and Equipment Modeling
Sensors and Control for VLSI Manufacturing
VLSI Device Structures and Physics
VLSI Fabrication Technology
VLSI Materials, Interconnections, and Contacts
VLSI Packaging and Testing

LASERS AND QUANTUM ELECTRONICS
Coherent UV and X-Ray Sources
Free-Electron Lasers
Laser Applications in Aeronautics, Biology, Chemistry, Communications, Electronics, and Physics
Laser Devices and Laser Physics
Nonlinear Optical Devices and Materials
Optoelectronic Devices
Photoacoustic Phenomena

Semiconductor Diode Lasers
Ultrafast Optics and Electronics

MICROWAVES, ACOUSTICS, AND OPTICS
Acoustic Microscopy
Acousto-Optic Devices
Fiber Optics
Holography
Microwave Integrated Circuits and Devices
Nondestructive Testing
Optical Interferometry
Scanning Optical Microscopes

SOLID STATE
Applied and Fundamental Superconductivity
Crystal Preparation: Epitaxy and Ion Implantation, and Molecular Beam Epitaxy
Defect Analysis in Semiconductors
Electron and Ion Beam Optics
Electron Spectroscopy
Experimental Determination of the Electronic Structure of Solids
High Resolution Lithography
Laser, Electron, and Ion Beam Processing and Analysis
Magnetic Information Storage
Magnetic Materials Fundamentals and Nanostructures
Nanostructure Fabrication and Applications
Molecular Beam Epitaxy
Novel Packaging Approaches for Electronic Systems
Optoelectronic Devices
Physics and Chemistry of Surfaces and Interfaces
Semiconductor and Solid State Physics
Solid State Devices: Physics and Fabrication
Ultrasmall Electron and Photodevices

SPACE PHYSICS AND RADIOISCIENCE
Detection of Electromagnetic Fields from Earthquakes
Electromagnetic Waves and Plasmas
Geomagnetically Trapped Radiation
Ionospheric and Magnetospheric Physics
Ionospheric Modification
Lightning Discharges
Lightning-Ionosphere Interactions
Planetary Exploration
Radio Wave Scattering
Remote Sensing of Atmospheres and Surfaces
Space Engineering (also see the "Space Science and Astrophysics" section of this bulletin)
The Electrodynamic Tether Experiment on the Space Shuttle
Ultra-Low Frequency Fluctuations of the Earth's Magnetic Field
Very Low Frequency Wave Propagation and Scattering
TELECOMMUNICATIONS AND SPACE INFORMATION SYSTEMS

Applied Optics and Optoelectronics
Cellular Radio Systems/Networks
Channel Assignment/Handoff
Coherent Optical Communications
Communication Channels
Digital Telephone Switching
Frequency Reuse in Large Wireless Systems
High Performance Digital Signal Processing
Mobility Issues in Large Networks
Multiple Access Techniques
Multipath Mitigation Techniques
Optical Fiber Communications
Optical Networks
Optoelectronic Components and Systems
Propagation in and around Buildings
Radar Signal Processing
Radiating Systems
Satellite Communication Stations
Search for Extraterrestrial Intelligence
Space Data Management
Telephone and Data Networks
Underwater Communications
Voice Signal Processing
Wavelength Division Multiplexing
Wireless Local Area Data Networks
Wireless Personal Communication Systems

COURSES

Electrical engineering courses are numbered according to the year in which the courses are normally taken.

20–99 first or second year
100–199 third or fourth year
200–299 mezzanine course for advanced undergraduates or graduates
300–399 first graduate year
400–499 second or third graduate year
600–799 special summer courses

The Department of Electrical Engineering (EE) offers courses in the following areas:

Computer Hardware
Computer Software Systems
Control and Systems Engineering
Digital Communication
Electronic Circuits
Electronic Devices, Sensors, and Technology
Fields and Waves
Information Theory and Coding
Lasers, Optoelectronics, and Quantum Electronics
Network Systems
Optics, Imaging, and Communications
Radioscience
Signal Processing
Space and Radio Science
Solid State Materials and Devices
Transmission Systems and Telephony
VLSI Design

UNDERGRADUATE

100. Seminar —Discussion of special topics of interest to electrical engineering undergraduates: research in EE, the department, graduate schools, career opportunities.
1 unit, Aut (Flynn) M 4:15

4 units, Win (Boyd) MWF 9

3 units, Aut (Boyd) MWF 11


106. Planetary Exploration —The other worlds of our solar system as revealed by recent space missions. Comparative properties of the terrestrial and Jovian planets; planetary atmospheres, surfaces, interiors, and rings; planetary and satellite orbits and spacecraft trajectories, orbital perturbations; properties of the interplanetary gas, dust, comets, and meteorites. What the planets can tell us about potential terrestrial catastrophes (acid rain, ozone depletion, nuclear winter, runaway greenhouse, collision with an asteroid or large comet). Origin and evolution of planetary systems. Remote sensing from spacecraft at radio, infrared, light, and ultraviolet wavelengths. U.S. and Russian space programs and their comparative engineering and scienc-
tific aspects. Prerequisite: one year of college engineering, mathematics, or physics.

3 units, Spr (Staff) 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.

4 units, Aut (Plummer) MWF 10

plus one hour by arrangement

112. Electronics II — Basic operating principles and device equations for p-n junction diodes and bipolar junction transistors. Basics of transistor amplifier design using bipolar transistors. Weekly one hour recitation session by arrangement. Prerequisites: 101, 111.

4 units, Win (Plummer) MWF 11

113. Electronic Circuits — Design of single and multistage amplifiers using operational amplifiers and discrete transistors. Bipolar transistor design is emphasized. Frequency response and feedback principles are introduced and applied. Prerequisites: 102, 112.

3 units, Aut (Kovacs) MWF 10

Spr (Dutton) MWF 10

121. Digital Design Laboratory — Introduction to digital circuits and their applications. Topics: measurement techniques, logic families, switching speed, Boolean algebra, state machines, computer-aided design, logic simulation, digital data transmission, analog and digital converters, and digital displays. Prerequisite: Engineering 40.

3 units, Win (Gill)

Spr (McKeown) TTh 1:15

three-hour lab weekly by arrangement

122. Analog Laboratory — Design and testing of analog circuits. Transistor amplifier with feedback; discrete components differential amplifier; op-amps and their applications; active filters and oscillators; regulated power supplies; power amplifiers. Corequisite: 113.

3 units, Aut (Staff) TTh 9:30-10:20

Spr (Kovacs) MW 3:15

three-hour lab weekly by arrangement

133. Analog Communications Design Laboratory — Design and testing of analog communications circuits including applications. Amplitude modulation (AM) using discrete multiplier circuits and fully integrated implementations. Phase and Frequency Modulation (FM) based on discrete and integrated modulator circuits such as voltage-controlled oscillators (VCOs), Phased-Lock Loop (PLL) techniques, characterization of key parameters and their applications, e.g., in modems. Lectures on practical aspects of circuit implementations. Labs involve the systematic building and characterization of AM, FM and PLL circuits and subsystems. Enrollment limited to 40 undergraduate and coterminal EE students. Prerequisite: 122.

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

137. Laboratory Electronics — (Enroll in Applied Physics 207.)

138. Laboratory Electronics — (Enroll in Applied Physics 208.)


4 units, Aut (Kino) MWF 8:35-9:50

Win (Inan) MWF 11-12:15


3 units, Spr (Inan) MWF 9

144. Electromagnetic Waves Design Laboratory — Lecture, lab, and design project. Introduction to hands-on field and wave engineering for wireless communications and remote sensing. Uses simple, inexpensive lab equipment as a front end to the personal computer. Measurement and design capability in 1-20 GHz range in support of design project. Two- to three-person team projects from antenna, guided wave distributed circuits, remote sensing, or related topics. Working model constructed and demonstrated; some funding available for project costs. Prizes for best projects. Prerequisites: 122, 142.

3 units, Win (Leeson) MW 10

three hour lab weekly by arrangement

181. Introduction to Computer Systems and Assembly Language Programming — (Enroll in Computer Science 110.)

182. Computer Organization and Design — Basic computer organization. Computer components: memory systems including caches, computer arithmetic, processors, controllers, input/output, buses, DMA. Data formats, addressing modes, instruction
sets, and microcode. Study of the design of a small computer. Prerequisites: Engineering 40, Computer Science 110. Recommended: 121 or equivalent.

4 units, Aut (Hennessy) TTh 9:30-10:45
Win (Gupta) TTh 1:15-2:30

183. Advanced Logic Design Laboratory — Experiments in digital logic design using TTL, integrated circuits, MSI and LSI registers and ALUs, Programmable Gate Arrays, and PLAs. Choice of projects 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. Co- or prerequisites: 121, 182.

3 units, Aut, Spr (Staff) MWF 8
Win (Olukotun) MWF 8
four-hour lab by arrangement

184. Programming Paradigms — (Enroll in Computer Science 107.)

188. Concurrent Programming — (Enroll in Computer Science 140.)

189A. Object-Oriented Systems Design — (Enroll in Computer Science 108.)

189B. Software Project — (Enroll in Computer Science 194.)

190. Special Studies or Projects in Electrical Engineering — Independent work under the direction of a faculty member. Individual or team activities involving lab experimentation, design of devices or systems, or directed reading.

by arrangement

191. Special Studies and Reports in Electrical Engineering — Independent work under the direction of a faculty member given for a letter grade only. If a letter grade given on the basis of required written report or examination is not appropriate, student should enroll in 190.

by arrangement

192. Special Seminars — Special seminars and experimental courses are given on topics of current interest by specialists in the field. Announcements are made one or two quarters prior to presentation. See Time Schedule and bulletins in the department office for current listing.

by arrangement

UNDERGRADUATE AND GRADUATE

201. Seminar — Weekly discussions of special topics of current interest in electrical engineering. Autumn Quarter: orientation to Stanford and to the EE department. Winter Quarter: prepare for life after the M.S. degree, in industry or as Ph.D. students. Speakers from faculty, students, and outside. Students with a conflict may arrange to view seminar via videotape in the library.

1 unit, Aut (Reis) 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

203. The Entrepreneurial Engineer — Seminar forers the knowledge base of prospective entrepreneurs with an engineering background. Contributions made to the business world by engineering graduates. Speakers include Stanford (and other) engineering and M.B.A. graduates who have 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

205. Introduction to Control Design Techniques — (Enroll in Engineering 205.)

206. Control System Design and Simulation — (Enroll in Engineering 206.)

209. Nonlinear Control — (Enroll in Engineering 209.)

212. Integrated Circuit Fabrication Processes — For students interested in IC design and the influence of fabrication processes or intending to pursue doctoral research involving use of Stanford’s IC laboratory. The process simulator SUPREM is used to gain hands-on “virtual” lab experience. Topics: fundamental principles of integrated circuit fabrication processes, physical and chemical models for crystal growth, oxidation, ion implantation, etching, deposition, lithography and metallization; the interactions of IC layout and processing for bipolar and MOS devices in the context of the Stanford BiCMOS process. Required for 410. Prerequisite: 112 or equivalent.

3 units, Aut (Saraswat) TTh 1:15-2:30


3 units, Aut (Lee) MWF 10

216. Principles and Models of Semiconductor Devices — Fundamentals of carrier generation, transport, recombination, and storage in semiconduc-
...tors. Physical principles of operation of the p-n junction, metal semiconductor contact, bipolar junction transistor, MOS capacitor, MOS and junction field-effect transistors, and related devices such as CCDs and solar cells. First-order device models that reflect physical principles and are useful for integrated-circuit analysis and design. Prerequisites: 111, 112, or equivalent.

3 units, Aut (Wong) MWF 2:15

217. Electron and Ion Beams for Semiconductor Processing — Focused and flood beams of electrons and ions are employed for processing semiconductor devices. Part I: the generation of such beams including thermionic emission, field-induced emission, first-order focusing and glow discharge processes. Part II: the interactions of such beams with the target including scattering in solids, the distribution of energy, heating, sputtering, beam-induced etching (including reactive-ion etching) and beam-induced deposition. Introduction to computer modeling of etching and deposition. Prerequisite: 212 or equivalent.

3 units, Spr (Pease) MWF 8 alternate years, not given 1996-97

218. Semi-Custom VLSI Systems — Introduction to the design, architectures, and design automation of semi-custom integrated circuits. Hands-on experience in designing and prototyping a board level system using semi-custom VLSI. Topics: semi-custom design methodology; macro library, design entry and synthesis, simulation, automated placement and routing, and testing; performance optimization for macro library-based design; packaging; architectures of sea of gates, programmable logic arrays, and FPGAs. Prerequisites: basic knowledge of digital systems, logic design at the level of 182 and CMOS circuits at the level of 112, or consent of instructor.

3 units, not given 1995-96

228. Basic Physics for Solid State Electronics — Intended as a prerequisite for graduate-level courses in physics of solid state devices. Topics: review of classical kinetic theory, introduction to statistical mechanics and to the band theory of solids. Prerequisite: Physics 70 or any course in modern physics.

3 units, Aut (J. Harris) TTh 2:45-4

229B. Thin Film and Interface Microanalysis — (Enroll in Materials Science and Engineering 323.)

229D. Introduction to Magnetism and Magnetic Materials — (Enroll in Material Sciences and Engineering 347.)

231. Lasers I — Introduction to lasers and how they work, including quantum transitions in atoms, stimulated emission and amplification, rate equations, saturation, feedback, coherent optical oscillation, laser resonators, and optical beams. Limited primarily to steady-state behavior; uses classical models for atomic transitions with little quantum mechanics background required. Prerequisites: electromagnetic theory to a level of at least 142, preferably 241, and some knowledge of atomic or modern physics such as Physics 57, 130-131.

3 units, Aut (Siegman) MWF 3:15

232. Lasers II — Continuation of 231 emphasizing dynamic and transient effects, including spiking, Q-switching, mode locking, frequency modulation, frequency and spatial mode competition, linear and nonlinear pulse propagation, short pulse expansion and compression. Prerequisite: 231.

3 units, Spr (Siegman) MWF 9

238. Electrical and Magnetic Properties of Solids — (Enroll in Materials Science and Engineering 199/209.)

239A. Solid State Physics: Survey — (Enroll in Applied Physics 372.)

239B. Solid State Physics: Continuation — (Enroll in Applied Physics 373.)

239C. Photoelectronic and Photovoltaic Materials and Devices — (Enroll in Materials Science and Engineering 332.)

241. Waves I — Introduction to waves and wave phenomena as they appear in different natural, lab, and application settings. Electromagnetic, acoustic, seismic, atmospheric, plasma, and water waves and their mathematical and physical correspondence in terms of Hamilton's principle. Propagation, attenuation, reflection, refraction, surface and 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 are minimized to stress basic wave concepts common to diverse fields of application. 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 (Staff) MWF 9

242. Waves II — Continuation of 241, emphasizing fundamental topics in EM theory for further study and application of microwave, optical, or plasma phenomena. Plane, cylindrical, and spherical waves and boundary value problems; radiation and reciprocity: wave guides, fiber optics, and cavity resonators. Uniaxial and gyrotropic anisotropic media with magnetoeionic plasma, and ferrite applications. Resonators. Perturbation theories, attenuation, and energy conservation. Prerequisite: 241 or 142.

3 units, Win (Kino) MWF 10

243. Integrated and Fiber Optics — Introduction to the basic operating principles and applications of the state-of-the-art integrated and fiber optics components. Topics: LiNbO3 optical switches and modulators, Si optical benches, semiconductor quantum
well modulators, and optical fiber designs. Analysis of optical modes and coupling between various optical guides. Applications in communications. Prerequisite: 241.

3 units, Spr (Chang-Hasnain) MW 12:50-2:05

244. Communication Engineering Transmission Systems — Design of transmission systems for television, telephone and data-using satellites, microwave repeaters, mobile radio, and broadcast transmitters. Performance of FM, AM, SSB common digital schemes and spread-spectrum modulation, time, frequency, and code multiplexing. Emphasis on link performance, capacity, total system design, and cost optimization. Current industry design problems and research results. Prerequisite: senior or graduate standing in Electrical Engineering, or consent of instructor.

3 units, Aut (Lusignan) MWF 2:15

246. Microwave Engineering — Coherent development of the concepts and applications of distributed circuits. Emphasis on MIC structures (microstrip, coplanar waveguide, slotline, finline, and image line) capable of transmitting millimeter wave analogue signals and picosecond pulses. Modal properties (TEM, quasi-TEM, TE, TM) of general guidelines. Higher order mode excitation effects at discontinuities (steps, bends, etc.) and junctions are modeled by lumped equivalent circuits, using Z-Y-S-matrix representations. Dispersion, attenuation, and distributed source excitation in distributed circuits. Analysis of circuit components (impedance transformers, directional couplers, hybrids, circulators, filters, solid state amplifiers). Illustrations of IC circuit structures. Computer-aided design principles. Recommended: 142 or equivalent.

3 units, Aut (Inan) MWF 10


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


3 units, Aut (Yamamoto) TTh 11:12-15

249. Electromagnetic Probing of the Space Environment — Experimentation in the near-earth space environment, using radio and other electromagnetic waves and electric and magnetic instrumentation on space probes. Tools used, including transmitters, antennas, receivers, sensors, radars, and displays. The earth’s ionosphere, magnetosphere, and interplanetary space. The role of the sun, and the effects produced by changes in solar activity. Geoelectric and geomagnetic fields. Charged particle motion, trapped particles (Van Allen radiation), and the aurora. Applications to current experimental programs. Planning and execution of experiments. Prerequisites: familiarity with electromagnetics at the level of 142 and senior or graduate standing.

3 units, Aut (Fraser-Smith) MWF 1:15 alternate years, not given 1996-97

250. Communications Design Seminar — Recent developments in telecommunications research, including fiber-optic networks, high-speed switching, voice and data processing, packet radio, and satellite applications. Speakers from Stanford labs and telecommunications industry.

1 unit, Aut, Spr (D. Harris) T 4:15


3 units, not given 1995-96

254. Principles of Radar Systems — Analysis and design, emphasizing radars as systems. Radar equation and systems parameters, components of radar systems, radar cross-section and target characteristics, signal detection in noise, ambiguity function (with applications to measurement precision, resolution, clutter rejection, and waveform design); pulse
Elements of computer-aided circuit analysis and layout techniques. Prerequisites: 112; familiarity with circuits, logic, and digital systems.

3 units. Aut (Horowitz) TTh 2:45-4
Spr (DeMicheli) MW 11-12:15

272A. Design Projects in VLSI Systems — For students with research and applications interest in VLSI systems. Working in teams of two, students complete modest-sized CMOS chip of their own design. Project includes writing a functional model (in Verilog), using synthesis tools, custom layout, and simulation. Overview of the issues involved in VLSI design. Topics: design tools and techniques, complexity management, clocking issues, layout and floorplanning, design of large array structures, testing and testability issues. Prerequisites: 271, experience with digital design.

4 units. Win (Horowitz) TTh 1:15-2:30
lab by arrangement

272B. Testing and Simulation of VLSI Systems — Continuation of 272A, simulating, testing, and elaborating projects designed in 272A. Students functionally simulate and test projects and report the results. Additional credit for more extensive work by arrangement. Lectures include simulation and testing techniques used in the lab. Prerequisite: completing the 272A design project.

2 units. Spr (Horowitz) TTh 9:30-10:45
lab by arrangement


3 units, Spr (Cox) MWF 10

278. Introduction to Statistical Signal Processing — Random variables, vectors, and processes; time averages, expectations, and laws of large numbers; stationarity, autocorrelation and spectral analysis; linear filtering of random processes; independent increment, Gaussian, and Poisson random processes. Prerequisites: 102 or 261, Statistics 116.

3 units. Aut (Gray) MWF 10
Spr (El Camal) MW 2:15-3:30

279. Introduction to Communication Systems — Analysis and design of communication systems;
analog and digital modulation and demodulation, frequency conversion, sampling, multiplexing, noise and quantization; spectral and signal-to-noise ratio analysis. Prerequisites: 102 or 261, 278.

3 units, Win (Cox) TTh 2:45-4

280A. Biomedical Sensing and Control — Research projects in biomedical technology, sensing, signal processing, control, and computation. Previous work has produced a directional hearing aid of novel design, real-time adaptive controls for infusion of therapeutic drugs, signal processing for fetal electrocardiography, and developments for biomedical research and practice. Student teams are supervised by EE and Medical School faculty. New projects are selected by students and faculty. Prerequisite: senior or graduate status.

3 units, Win (Kovacs, Thompson, Widrow) by arrangement

280B. Biomedical Sensing and Control—Continuation

3 units, Spr (Kovacs, Thompson, Widrow) by arrangement

281. Microcomputer-Based System Design — Lectures on the architecture and design of microprocessor-based systems. Lab experiments use Motorola universal evaluation board. Individual design project required. Prerequisites: 121, 181, or equivalent.

3 units, Aut (Gill) TTh 9:30-10:45 lab by arrangement

282. Computer Architecture and Organization — Structure of systems using processors, memories, input/output (I/O) devices, and I/O interfaces as building blocks. Computer system instruction set design and implementation, including memory hierarchies and pipelining. Issues and tradeoffs involved in the design of computer system architectures with respect to the design of instruction sets. Prerequisite: 182.

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

282H. Computer Architecture and Organization (Honors) — Accelerated version of 282. Students are expected to have complete familiarity with the basics of computer implementation and control, including finite state machine control, and microprogrammed control, and be familiar with logic design and the basics of CPU performance metrics (CPI) and memory system design. Diagnostic qualifying quiz is given on the first day.

3 units, Aut (Oluokutun) TTh 1:15-2:30

283. Compilers — (Enroll in Computer Science 143.)


3 units, Win (Tobagi) TTh 9:30-10:45

285. Programming Languages — (Enroll in Computer Science 242.)

286A. Operating Systems and Systems Programming — (Enroll in Computer Science 240A.)

286B. Advanced Topics in Operating Systems — (Enroll in Computer Science 240B.)

287. Introduction to Computer Graphics — (Enroll in Computer Science 248.)


289. Introduction to Computer Vision — (Enroll in Computer Science 223B.)

290. Curricular Practical Training for Electrical Engineers — For EE majors who need relevant work experience as part of their program of study. Final report to the student’s adviser required.

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

292. Special Seminars — Special seminars and experimental courses are given on topics of current interest by specialists in the field. Announcements are made one or two quarters prior to presentation. See Time Schedule and bulletins in the department office for current listing.

by arrangement


3 units, Aut (da Rosa) MWF 3:15


3 units, Win (da Rosa) MWF 3:15

GRADUATE

300. Master’s Thesis and Thesis Research — For students who wish to do independent work under the direction of an EE faculty member as part of their master’s degree program. A written thesis is required for final letter grade. The continuing grade “N” is given in quarters prior to the thesis submission. (See 390 if a letter grade is not appropriate.)

by arrangement
310. Integrated Circuits Technology and Design Seminar — In-depth treatment of device structures, fabrication technologies, and circuit design issues in integrated circuits. Introduces current research topics in these areas.

1 unit, Aut (Lee) T 4:15
Win (Wong) T 4:15
Spr (Saraswat) T 4:15

311. Advanced Integrated Circuit Fabrication Processes — Modern MOS and bipolar devices are sensitive to fabrication techniques. How are modern devices and circuits fabricated and what future changes are likely? Advanced techniques and models of diffusion, oxidation, ion-implantation, lithography, etching, deposition, interconnected and contacts. Use of SUPREM and SPEEDIE for process modeling. MOS and bipolar process integration. Manufacturing process control. Prerequisite: 212, 216, or equivalent.

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

312. Solid-State Sensors and Actuators — Survey of solid-state sensors and actuators focusing on use of integrated circuit fabrication technology for their realization. Categories of sensors and actuators are biological, chemical, mechanical, optical, thermal, etc. Basic mechanisms of transduction, fabrication techniques, and relative merits of the different technologies. Micromachining techniques for monolithic integration of active circuits with sensors or actuators and directions for future research. Prerequisite: 212.

3 units, Win (Kovacs) MWF 1:15


3 units, Win (Kovacs) MWF 10

314. RF Circuit Design — Design of RF circuits for communications systems. Topics: the design of low-noise amplifiers at RF, passive and active filters, mixers, modulators and demodulators; review of classical control concepts necessary for oscillator design including PLLs and PLL-based frequency synthesizers. Design of high-efficiency (e.g., class E, F) RF power amplifiers, coupling networks. Behavior and modeling of passive and active components at RF. Prerequisite: 214.

3 units, Win (Lee) MWF 2:15


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

316. Advanced VLSI Devices — In modern VLSI technologies, MOS and Bipolar device electrical characteristics are sensitive to structural details and therefore to fabrication techniques. How are VLSI devices and circuits fabricated and what future changes are likely? What are the implications for device electrical performance caused by fabrication techniques? Physical models for submicron structures, control of electrical characteristics (threshold voltage, breakdown voltage, current gain) in small structures, and alternative device structures for VLSI. Prerequisites: 212, 216, or equivalent.

3 units, Spr (Wong) TTh 2:45-4

317. Microlithography — Fundamentals of exposure and development of resist patterns down to submicron dimensions. The interaction of the exposing radiation with resists and the generation of high quality images using light, x-rays, electrons, and ions. Some “hands-on” computer simulation of the exposure and development of patterns in resist. Prerequisites: 212, basic competence in computing 141 or equivalent.

3 units (Pease)
alternate years, given 1996-97

318. Computer-Aided Design of VLSI Systems — Computer-aided synthesis of digital circuits. Analysis and design of exact and heuristic algorithms and description of current CAD tools. Topics: hardware modeling and modeling languages (e.g., VHDL, Verilog); architectural synthesis and optimization methods: (scheduling, binding, data-path and control synthesis), logic synthesis and optimization for two-level and multiple-level combinational and sequential circuits; library binding. Recommended: familiarity with logic design, algorithm development, and programming.

3 units, Win (DeMicheli) MW 3:15-4:30

319. Integrated Systems Laboratory — 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). Lecture 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, 318; or consent of instructor.

3 units, alternate years, given 1996-97

322A. Basic Quantum Mechanics — Two-quarter sequence provides a firm foundation in quantum mechanics in condensed matter physics and solid-state electronics. Postulates are developed emphasizing their physical interpretation. Topics: wave mechanics, probability amplitudes, matrix mechanics, the Dirac formalism, free particles, the harmonic oscillator, angular momentum, and the hydrogen atom. Prerequisites: Physics 57 or equiva-
3 units, alternate years, given 1996-97

322B. Basic Quantum Mechanics — Development of perturbation theory, including time-dependent perturbation and the interaction of atomic systems with radiation. Identical particles, the Pauli exclusion principle and exchange. Example application; the helium atom, covalent bonding, atomic and molecular spectra, electrons in solids, quantum well devices. Prerequisite: 322A.
3 units, alternate years, given 1996-97

325. Principles of Magnetic Recording — (Enroll in Materials Science and Engineering 348.)

328A,B. Physics of Semiconductor Devices — Physical principles that govern operation of semiconductor devices and their applications in advanced semiconductor devices. Two-quarter sequence: 328A emphasizes semiconductor physics (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, e.g., heterojunction (HJ) p-n diodes, HJ-bipolar transistors, HJ-FET's electron transfer devices, and photonic devices. Examples are related to the up-to-date research carried out in lab. Prerequisites: 216, 228, and 328A (for 328B). Recommended: 238.
3 units, Win, Spr (J. Harris) MWF 10

329. The Electronic Structure of Surfaces and Interfaces — Basic physical concepts and phenomena for surface science techniques probing the electronic structure of surfaces and interfaces. Microscopic and atomic models in understanding microstructures have technologically important applications, e.g., within semiconductor device technology and catalysis. The basic physical processes of low energy electron diffraction, Auger electron spectroscopy, UV and x-ray photoemission spectroscopy, electron/photon stimulated ion desorption, inelastic tunneling spectroscopy, ion scattering, surface EXAFS, and energy loss spectroscopy; and experimental aspects of these surface science techniques. Prerequisites: Physics 70 or equivalent; 238 or consent of instructor.
3 units, alternate years, given 1996-97

331. The Science of Semiconductor Interfaces — The physics and chemistry of interfaces in semiconductor device structures at an atomic level. Metal-Insulator-Semiconductor (MOS and MIS) Systems; atomic level mechanism for traps and fixed charge; accurate derivation of band bending for accumulation, depletion, and inversion; effect of impurities and defects. Metal-Semiconductor (MES) Systems; importance of metal-semiconductor chemical reactions; mechanisms of Schottky barrier formation; mechanisms for ohmic contact formation, including tunneling, MIS diodes, and heterostructures. Interface effects in heterostructures; interdiffusion and defects. Prerequisites: any two of 216, 228, 238, 322A, 328A.
3 units, Spr (Helms) TTh 1:30-2:45
alternate years, not given 1996-97

332. Semiconductor Lasers — Overview of physical principles and characteristics of semiconductor lasers, including optical gain in bulk, quantum well, and strained quantum well materials; optical modes; characteristics and fabrication of various laser structures: broad stripe, buried heterostructure, DFB, DBR, vertical-cavity, and phase-locked arrays; dynamic behavior; gain-switching, modulation, mode-locking, and noise characteristics; laser designs for various applications. Prerequisites: 142, 216. Corequisites: 228, 231.
3 units, Aut (Chang-Hasnain) MW9:30-10:45

334. Applied Superconductivity — (Enroll in Applied Physics 334.)

3 units, Win (Wang) TTh 9:30-10:45

338A. Quantum Mechanics and Measurement — (Enroll in Applied Physics 387.)

338B. Mesoscopic Quantum Physics — (Enroll in Applied Physics 388.)

344. High Frequency Laboratory — Combination lecture/lab emphasizing the lab. Techniques in the 1MHz-1GHz range useful in designing and measuring oscillators, amplifiers, and mixers. Basic high frequency measurement techniques including s-parameter measurements. Lectures given by the professor and experts from Hewlett-Packard. (Two lectures, one lab per week.) Enrollment limited to 20. Prerequisites: good understanding of transmission lines, Smith charts.
3 units, Aut (Cox) MW 3:15-4:30
Spr (Lee) MW 3:15-4:30
lab by arrangement

346. Introduction to Nonlinear Optics — Wave propagation in anisotropic, non-linear, and time-varying media. Microscopic and macroscopic description of electric dipole susceptibilities. Free and forced waves — phasematching; slowly varying envelope approximation — dispersion, diffraction, space-time analogy; harmonic generation; frequency conversion; parametric amplification and oscillation; and electro-optic light modulation. Prerequisites: 241, 242.
3 units, Spr (S. Harris) MWF 2:15
347. Optical Methods in Engineering Science — The design and understanding of modern optical systems. Topics: geometrical optics, aberration theory, systems layout, applications such as microscopes, telescopes, optical processors. Computer ray tracing program used for class demonstrations and as a design tool. Prerequisite: 268 or 366 or equivalent.
3 units (Hesselink)
alternate years, given 1996-97

3 units, Win (Kazovsky) Th 11-12:15

349. Advanced Modern Optics — Holography (basic principles, Bragg holography); photorefractive effect (physical principles and applications); wave matter interactions (polarization effects); advanced signal processing (real-time processors, optical interconnects, holographic and associative memories.) Prerequisite: 268 or 366 or equivalent.
3 units, alternate years, given 1996-97

350. Radioscience Seminar — Seminars by university and industrial researchers on topics from space physics, planetary exploration, ionospheric and magnetospheric physics, radar and remote sensing of the environment, applied electromagnetics, waves in optical fibers and information systems with space applications. Student-faculty discussions.
1 unit, Aut (Zebker) W 4:15-5:30
Win (Inan) W 4:15-5:30
Spr (Fraser-Smith) W 4:15-5:30

351. Digital Switching in Telecommunications — Switching fundamentals, space and time switching, blocking probability analysis, rearrangeable networks, self-routing networks, fast packet switching architectures, network synchronization, signaling methods, analog and digital terminations. Prerequisite: 374 or 244, or equivalent.
3 units, Spr (Narasimha) WF 3:15-4:30

352. Electromagnetic Waves in the Ionosphere and Magnetosphere — Magnetohydrodynamic 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 (Hellwell)
alternate years, given 1996-97

353. Business Management for Electrical Engineers — Focuses on issues involved in business decision making: case method examines real situations and companies. Problems of the software industry isolated and examined. Strategic planning. Issues in management of new product development, marketing, and manufacturing. Basics of accounting and financial analysis. Provides an understanding of typical issues, the functional areas of an enterprise. Fundamental management principles, and an ability to pursue areas of interest independently. Enrollment limited to 60. Prerequisite: graduate student in Electrical Engineering or Computer Science. No auditors.
3-4 units, Win (enroll in Computer Science 394)
Spr (Liddle) MF 8:9:45

354. Introduction to Radio Wave Scattering — Integral and differential equations of radio wave scattering; exact, approximate, and numerical solutions of single particle scattering for spheres, edges, points, and cylinders. Scattering from rough surfaces with large and small roughness scales, as time permits. Multiple scattering; formulation and solution techniques for equation of transfer in discrete media and scattering by continuous media in weak and strong regimes. Applications to radar, radar astronomy, remote sensing, and biological media. Prerequisites: 241 or equivalent, and partial differential equations, or consent of instructor.
3 units (Tyler)
alternate years, given 1996-97

358A. Lasers Laboratory — (Enroll in Applied Physics 304.)

358B. Nonlinear Optics Laboratory — (Enroll in Applied Physics 305.)

361A. Modern Control Design I — (Enroll in Engineering 208B.)

361B. Modern Control Design II — (Enroll in Engineering 208C.)

fundamental value decomposition with applications. Introduction to Lyapunov theory, nonlinear systems and linearization. Introduction to linear quadratic optimal regulator and estimator. Inner product spaces, the adjoint operator, and least-squares methods. Examples and applications from digital filters, circuits, signal processing, and control systems. Prerequisites: exposure to linear algebra (Math. 103) and probability (Statistics 116). Co- or prerequisite: 278.

3 units, Aut (How) TTh 11-12:15


3 units, alternate years, given 1996-97


3 units, Win (Goodman) MW 11-12:15

367. Statistical Optics — Applications of statistical tools to a variety of problems in modern optics. First-order statistical properties of thermal and laser light, effects of partial polarization, basic definitions of coherence, propagation of mutual coherence functions, the Van Cittert-Zernike theorem, imaging with partially coherent light, imaging in random inhomogeneous media, and statistics of optical detection processes. Prerequisites: 278, 366.

3 units, alternate years, given 1996-97

368. Digital Image Processing — Topics: physical descriptions of continuous images; properties of the human visual system; sampling and quantization of image; matrix representation of image forming and image processing systems; unitary transforms; image compression enhancement, and restoration; scene matching and recognition, and applications. Demonstrations. Students write image processing algorithms. Prerequisites: 261, Statistics 116 or 278.

3 units, Spr (Gray) MWF 10
alternate years, not given 1996-97

369A. Medical Imaging Systems I — Imaging internal structures within the body using high-energy radiation studied from a systems viewpoint. Modalities covered: x-ray, computerized tomography, and nuclear medicine. Analysis of existing and proposed systems in terms of resolution, modulation transfer function, detection sensitivity, noise, and potential for improved diagnosis. Prerequisite: 261. Recommended corequisite: 366.

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

369B. Medical Imaging Systems II — Imaging internal structures within the body using non-ionizing radiation studied from a systems viewpoint. Modalities covered: ultrasound and magnetic resonance. Analysis of ultrasonic systems including diffraction and noise. Analysis of magnetic resonance systems including physics, Fourier properties of image formation, and noise. Prerequisite: 261. Recommended: 366, 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 (Cover) Th 4:15-5:30
Win (Kailath) Th 4:15-5:30
Spr (Hesselink) Th 4:15-5:30

371. Advanced VLSI Circuit Design — Overview of important issues in high performance digital VLSI design. Focus is from a systems perspective (a fast processor, DSP, etc.), CMOS, bipolar (ECL like) and BiCMOS circuits. Topics: wire modeling, logic families, latch design and clocking issues, clock distribution, RAMs, ALUs, I/O and I/O noise issues. Final project involves the design of a subsystem for a high-speed processor. Extensive use of SPICE. Prerequisites: 271, 313 or consent of instructor. Recommended: knowledge of C and C-shells.

3 units, not given 1995-96

372. Quantization and Data Compression — Theory and design of codes for quantization and signal compression systems (source coding systems), systems which convert analog or high bit rate digital signals to low bit rate signals while optimizing fidelity subject to available communication and storage capacity. Focus is theoretical and practical tradeoffs among bit rate, fidelity, and complexity in codes for quantization and compression. Topics: scalar quantization (PCM), transform and predictive codes, lossless (entropy) codes, vector quantizers designed using clustering and decision tree design algorithms, Shannon distortion-rate theory,

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


3 units, Spr (Widrow) TTh 1:15-2:30


3 units, Spr (Widrow) TTh 1:15-2:30


3 units, alternate years, given 1996-97


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


3 units, alternate years, given 1996-97


3 units, alternate years, given 1996-97


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 estimation 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 1 — Maximum-likelihood data detection, signaling methods and bandwidth requirements, bandpass systems and analysis, intersymbol interference and equalization methods, phase-locking, and synchronization. Prerequisites: 103, 278.

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

379B. Digital Communication II — Capacity calculation, cut-off rates, Viterbi Detection, convolutional codes, trellis and lattice codes, shaping codes, encoder/decoder complexity, spread-spectrum methods. Prerequisites: 278, 379A.

3 units, Spr (Cioffi) TTh 1:15-2:30
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 (Staff) TTh 2:45-4

382. Processor Design — Basic cycle time, processor area tradeoffs, and processor design studies. Vector processors, multiple instruction issue processors and shared memory multiprocessors. Queuing analysis of memory systems and I/O systems. Prerequisite: 282 or equivalent.

3 units, Win (Flynn) MWF 10

383. Advanced Compiling Techniques — (Enroll in Computer Science 243.)

384. Computer Networks: Architectures and Protocols — Objectives of computer networks: network structure and components; switching techniques (circuit- and packet-switching); network functions; layered network architectures (the ISO reference model); data link protocols (character-oriented protocols, bit-oriented protocols, error checking, window flow control, and multi-access protocols); network control (datagrams, virtual circuits, routing, and congestion control); transport and session protocols (end-to-end communication, interconnection of networks); presentation layer protocols are cited for point-to-point, satellite, packet radio, and local area networks.

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

385. Special Seminars in Computer Systems — See Computer Science 345A.

386A. Parallel Computer Architecture and Programming — (Enroll in Computer Science 315A.)

386B. Parallel Programming Project — (Enroll in Computer Science 315B.)

387. Error-Correcting Codes — Theory and implementation of codes for detection and correction of random and burst errors. Finite field theory. Linear block codes, cyclic codes, Hamming codes, fire codes, BCH codes, Reed-Solomon codes. Decoding algorithms for BCH codes. Prerequisites: some familiarity with discrete mathematics and linear algebra.

3 units, Spr (Gill) MWF 2:15

388. Programming Language Design — (Enroll in Computer Science 342.)

389. Topics in Programming Systems — (Enroll in Computer Science 349.)

390. Special Studies or Projects in Electrical Engineering — Independent work under the direction of a faculty member. Individual or team activities may involve lab experimentation, design of devices or systems, or directed reading.

by arrangement

391. Special Studies and Reports in Electrical Engineering — Independent work under direction of a faculty member; written report or written examination required. Letter grade given on the basis of the report; if not appropriate, student should enroll in 390.

by arrangement

392. Special Seminars — Special seminars and experimental courses are given on topics of current interest by specialists in the field. Announcements are made one or two quarters prior to presentation. See Time Schedule and bulletins in department office for current listing.

by arrangement

392R. Japanese Manufacturing and Technology R&D — For engineers, scientists, and managers following technology and manufacturing developments in Japan. Interdisciplinary seminar. Topics: Japanese government and industry laboratory electronics technology R&D, manufacturing, management, policy, technology development projects and practices, and computing technologies. Sponsored by the U.S.-Japan Technology Management Center, speakers from industry, academia, and government in the U.S. and Japan.

1 unit, Aut, Spr (Staff) Th 4:15-5:30


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

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.

1-15 units, Aut, Win, Spr (Gray)
by arrangement

398. Principles of Experimentation for Computer Vision — (Enroll in Computer Science 328A.)
399. Topics in Computer Vision — (Enroll in Computer Science 328B.)

400. Thesis and Thesis Research — Limited to students who have established candidacy for the degree of Engineer or Ph.D. A grade of 'S' indicates satisfactory work; no letter grade is assigned.

by arrangement

410. Integrated Circuit Fabrication Laboratory — Enrollment preference given to students pursuing doctoral research programs in which the facilities of the IC lab are used. Laboratory fabrication of silicon gate NMOS or CMOS integrated circuits. Emphasis is on practical aspects of IC fabrication, including silicon wafer cleaning, photolithography, etching, oxidation, diffusion, ion implantation, chemical vapor deposition, physical sputtering and wafer testing. Prerequisites: 212, 216, consent of instructor.

3-4 units, Win (Staff) by arrangement

418. Design and Prototyping Languages — Introduction to current advanced CAD languages, tools, and methods aimed at the rapidly expanding field of distributed and realtime systems. Hardware and software systems modeling provides a working knowledge of some of the languages and systems in current commercial use, and emerging advanced languages and methodologies that are presently in the research and experimentation phase. Emphasizes foundational principles and theories. Prerequisites: 182; Computer Science 106A, B or 242; or consent of instructors.

3-4 units, Win (DeMicheli, Luckham)
MW 12:50-2:05
alternate years, not given 1996-97


3 units, alternate years, given 1996-97

430. Solid State Laboratory Seminar — Research subjects of interest to the Solid State Laboratory. Topics: surfaces and interfaces, molecular beam epitaxy, high density storage, novel manmade electronic structures, fine line lithography, nanofabrication, optical and optoelectronic devices, high temperature superconductors, advanced semiconductor processing, and Schottky barriers. Faculty, advanced graduate students, and invited speakers from outside the University present material for discussion.

1 unit, Aut, Win, Spr (J. Harris, Pease, Wang) W 4:15-5:15

453. Geomagnetically Trapped Radiation — Charged particle trapping in planetary magnetic fields, and its importance in near-earth-space phenomena. Motion of charged particles in inhomogeneous magnetic and electric fields, adiabatic 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 1996-97

478. Special Topics in Information Theory — Advanced topics in information theory including the geometry of information, the relationship of universal data compression and universal investment theory, duality theorems for rate distortion and channel capacity, Bennett's notion of logical depth and its relation to Kolmogorov complexity, Han-Verdu capacity bounds for generating random variables, and the role of feedback in communication.

3 units, Spr (Cover) TTh 1:15-2:30
alternate years, not given 1996-97

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 1996-97

481C. Topics in Computer Graphics — (Enroll in Computer Science 348C.)

482. Advanced Computer Organization — Topics in high performance processor design focusing on pipelining, memory systems, and vector processors. Design project. Enrollment limited to 30. Prerequisites: 282, 382.

3 units, Spr (Oluokun) TTh 4:15-5:30

483. Topics in Compilers — (Enroll in Computer Science 343.)
484. **Computer Networks: Modeling and Analysis**—Network functions, architectures, and protocols; computer traffic characterization; resource sharing; packet-switched-store-and-forward networks; delay analysis, network design and optimization including capacities assignment, routing and topological design; multi-access/broadcast protocols (used in packet-switched satellite, ground radio, and local networks); fixed assignment, adaptive strategies, stability considerations and dynamic control. Prerequisite: 284. Recommended: knowledge of 384.
3 units, Spr (Tobagi) TTh 9:30-10:45

486. **Advanced Computer Arithmetic**—Number systems, floating point representation, state of the art in arithmetic algorithms, problems in design of high speed arithmetic units. Prerequisite: 282.
3 units, Aut (Flynn) TTh 11-12:15 alternate years, not given 1996-97

487. **Digital Signal Processing Architecture and Systems**—The design and implementation of signal processing systems. Survey of a variety of architectures and the tools available to automate this task. Case studies in data communications and image processing. Topics: behavioral specification and hardware simulation of signal processing systems, hardware generation using silicon compilers, dedicated architectures, programmable architectures, real-time operating systems, array processors, architecture design tools, asynchronous design, and low-power implementation. Prerequisites: 271, basic DSP concepts, C Programming language, and UNIX.
3 units, not given 1995-96

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 1996-97

3 units, alternate years, given 1996-97

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
still others have established courses similar to those of EES in other universities.

Many EES graduates have become leaders in technology-based businesses, which have an increasing need for well-educated, analytically oriented people who understand both business and technology. The EES program is attractive to engineering professionals because it enhances their technical training with the conceptual framework needed to analyze problems of production, investment, marketing, and strategic planning in a technical environment.

**APPROACH**

The basic course work is organized around a unique, coherent combination of problem solving concepts drawn from the fields of dynamics, uncertainty, optimization, economics, and decision analysis. These "portable concepts" are transferable to problems in a variety of specific areas. Students are then encouraged to broaden and enrich these skills through electives in other departments of their choice such as Business, Computer Science, Economics, Industrial Engineering, Mathematics, Operations Research, and so on.

Students benefit most from the program by acquiring first-hand experience in the capabilities of present methodology. Project courses, on-campus applied projects, and internships are available to provide this experience.

**REQUIRED BACKGROUND**

Students admitted for graduate study in EES must have a background of undergraduate work that indicates a level of mathematical problem-solving maturity customarily found in an undergraduate engineering or physical science program. A full year's college-level calculus course, a course in linear algebra, and several courses applying calculus would be minimal mathematical preparation. Some familiarity with formal proofs is strongly recommended. Students who are not adequately prepared should take suitable mathematics courses prior to taking the core courses. Those needing a review of linear algebra or calculus are advised to attend the two-week intensive workshop offered by the department just prior to Autumn Quarter. Undergraduate course work in economics is strongly recommended.

**GRADUATE PROGRAMS**

Three primary programs of study lead to the degrees of Master of Science, Engineer, and Doctor of Philosophy in Engineering-Economic Systems. In addition, the department offers a coterminous B.S./M.S. program.

Study programs should be selected to give a broad coverage as well as work in depth in one or more specific areas. The course program should include a selection of foundation material from the offerings of other departments to provide breadth.

**MASTER OF SCIENCE**

Department requirements for the M.S. degree provide great flexibility for meeting individual objectives. The master's degree may be viewed as a terminal degree program with a professional focus or as an exploratory vehicle to formulate and select a more advanced graduate program. Course programs are approved individually by the Engineering-Economic Systems (EES) faculty.

The M.S. degree requires a minimum of one academic year of study beyond the B.S. degree, although many students choose to enrich their program with an additional year's work. University regulations governing the M.S. are described in the "Graduate Degrees" section of this bulletin. The department requires a minimum of 45 units of course work with a letter grade indicator (LGI) of 2.75 in the total course program. This total must include at least 41 units of regular lecture courses, 26 units of which must be courses in EES with letter grades. Included in the EES courses must be the following core: 201A, 212A, 221A, 231A, and 241A. Additionally, students must complete at least one EES project course with a letter grade. The department does not have a thesis requirement for the master's degree. (See "Courses" below for a list of those meeting these requirements.)

Up to 16 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 "Graduate Degrees" section of this bulletin.

The department requires the student to successfully complete (1) an approved M.S. program with a 3.0 letter grade indicator (LGI), (2) 45 units beyond the M.S. degree including completion of all EES core courses with a 3.0 or better LGI, (3) approval of a thesis proposal by the thesis supervisor, (4) satisfactory oral presentation of the thesis to the thesis supervisor and one other faculty
member appointed by the department, and (5) completion and approval of the Engineer thesis by the thesis supervisor.

DOCTOR OF PHILOSOPHY

The Ph.D. degree requires a minimum of three academic years of study beyond the B.S. degree. University regulations governing the Ph.D. are described in the “Graduate Degrees” section of this bulletin.

Admission to the doctoral program does not imply that the student is a candidate for the Ph.D. degree. Only after the application for doctoral candidacy has received official department and University approval does the student become a candidate.

All students who have not already earned a master’s degree must receive the M.S. in Engineering-Economic Systems as a prerequisite to candidacy for the Ph.D. Not later than the first Autumn Quarter after receiving the M.S. degree, the student should submit an application to participate in the department qualifying procedure.

In addition to University requirements, the student must successfully complete (1) the department qualifying procedure, (2) an approved program of courses, (3) a 3.5 letter grade indicator (LGI) on the core courses (see “Courses” below), (4) an oral examination near the completion of the doctoral program, and (5) a dissertation, based on research, which must be a contribution to knowledge. The department does not have a foreign language requirement.

Ph.D. MINOR

Doctoral students throughout the University may complete a minor in Engineering-Economic Systems by taking 21 units of EES courses that include five core courses. The selection must be approved by the department adviser and by the EES academic affairs chair.

FINANCIAL ASSISTANCE AND ADMISSION

Most students in the EES doctoral program have found that, after completing the qualifying procedure, they are able to obtain financial support through a combination of research assistantships, teaching assistantships, and internships, all of which contribute directly to their educational programs as well as provide financial support. For most students, the critical period financially is the first year and one half of graduate work, when a financial commitment of about $30,000 per year is required to cover tuition and expenses.

A limited number of fellowships for first-year students are available through the department. Two other potential sources of first-year support are research assistantships and loans. However, research assistantships are, in most cases, awarded to students who have completed the qualifying procedure.

Information about loan programs and need-based aid is obtained from the Graduate Financial Support section of the Financial Aid Office.

The application forms for admission may be obtained from Graduate Admissions, the Registrar’s Office. Applications for fellowships must be made by February 15 preceding the Autumn Quarter to which admission is desired and must be accompanied by a complete application for admission. (Applications not requiring financial aid are accepted until April 15.) Research assistantships, however, are awarded by the individual faculty research supervisors, not by the department, and have no such deadline.

Except in unusual circumstances, admission to the department is limited to Autumn Quarter because courses are arranged sequentially with basic courses and prerequisites offered early in the academic year.

INTERNSHIPS

Since most complex system problems cannot be realistically duplicated within a university, some internships are available to help Ph.D. students develop the ability to solve system problems by working on real problems.

Internships may be found in large industrial firms; in companies and research groups concerned with the design, operation, and planning of complex projects and systems; and in government agencies.

The duration of an internship ranges from six to twelve months depending on the time required to successfully complete the project. Internships for international students must conform to visa restrictions. Internships are not required, but are strongly encouraged as integral parts of a Ph.D. program.

RESEARCH AND SYSTEM APPLICATIONS

It is important for students to receive experience in applying system concepts in at least one specific problem area. This experience can be gained through an internship, applied research projects, and special courses that concentrate on applying system concepts to specific areas.

The major research programs of the department are listed below. Regular and consulting faculty active in these programs are indicated.

BUSINESS AND TECHNOLOGY

(Howard, Tse)

This program focuses on the successful creation and management of high technology companies and on the use of advanced technology to change and improve the practices and the decision making processes of conventional business...
enterprises so as to secure a new competitive position in a global changing competitive environment. Research combines analytical thinking with case studies to develop fundamental principles applicable to high technology business, and to the use of advanced technology in business decisions and enterprise management.

Internship is a required and integral part of this research program. Currently internships are available at several high technology companies, consulting companies, and companies on the Pacific Rim.

Research topics in this program include product and process innovation, marketing high technology products, investment in entrepreneurship, and business reengineering.

**DECISION ANALYSIS**

(Fehling, Holtzman, Howard, Matheson, Shachter)

This program is dedicated to advancing the discipline of decision analysis by extending the theoretical foundations, increasing the effectiveness of practice, and expanding the field of application. Decision analysis is a philosophy, a body of knowledge, and a professional practice for the logical illumination of decision problems; it simultaneously considers the uncertain, dynamic, and complex consequences of a decision, as well as the assignment of value to its consequences.

Many large and important problems covering the spectrum of business, government, medicine, and law have been successfully treated by decision analysis. Applications have been made to decisions in virtually every area of human endeavor, including control of hazardous processes, research and development, business strategy, clinical medical treatment, legal settlement, and major capital investments.

The program maintains a close relationship with professional decision analysts working on major decision problems. Internships are available at several local consulting firms.

Much of the program research is conducted through the Decisions and Ethics Center directed by Professor Howard. Current research areas include (1) the design of agreements to govern the actions of several participants to a venture, (2) the development of procedures for clarifying unstructured areas of concern as a first step in formulating decision problems, (3) the analysis of decisions involving risks of injury or death, (4) the use of decision analysis in medicine, and (5) the development of efficient procedures that allow the benefits of decision analysis to be applied to a broad spectrum of applications at low cost in time, money, and effort.

**INTELLIGENT SYSTEMS**

(Chiu, Fehling, Holtzman, Luenberger, Shachter, Tse)

The program on intelligent systems has two major objectives. First, it seeks to advance understanding of problem-solving in human organizations, ranging from small cooperative teams to large-scale, highly distributed enterprises. Studies focus on real-world examples of organizational problem-solving in the private and public sectors such as strategic business planning, large-scale production management, supply-chain design and management, new product development, medical policy formation and decision making, disaster-relief planning, and military logistics and transportation deployment.

Second, the program develops new methods and computer-based technology to enhance the quality of organizational problem-solving, focusing on the design, development, and evaluation of computer-based intelligent systems that aid organizational decision makers in coordinating their efforts to solve such complex problems. Topics of particular interest are the work on developing algorithms automating elements of large-scale planning processes and constructing autonomous computer agents that fully automate more routine problem-solving and coordination activities.

Research and teaching emphasize interdisciplinary approaches combining mathematical, analytic techniques from systems and decision sciences with empirical methods and models from cognitive science and social sciences, as well as computational methods from computer science and artificial intelligence.

Much of the basic and applied research in this program is conducted through the Laboratory for Intelligent Systems (LIS), directed by Professor Fehling.

**ECONOMIC ANALYSIS**

(Chiu, Dunn, Fehling, Feinstein, Luenberger, Sweeney, Tse, Weyant)

This program includes modeling and analysis of economic entities and their interactions. Several areas, described below, have commanded particular attention.

**Natural Resource and Environmental Economics**—Examines the problems associated with depletable or renewable natural resources, including energy, biological, mineral, and environmental resources. Research efforts include economic responses to global greenhouse gas accumulation, analysis of water markets, and economics of depletable energy resources.

**Organizational Economics**—Studies incentives and information in organizations and inter-organizational systems. Incentives include those created by rules governing activities such
as information sharing, cost allocation, and transfer pricing within an organization.

**Systems Economics** — A response to the growing magnitude and complexity of economic decision problems, it combines economic theory in finance, general equilibrium theory, and decision theory with the problem-solving viewpoint and techniques of systems analysis.

**ENERGY MODELING ANALYSIS AND POLICY**  
(Huntington, Sweeney, Weyant)

Energy modeling and analysis activity centers around the Energy Modeling Forum (EMF) and the Energy, Natural Resources, and Environment Program (ENREP) of the Stanford Center for Economic Policy Research (CEPR). EMF involves the application of formal analysis in the study of energy policy issues. Sponsored by the Electric Power Research Institute, the Department of Energy, and about 15 industrial affiliates, EMF is based at Stanford with Professor Weyant as director.

Current EMF studies focus on key world oil market uncertainties, global climate change, the role of energy conservation, and energy policy in Japan.

Research sponsored by CEPR includes modeling and analysis of world oil markets, oil storage policies, and economics of alternative automotive fuels. Additional research includes regulation of public utilities, optimal stockpiling under a gaming strategy, energy, and the environment.

**MATHEMATICAL SYSTEM ANALYSIS**  
(Chiu, Luenberger, Morris, Smallwood, Tse)

Mathematical system analysis is the development and application of those mathematical principles and techniques that help formulate and solve system problems. The field is one of great diversity, both with respect to the types of mathematics employed and in the areas of application. The Stanford program emphasizes the interaction of theory and application. Faculty and students have developed methods in (1) modern control theory, including observers, dynamic programming, optimal control techniques, adaptive methods, and descriptor-variable theory; (2) optimization, including functional analysis methods, convergence theory for mathematical programming methods, decentralization methods, and new algorithms; and (3) economics, including fixed-point methods, representation of dynamic phenomena, and investment theory.

**SCIENCE AND TECHNOLOGY POLICY**  
(Dunn, Fehling, Howard, May, North, Perry, Shachter, Sweeney, Weyant)

The science and technology policy program is concerned with the analysis of national and international policies that relate to goods and services based on new and evolving science-based technologies. It has close relationships with other activities on campus with similar objectives, as explained below.

**Telecommunications and Information Policy** — Analyzes policies concerned with the creation, distribution, and utilization of information and communication products. Close ties with the Center for Telecommunications exist.

**National Security Policy** — Analyzes the existing international security system and alternative systems that may be established through the adoption of arms control and related international agreements. Projects are carried out in cooperation with the Center for International Security and Arms Control at Stanford. Current work includes a study of system alternatives that would be made possible by increased information exchange and improved verification of compliance with treaties.

**Energy and Environment Policy** — Analyzes policies at the state and national levels concerned with the management of depletable and renewable natural resources and the environment. Current research projects focus on the regulation of public utilities providing natural gas and electric power. Close ties with CEPR exist.

**Medical Policy** — Analyzes medical decision making and the implications of the application of modern decision theory to medical practice for medical policy. Close ties with the School of Medicine exist and EES students are working on projects with both EES and medical school faculty members.

**COURSES**

Core Courses:  

Project Courses:  
206, 218, 234, 235, 236, 275, 283, 286

Lecture Courses:  
31, 170, 171, 207, 208, 213, 214, 222, 228, 231C, 238, 246, 247, 255, 284, 285, 286, 287, 288

Other Courses:  
290, 291, 292, 293, 294, 386A, 386B, 386C, 400 series

Course descriptions, organized by general subject area, are listed below.
201A. Dynamic Systems — Introductory, emphasis on the development of a dynamic system model for familiar dynamic phenomena. Goal: to recognize and analyze dynamic phenomena in diverse situations. Concepts: formulation and analysis; state-space formulation; solutions of linear dynamic systems, equilibria, dynamic diagrams; eigenvector analysis of linear systems, the concept of control and feedback; structural properties including controllability and observability, and linear stabilizing feedback. Dynamic programming and optimal feedback control. Prerequisite: Math. 113 or equivalent.

4 units, Win (Tse) MW 12:50-2:05

201B. Optimal Dynamic Systems — Nonlinear system analysis; stability, Liapunov functions, general summarizing functions. Optimal control theory and the Pontryagin maximum principle; problems with inequality constraints, transversality condition, discounting cost, infinite horizon problem; the Hamilton-Jacobi-Bellman equation; adaptive learning and control systems. Applications include optimal economic growth, control of predator/prey systems, spread of production innovation.

3 units, Aut (Tse) MW 9:30-10:45

207. FED: Formulation, Evaluation, and Decision for System Analysis — Synthesis of core concepts with applications. Emphasis on model formulation, system evaluation, and application-driven development of quantitative techniques. Theory and analytical techniques introduced through formulation and analysis of case studies are developed into generalized concepts. Case studies include measures of transportation risk, urban transit operational analysis, location of fire houses, ATM (automatic teller machines) transmational data analysis, capacity planning of telecommunication networks. Concepts and theory include random incidence analysis, geometric probabilities, queueing theory, location theory, and network analysis. Prerequisite: 221A or equivalent.

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

208. The Art of Mathematical Modeling — Constructing mathematical models is essential to the successful application of quantitative analysis to unexplored problem areas. The practical and philosophical issues associated with the modeling process. Purpose is to improve one's ability to build formal structures for solving practical problems. Students are given first-hand experience in constructing and critiquing mathematical models, emphasizing ingenuity and creativity rather than mathematical models or techniques. Prerequisites: familiarity with calculus and probability.

3 units, Win (Smallwood, Morris, Schwartz) F 1:15-4

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 is on the translation of theory into qualitative understanding and concrete procedures for analysis and implementation. Recommended corequisite: 241A.

4 units, Aut (Johnson) MW 9

212B. Economic Analysis — Continuation of 212A. Topics: market structure and industrial organization (oligopoly, strategic behavior of firms, game theoretic models); general equilibrium theory (formulation, Walras' Law, existence, uniqueness); intertemporal equilibrium and asset markets; public goods, externalities. Emphasis is on building a framework as a basis for additional advanced economics.

3 units, Win (Sweeney) MW 2:45-4:15

213. Microeconomics — Microeconomics from a unified viewpoint, based on benefits to individuals, groups, and firms. Basic foundations of consumer and production theory and efficiency, and equilibrium theory from a benefit viewpoint. Types of equilibrium models and how they may be solved efficiently. Externalities, welfare, uncertainty, and information emphasizing the benefit viewpoint. Prerequisite: 212A or equivalent.

3 units, Aut (Luenberger) TTh 1:15-2:30


3 units, Win (Dunn) MW 11-12:15

217. Finance and Economic Growth Theory — Key ideas in finance and economic growth for engineers. Part I, basic ideas in finance: long view of expected return, risk, and diversification comparing the U.S. and other countries' financial markets; diversification as a minimization of risk process; market risk premium including a general equilibrium theory, the Capital Pricing Model and its application; evaluation of derived instruments (options); bond evaluation; concepts of duration and convexity, the immunization process. Part II, economic growth theory: the mechanism of economic growth as derived by the basic differential equation of positive growth theory, the equation of interest theory and its role in the intertemporal allocation of resources, an economic interpretation of optimal
control theory, an assessment of growth problems and prospects under different economic systems.

3 units. Sum (de la Grandville) MW 2:15-4

218. Economic Analysis Practice — Project course focusing on applications of economic analysis. Students teams model and analyze an economic issue and present findings to the class. Faculty suggest project areas and methods useful for addressing problems. Potential projects for illustration: develop a forecasting model for office space demand, analyze investment options by a regulated industry, develop a model to aid pricing decisions in a corporation, and analyze California’s zero-emission vehicle mandate.

4 units. Spr (Sweeney, Huntington) MW 11-12:15

248. Capital Investment and Financing Decisions — Optimal capital investment and financing decisions for firms operating in a dynamic and uncertain environment. Emphasis on development of appropriate objectives and tools of analysis for evaluating competing projects and methods of financing them in a multiperiod setting. Topics: appropriate risk-return criteria to apply to individual projects undertaken over time so that firm-wide return is maximized in the long run, valuation and optimal exercise strategies for options to initiate and manage capital investments and their financings over time, and the relationship between investment type and optimal financial structure. Applications focus of technology-based companies and large-scale engineering projects. Methods draw on recent advances in corporate and project finance, decision analysis, irreversible investment, and investment asset pricing in the multiperiod setting. Prerequisites: basic finance theory (equivalent of 246 or Industrial Engineering 235). Recommended: background in decision analysis, probability theory, and dynamic optimization.

3-4 units. Spr (Johnson) MWF 10

255. Economics of Natural Resources — Economic analysis of natural resource use, particularly energy and including air, water, and other depletable mineral and biological resources. Emphasis is on energy and other depletable resources and on an integrating theory for depletable and renewable resources. Stock-flow relationships; optimal choices over time: short-run and long-run equilibrium conditions; depletion/extension conditions; market failure mechanisms (common-property, public goods, discount rate distortions, rule-of-capture); policy options. Prerequisite: 212A, or Economics 202.

4 units. Spr (Sweeney) MW 9:30-10:45

PROBABILITY

221A. Probabilistic Analysis — Applied probability with a unique perspective: probability viewed as life’s possibilities and the associated likelihood of their occurrences; probabilistic analysis viewed as the structuring, processing, and presentation of probabilistic information. Introduction of Axioms of Probability Measures, the concepts of sample space, conditioning, random variables, distribution functions and various expectation, etc., as the means to achieve probabilistic analysis. Concepts, tools, and modeling are emphasized. Examples from social, legal, medical, and engineering systems. Prerequisite: working knowledge of calculus.

4 units. Win (Chiu) MW 4:45-6

222. Probabilistic Analysis — Continuation of 221A. Topics: limit theorems, discrete and continuous time Markov chains, renewal processes, queuing theory, and transform analysis. Emphasis on building a framework to formulate and analyze probabilistic systems.

3 units. Spr (Chiu) MW 9-10:15


3 units. Spr (Shachter) TTh 9:30-10:45

DECISION ANALYSIS

31. Introduction to Decision Analysis — How to make good decisions. Psychological research shows that in simple situations people make decisions that on close examination they regard as wrong. Decision analysis allows one to convert opaque decision situations that confuse into a clear basis for action by using transparent, logical steps. Topics: distinctions, clarity test, possibilities and probabilities, probability assignments, relevance, intangibles, value of information and experimentation, relevance and decision diagrams, risk attitude, analysis of large scale decisions. Examples from fields of application, providing the philosophical concepts and practical techniques necessary to master decision-making in a complex, dynamic, and uncertain world. Requires rigorous and analytical thought. Prerequisite: high school algebra. DR:6(8)

3 units. Sum (Shachter) TTh 9-10:45
23IA. Principles of Decision Analysis — Presentation of a coherent approach to decision making, using the metaphor of developing a structured conversation having desirable properties, and producing actional thought that leads to clarity of action. Instruction is Socratic, with computational issues covered in problem sessions. Emphasis is on the creation of distinctions, representation of uncertainty by probability, development of alternatives, specification of preference, and the role of these elements in creating a normative approach to decisions. Evaluates information gathering opportunities in terms of a value measure. Relevance and decision diagrams represent and clarify inference and decision. Principles are applied to decisions in business, technology, law, and medicine.

4 units, Aut (Howard) TTh 11-12:15

231B. Decision Engineering — Extension of decision making from a system of thought about decisions to the considerations necessary for aiding other people and organizations in decision making: decision engineering. Topics: how to organize the decision conversation, the role of the decision analysis cycle and the model sequence, assessing the quality of decisions, framing decisions, the decision hierarchy, strategy tables for alternative development, creating decision diagrams that are sparse and effective, understanding and overcoming biases in assessment, developing and using evocative and assessed knowledge maps, dealing with “uncertainty about probability.” Interpretation of various forms of sensitivity analysis, use of approximations, value of revelation, value of joint information, options, flexibility, bidding, assessing and using corporate risk attitude, risk sharing and scaling, and treating decision involving health and safety. Prerequisite: 231A; knowledge of probability using continuous variables (221A or equivalent may be taken concurrently).

4 units, Win (Howard) TTh 11-12:15

231C. Advanced Decision Analysis — Extension of decision analysis beyond the basic paradigm. Emphasis on determining and extending the boundaries of systematic analysis of decisions. Topics: concept of decision composite; probabilistic insurance and other challenges to the normative approach; relationship of decision analysis to classical inference and data analysis procedures; the likelihood principle and exchangeability principles; inference, decision, and experimentation using conjugate distributions; developing a risk attitude based on general properties; examination of alternative decision-aiding practices like analytic hierarchy and fuzzy approaches. Presentations on current research. Object is to prepare doctoral students for research and to enable all to understand the discipline at the most fundamental levels. Prerequisite: 231B.

3 units, Spr (Howard) Th 2:45-5:15

234. Intelligent Decision Systems — Extension of decision analysis beyond individual decisions to classes of decisions that share a common structure. Decision class analysis methodology is used as the foundation for designing automated decision analysis systems. Lectures, class examples, and a term project. Topics: decision class analysis, influence diagrams, knowledge maps, preference models, pre-condition-action rules, formal decision methods, storyboarding. Other topics depending on student interests and project focus. Prerequisite: 231B. Recommended: 235/236 (may be taken concurrently).

4 units, Spr (Holtzman) F 1:15-3

235. Medical Decision Analysis — Decision analysis (DA) to assist in patient and physician decisions. Student teams analyze current clinical decision situations as a term project. Analysis teams carry out at least one full DA cycle pass, including model development, deterministic sensitivity analysis, probabilistic structuring and assessment, and model appraisal. Topics: the decision-making role of patients and their physicians, medical preference models, practicing decision analysis in a medical context, medical ethics, and the design and use of automation to support medical decisions. Discussions are tailored toward the term project. Taught simultaneously with 236. Prerequisite: 231B.

4 units, Spr (Holtzman, Matheson) MWF 3:15-4:30

236. Decision Analysis Practice — Opportunity for students trained in decision analysis (DA) theory to apply that knowledge in practice. Student teams analyze a current decision situation faced by an actual decision-maker as a term project. Analysis teams carry out at least one full DA cycle pass, including model development, deterministic sensitivity analysis, probabilistic structuring and assessment, and model appraisal. A key challenge is communicating with decision participants not trained in decision analysis. Discussions are tailored toward the term project. Decisions analyzed by students have covered a wide spectrum of decision-making arenas: the university, business, military, international relations. Grading based on the professional quality of each team’s analysis and presentations. Taught simultaneously with 235. Prerequisite: 231B.

4 units, Spr (Holtzman, Matheson) MWF 3:15-4:30

238. The Ethical Analyst — The professional analyst who uses technical knowledge in support of any individual, organization, or government is ethically responsible for the consequences. Material sensitizes the individual to ethical issues, providing the means to form ethical judgments, and questions the desirability of physical coercion and deception as a means to reach any end. An exploration of human action and relation in society is conducted in the light of previous thought, and is used to provoke
additional research on the desired form of social interactions. Attitudes toward ethical dilemmas are explored by creating an explicit personal code. Issues from the full range of human affairs test the student’s framework for ethical judgment.

1-4 units, Spr (Howard) T 2:45-5:15

OPTIMIZATION


4 units, Aut (Shachter) TTh 9:25-10:50


3 units, Win (Shachter) TTh 9:30-10:45

246. Investment Science — Introduction to modern quantitative investment analysis: theory and practical application. Objective is to teach how modern investment concepts can be used to evaluate and manage opportunities, structure portfolios, and use sophisticated investment products including stocks, bonds, mortgages, and annuities. 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. Emphasis is on translating theory into actual procedures. Examples of applications for every major topic. Two-group projects devoted to application of the theory.

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

Sum (Feinstein) TTh 9-10:50

247. Advanced Investment Science — Advanced topics and research in the theory and application of investment concepts. Topics: futures contracts, continuous and discrete time models of stock price behavior, basic options theory, advanced options techniques, models and applications of stochastic interest rate processes, hedging problems, evaluation of risky projects, and optimal portfolio growth. Attention to computational issues and general theory. Teams work on independent projects that apply the course principles. Prerequisite: 246.

3 units, Spr (Luenberger) TTh 1:15-2:30

APPLICATIONS AND RESEARCH

170. The Role of Technology in National Security — Examines critical decisions made by the U.S. in selected security and space programs, emphasizing current issues. Case studies illustrate the process by which technical issues, along with political and economic issues, are brought into the policy process; particularly, the way in which technical organizations in government, government committees, and science advisory boards interact to bring advice to senior policymakers. Examination of some case decisions in other countries.

3 units, Aut (May) MW 4:15-5:30

171. The Role of Technology in Policy Decisions — (Same as Science, Technology, and Society 172.) Same objectives as 170, with case studies primarily from recent and current energy and environmental policy decisions, e.g., air quality standards, development of future energy technologies, and management of environmental hazards. Case studies illustrate the process of integrating technical information with economic and political considerations, with emphasis on differing roles and points of view among government experts, scientific advisory boards, and interested/affected parties among the public.

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

206. Decision System Project Course — Examines recurring decision problems and constructs prototype decision systems to assist in their solution. Emphasis is on constructing modular systems to address real technical problems and provide insight to decision makers, using structured programming, object-oriented design, and Engineering-Economic Systems (EES) core concepts. Design and implementation focus on representation of problem structure and the nature of interactions among different subsystems. Possible generalization of tools for use in future years. Students are expected to have some computer programming experience, but no prior exposure to symbolic or object-oriented program-
272. Progress in Worldwide Telecommunications — Interdisciplinary topics in current worldwide developments and trends in telecommunications services, technology, developments, standardization, regulation, and competition. Interactions of common global and divergent regional and national interests, and the needs of the underserved parts of the world. Source material and guest speakers from representative participants in telecommunications development (service providers, regulating agencies, standards organizations, equipment manufacturers, leading institutions, and development countries.

3 units, Sum (Ivanek)

275. Quantitative Analysis of Public Policy Decisions — Focuses on problems in public policy, including environmental quality, health care, natural resources, technology development, and transportation and communication infrastructure. Students gain experience applying quantitative analytical methods to these problems; decision-oriented, emphasizing the use of quantitative analysis. Students work in groups on a single public policy problem for the entire quarter. Each group makes a presentation and submits a paper containing recommendations for addressing the problem and describing the approach used to reach this recommendation. Project work is complemented by lectures and discussions on the analytical process, illustrated with examples from the instructor's experience. Prerequisites: 201A, 212A, 231A, and 241A, or equivalent, or consent of the instructor.

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


4 units, Spr (Weyant) MW 1:15-2:30

284. Symbolic Programming for Building Intelligent Systems — Survey of basic symbolic programming techniques used to build computational models of intelligent, problem-solving systems. Review of mathematical basis for these methods. Fundamental concepts and techniques underlying modern approaches to programming. Topics: data abstraction and abstract data types; procedural abstraction, scoping, and closure; basic structures (conditional branching, recursion, and iteration); modularity in program construction and object-oriented programming; methods employed by intelligent systems builders; pattern-directed flow of control; search processes; unification and logical inference; and advanced control structures to support rule-based programming, agenda-based control, and multi-tasking. Mathematical foundations of symbolic programming (predicate logic and the formalization of process structure in Church's lambda-calculus. Exercises/project provide hands-on practice with symbolic programming methods using the programming language SCHEME, a dialect of LISP. Prerequisite: courses or hands-on experience with some high-level programming language (LISP, C, or Pascal).

3 units, Win (Fehling) Th 2:30-5

alternate years, not given 1996-97

285. Intelligent Systems: Theory and Development Methods — Basic theories and methods for building computational models of intelligent systems. Perspectives on problem-solving and decision-making from the cognitive and social sciences, AI, decision theory and analysis, and the mathematical systems sciences (e.g., operations research and dynamic system modeling and control). Emphasis on the modeling of intelligent organization systems that perform tasks via the coordinated actions of multiple, participating actors. Symbolic programming techniques in EES 284 model the essential cognitive structures and processes, enabling intelligent systems to perform their tasks in complex, dynamic domains. Programming exercises/limited class project, develop formal and symbolic programming techniques needed to design and build intelligent systems. Topics: advanced data structure to encode problem-solving knowledge and belief, qualitative models of dynamic time-dependent processes, basic problem solving algorithms for such tasks as diagnosis and planning, heuristic methods for controlling search and inference, symbolic inference algorithms for decision-making under uncertainty, basic machine learning methods, and generic intelligent-system architectures, including multi-actor architectures (Pluralsurf, VDT, and Schemer). Prerequisites: 231A, 241A, 284 or equivalent symbolic programming experience. Recommended: work in cognitive science and organizational design in sociology or economics.

3 units (Fehling)

alternate years, given 1996-97

286. Intelligent Systems Projects — Development of intelligent systems that model or support organizational work. Examples of intelligent systems used to model and analyze organizational practices and built to aid organizational workers in performing tasks, e.g., control of operations enterprise-level management, organizational planning, and policy design. Examples from application domains e.g., health-care, strategic management, and manufac-
turing. Intelligent systems for organizational analysis or support. Student teams design/build prototypes of intelligent system applications to analyze or support performance of some well-defined task in a real-world organization. Prerequisite: 284, 285, or equivalent introduction to symbolic programming and AI. Recommended: work in organizational design or computer-supported collaborative work.

3 units (Fehling)
alternate years, given 1996-97

287. Voluntary Social Systems—Exploration of the ethical theory, feasibility, and desirability of a social order in which coercion by individuals and government is minimized and people pursue ends on a voluntary basis. Topics: efficacy and ethics; use rights for property; contracts and torts; spontaneous order and the free market; crime and punishment; guardian-ward theory for incompetency; the state and interventionism, the hypothesis of reverse results; applications to various topics—help for the needy, victimless crimes, and environmental protection; transition strategies to a voluntary society.

1-3 units, Win (Howard) TTh 2:30-4

288. Building Core Competence in Corporations—Focuses on the dynamic development of corporate skills, knowledge, and infrastructure to compete in a changing global competitive environment due to rapid technology advancement, global economic development, changes in consumer preference and government regulations. Uses combination of model analysis and case study to develop a methodology in building corporate core competence in response to dynamic competitive requirements. Links between EES core and the notion of core competence as a basis for dynamic organizational and strategy development.

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

OTHER COURSES

290. Introduction to Engineering-Economic Systems—Introductory lectures by faculty and research staff describing department research programs.

1 unit, Aut (Staff) T 4:15


1 unit, Win (Tse) T 4:15

292. Directed Reading and Research in Engineering-Economic Systems—Directed study and research on a subject of mutual interest to the student and staff member.

1 or more units, any quarter (Staff) by arrangement

293. Seminar in Engineering-Economic Systems—Lectures on the relationship between business and technology by guest specialists from the business and the technological communities.

1 unit, Spr (Tse) T 4:15

294. Thesis and Thesis Research—Limited to students who have established candidacy for the degree of Engineer or Ph.D. A grade of ‘+’ indicates satisfactory work; no letter grade is assigned.

any quarter (Staff) by arrangement

386A,B,C. Organizational Analysis: Computational and Mathematical Approaches—(Same as Civil Engineering 386A,B,C.) Advanced graduate seminar focuses on the dynamic performance of real-world organizations and organizational participants, and on their dynamic interactions with the social and physical environment. Explores processes (planning, activity management, and learning) using computational and mathematical models and computational tools to support and improve organizational work. Participants select/critically review contributions to organizational analysis and support technology drawing on social and behavioral science, economics, systems and decision sciences, and computer science and AI. Research topics: organization theory, organizational design, large scale and decentralized organizational planning, group decision-making or organization-wide process, team theory, coordination theory, principal-agent relationships as a basis for modeling organizational structure, and computer-supported collaborative work.

1-4 units, Aut, Win, Spr (Fehling, Levitt) by arrangement

400. System Research Seminar—Series. Group study of an area of current system research. Topics may include areas of theory and applications, announced on a quarterly basis.

1 or more units, Aut, Win, Spr (Staff) by arrangement

401A,B,C. Research Topics on Intelligent Systems—Participants critically discuss current theory and research on intelligent systems and their applications. Seminar focuses on topics addressed in 386A,B,C; computational methods for decision theoretic planning and reasoning about action, utility-guided categorization and situation assessment under uncertainty, intelligent control of manufacturing processes, and intelligent systems architectures.

1-4 units, Aut, Win, Spr (Fehling) by arrangement

455. Economic Analysis Seminar—Economic theory, analysis, and application research in progress. Highly interactive presentations, primarily given by graduate students.

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

470. Government Decision-Making in Technical Areas—Seminar for graduate students with an interest in government decision-making in areas which
involve a technological component, e.g., defense, energy, and environment, and high-technology trade and policy. Follows 170 or 171.

1-2 units, Aut, Spr (May)
by arrangement

INDUSTRIAL ENGINEERING AND ENGINEERING MANAGEMENT

Emeriti: (Professors) Eugene L. Grant, Robert V. Oakford, Henry E. Riggs, David A. Thompson
Chair: James V. Jucker
Deputy Chair: Hau L. Lee
Associate Professors: Stephen R. Barley, Margaret L. Brandeau, Kathleen M. Eisenhardt
Professor (Teaching): Robert McGinn
Affiliated Faculty: David Beach (Mechanical Engineering), Peter W. Glynn (Operations Research), Michael Harrison (Business), Charles A. Holloway (Business), Kosuke Ishii (Mechanical Engineering), James G. March (Business), David B. Montgomery (Business), Evan L. Porteous (Business), Krishna Sarawat (Electric Engineering)
Consulting Faculty: F. Ronald Bailey, Thomas H. Byers, Naushad Forbes, Thomas J. Kosnik, Michael G. Lyons, Behnam Tabrizi, Adel Turki
Visitor Associate Professor: Sultan Bhimjee

Industrial engineering is concerned with how best to organize people, information, money, materials, and technology to produce and distribute services and products. Depending on the degree level, students are prepared to design, manage, perform research on, or teach about productive systems that may be in private industry, in federal, state or local government, or in public, quasi-public, or nonprofit institutions.

Engineering management is concerned with the knowledge and processes required to manage technically based enterprises.

UNDERGRADUATE PROGRAM

BACHELOR OF SCIENCE

The program leading to the B.S. degree in Industrial Engineering is stated earlier under the “School of Engineering” section of this bulletin. This curriculum is planned to serve those students whose long-run objective is the planning, designing, and implementing of complex economic and technological management systems where a scientific and engineering background is necessary or desirable. The fundamentals of engineering are stressed. The Industrial Engineering program is designed to introduce the student to measurement and control theory, organization theory and behavior, management, economic analysis and modeling, facilities planning and design, and computers and information systems. The objective is to provide the student with systems concepts, the role and function of management, methods of analysis, and the human and economic factors that bridge the gap between pure engineering design and pure management. To achieve the objective, the student will take several courses in which a group project represents an important part of the course. In these projects, the student has the opportunity to formulate and solve problems and implement solutions for firms and organizations in the surrounding community.

Many students completing the bachelor’s program pursue graduate study in industrial engineering, in other professional schools (law, medicine, or business) or in fields related to industrial engineering such as economics, statistics, or operations research.

GRADUATE PROGRAMS

The Department of Industrial Engineering and Engineering Management (IEEM), in collaboration with other departments of the University, offers programs leading to the degrees of Master of Science and Doctor of Philosophy in Industrial Engineering and to the degree of Master of *Science in Engineering: Engineering Management. The department also offers a master's degree in Manufacturing Systems Engineering in cooperation with the Department of Mechanical Engineering.

Applicants for admission as graduate students in IEEM must submit the results of the verbal, quantitative, and analytical parts of the Graduate Record Examination. The deadline for application is February.

* Beginning in 1996-97, the Master of Science degree in Industrial Engineering will be combined with the Master of Science in Engineering: Engineering Management. The new degree will be a Master of Science in Industrial Engineering and Engineering Management.

MASTER OF SCIENCE

The M.S. degree programs require a minimum of 45 units beyond the equivalent of a B.S. degree at Stanford. All programs represent substantial progress in the major field beyond the equivalent of a bachelor's degree.
INDUSTRIAL ENGINEERING

The M.S. program is designed to provide sufficient additional skills beyond the B.S. in Industrial Engineering to prepare students better for a professional career. It is also for students with bachelor's degrees in other engineering disciplines who wish to learn more about production and distribution systems. A master's degree may also be used as a step toward a second advanced degree.

The detailed requirements for the M.S. degree are available from the IEEM office.

Any student admitted to graduate standing on the basis of a bachelor's degree in a field other than engineering must complete, in addition to the 45 units of work as outlined above, the equivalent of 45 units of mathematics, science, and engineering breadth. In addition, the student must comply with the prerequisites for the courses listed on the program for the M.S. degree.

ENGINEERING: ENGINEERING MANAGEMENT

The M.S. degree in Engineering with a concentration in Engineering Management is designed to provide knowledge of the process of management as applied to technically based enterprises and to provide additional skills in the student's basic engineering discipline. It is intended for students with the B.S. or M.S. degree in engineering disciplines other than Industrial Engineering (those with a B.S. degree in IE should pursue their M.S. in IE or Manufacturing Systems Engineering). Students interested in Management of Construction or Civil Engineering Infrastructure should apply to the Department of Civil Engineering at Stanford.

The M.S. degree in Engineering with a concentration in Engineering Management requires 30 units of specified courses in the Management area (designed to provide core managerial skills and focused on technology management) and a coherent package of 15 additional units of course work typically in the student's technical area (beyond the previous degree level). The managerial courses include accounting, finance, general management, marketing, organizations, and production. A sample program outlining detailed requirements for the degree is available from the IEEM office.

This program should be of particular interest to Honors Cooperative students, as well as co-terminal students interested in adding to their understanding of technically based enterprises.

ENGINEERING: MANUFACTURING SYSTEMS ENGINEERING

The M.S. in Engineering with a concentration in Manufacturing Systems Engineering addresses the need for engineers who combine management and design skills focused on manufacturing. There is a critical need for individuals who can deal directly with product design for manufacturability, design of integrated manufacturing systems; financial, organizational, and strategic management issues; and elements of automation technology such as computer-aided design, computer-aided manufacturing, robotics, and microprocessor control.

Manufacturing Systems Engineering is a joint effort of the Department of Mechanical Engineering and the Department of Industrial Engineering and Engineering Management. The program seeks highly qualified students with strong educational backgrounds in engineering and provides a demanding curriculum strong in both hardware and engineering management. Successful applicants should have a minimum of one year of full-time industrial experience.

The hardware and engineering-design aspects of the program include:

- Ambidextrous Thinking
- Design for Manufacturability
- Integrated Design for Marketability and Manufacturing
- Mechatronic Systems Design
- Microprocessor Applications
- Robotics and Manipulation

The engineering management subjects include:

- Engineering Economics
- Industrial Accounting
- Inventory Control and Production Systems
- Manufacturing Strategy
- Organizational Behavior and Management
- Quality Assurance and Control

The hardware and engineering-design courses provide hands-on training of these functions and the trade-offs that must be made in selecting alternative systems configurations.

The engineering management subjects provide a suitable perspective so that alternative system choices can be appropriately evaluated for their financial, organizational, and production impacts, as well as their impact on the firm's manufacturing policy.

Beyond the required core, the curriculum allows for elective courses chosen from a broad set of relevant electives providing additional training in engineering management, engineering-design hardware, and aspects of computer science. A student may follow individual interests and tailor the program to meet individual needs.

Students interested in a career focused on manufacturing management and product development may apply for the Dual Manufacturing Systems Engineering and M.B.A Program. The Dual M.S.E/M.B.A requires separate applications to each program. Minimum requirements can be met through six to seven quarters of study if the candidate matriculates in both programs simultaneously.
The detailed requirements for the M.S. in Manufacturing Systems Engineering are available from the IEEM office.

**DOCTOR OF PHILOSOPHY**

The Ph.D. degree is intended for students who desire careers in teaching and research. The program requires a minimum of three years (nine quarters) of full-time graduate study, at least two years of which must be at Stanford. However, the typical student takes four years after entering the doctoral program to complete all Ph.D. requirements. The Ph.D. degree must include a minimum of 90 quarter units of approved course work beyond the bachelor’s degree, not including units for dissertation research. Frequently, a Ph.D. applicant has already completed a master’s degree and would therefore be required to complete a minimum of 45 additional units. The detailed requirements for the Ph.D. program are available from the IEEM office.

**ASSISTANTSHIPS AND SCHOLARSHIPS**

A limited number of fellowships and assistantships are awarded each year. Detailed information may be obtained by writing the Department of Industrial Engineering and Engineering Management. Applications for fellowships, assistantships, and scholarships should be made by February 1 preceding the start of the academic year for which the award is to be made.

**COURSES**

**UNDERGRADUATE**

60. Engineering Economy — (Enroll in Engineering 60.)

100. Organizations: Theory and Management — For undergraduates only, with preference to IEEM majors. Survey of classical and modern organization theory, covering the behavior of the individual, the work group, and the organization.

4 units, Aut (Eisenhardt) sec. 1 TTh 10-11:50
sec. 2 TTh 1:15-3:05

107. Work, Technology, and Society — Work in contemporary society as influenced by rapid technological change. Causes and consequences of the current revolution in work and policies for grappling with resultant problems. Focus on the U.S. with attention to key trends in selected foreign countries. Topics: new technology in the workplace and its bearing on occupational and organizational changes, industrial relations, worker health and safety, economic competitiveness, women workers, workplace ethics, and innovative public and private policies on work. Limited enrollment. DR:9(5)

4 units, Spr (McGinn) MW 2:15-4:05


4 units, Win (Lee) MW 8-9:15

125. Manufacturing Systems Design — (Graduate students see 225.) The concepts and techniques of designing and improving performance and productivity in systems composed of and influenced by people, organizational factors, environmental factors, and technology. Emphasis on the design of high performance manufacturing systems. Multi-disciplinary approach. Use of simulation as a tool for design evaluation. Prerequisites: 100, 121; Computer Science 106B, Operations Research 153.

5 units, Spr (Jucker) TTh 10-11:50
Th 1:15-2:30

133. Industrial Accounting — Introduction to basic accounting concepts and operating characteristics of accounting systems. Principles of financial and cost accounting, design of accounting systems, techniques of analysis, and cost control. Designed for the user of accounting information and not as an introduction to a professional accounting career. Interpretation and use of accounting information for decision making is stressed. Non-majors who have taken or are taking elementary accounting should not enroll.

3 units, Aut (Bhimjee) TTh 2:45-4
Sum (Bhimjee) MTWTh 8

155. Assessment of Chronic, Low-Level Environmental Risks — (Enroll in Biological Sciences 155.)

180. Senior Project — Restricted to IE majors in their senior year. Students participate in a major project in groups of four. Attention to problem identification and definition, emphasizing synthesizing feasible solutions to real problems. Prerequisites: 100, 121, 125, 133, 235, 260; Engineering 40; Operations Research 152, 153.

4 units, Win (Staff) MW 11-12:15

191. Directed Study — Directed study on a subject of mutual interest to student and faculty member. Student must find a faculty sponsor and submit a one-page description of plan.

1 or more units (Staff) by arrangement

**PRIMARILY FOR GRADUATE STUDENTS**

201. Creativity and Innovation in Organizations — The nature of creative problem-solving, from need through implementation. Common blocks to problem-solving, at the individual, group, and organizational level, and methods of dealing with them. Interpersonal and organiza-
203. Organizational Behavior and Management—Organization theory; concepts and functions of management; behavior of the individual, work group, and organization. Emphasis is on case and related discussion. Enrollment limited to 65 graduate students per section; priority given to IEEM majors.

3 units, Aut (Tabrizi) MW 10-11:30
Win (Sutton) MW 1:15-2:45

210. Research Seminar on the Software Industry—(Enroll in Computer Science 290.)

214. Quality and the Products of Technology—(Same as Mechanical Engineering 214; Science, Technology, and Society 118.) “Quality” has acquired a specific and limited meaning in many manufacturing organizations (decreased variation, increased efficiency). True product quality includes relatively tangible characteristics (performance, economy, and reliability), and factors such as emotional response of the user, cultural consistency, craftsmanship, elegance, symbolism, 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 increase it. Readings, lectures, projects, papers, and field trips. Not a quality assurance or quality control in production course. Enrollment limited.

4 units, Win (Adams) TTh 11:15-1:05

220. Management and Organization of Research and Development—The organization of R&D in industry and the problems of the technical labor force. Relevant theoretical perspectives from sociology, anthropology, and management theory on the social and pragmatic issues that surround technical innovation and the employment of scientists and engineers. Possible topics: organization of scientific and technical communities, industrialization of research, nature of scientific and technical work, strategies for fostering innovation, careers of scientists and engineers, and managerial problems characteristic of R&D settings.

4 units, Spr (Barley) MW 1:15-2:30

223. Technology and Work—Theory and research of the social implications of technology and technological change for workers at all levels. Alternate conceptions of technology as social phenomenon, approaches to the study of technology in the workplace, reactions of individuals and groups to technological change, the construction of a technology’s social meaning, and the management of technological change. Emphasis is on automation, electronic data processing, and sophisticated microelectronic technologies, including CAD-CAM systems, telecommunication networks, medical imaging technologies, artificial intelligence, and personal computers.

4 units, Spr (Barley) MW 3:30-4:45

225. Manufacturing Systems Design—(See 125.) No graduate prerequisites.

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

234. Strategic Control Systems—(Same as Business 319.) How changes in markets, operations, and information technology are affecting the design of strategic control systems. Changes in manufacturing, marketing, and operations strategies induce changes in strategic planning and strategic controls. Management accounting emphasizes operational planning and control, strategic controls focus on the planning and control of strategic decisions. Emphasis on customer satisfaction, continuous improvement, external benchmarking, cost, quality, time, and innovation.

4 units, Spr (Staff) MTh 10-11:45


4 units, Aut (Turki) MW 9-10:30
Win (Turki) MW 9:20-10:50

240. Engineering Risk Analysis—Techniques of analysis of engineering systems for risk management decisions involving trade-offs (technical, humans, environmental aspects). Four parts: elements of decision analysis; probabilistic risk analysis (fault trees, event trees, etc.); economic analysis of failure consequences (issues of human safety and long-term economic discounting); and case studies (e.g., space, systems, nuclear power plants, liquefied natural gas terminals, and dams). Emphasis on risk management issues in the public and private sectors. Prerequisites: Statistics 116, Engineering 60, or equivalents.

3 units, Win (Paté-Cornell) MWF 11

241. Project Course in Engineering Risk Analysis—Students, individually or in groups, choose, define, formulate, and resolve a real risk management problem, preferably from a local firm or institution. Oral presentation and report required. Scope of the project to be adapted to the number of students involved. Three phases: risk assessment, risk communication, and risk management. Emphasis on the use of probability for the treatment of uncertainties
268. Manufacturing Strategy — For graduate students only; preference given to Manufacturing Systems Engineering students. Development and implementation of the manufacturing functional strategy. Emphasis on the integration of manufacturing strategy with the business and corporate strategies of a manufacturing-based firm. Topics: types of manufacturing technologies and their characteristics, quality management, capacity planning and facilities choice, the organization and control of operations, and determining manufacturing’s role in corporate strategy. Prerequisite: 261 or 260.

3 units, Spr (Carlson) MW 8:15-9:45

269. Industrial Management — Priority given to IEEM graduate students. Introduction to marketing and management policy for industrial products, focusing on real 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. Prerequisites: 133, Engineering 60. Recommended: 235.

4 units, Win (Kosnik) TTh 8-9:30


4 units, Spr (Kosnik) Th 3:30-5

273. Technology Entrepreneurship — For graduate students interested in starting a technology venture, joining a small firm intent upon rapid growth, or pursuing a career in consulting, venture capital, or the management of a technology business for larger companies. Lectures, cases, and distinguished guest speakers from successful technology companies. Student teams develop and present a written business plan. All functional areas of high potential start-ups are covered. Enrollment limited to 60 graduate students (priority given to IEEM students).

4 units, Spr (Byers, Lyons) TTh 3:15-5

Spr (Byers, Lyons) TTh 8-9:45

275. Organizations and Information Systems — For graduate students interested in how information systems impact organizations and how organizations take control of information technology (IT) to gain a competitive edge. Topics: IT strategy, the fit between IT and corporate culture, IT architectural alternatives, changing technologies and organizational learning, the effect of IT on competition, and outsourcing as an offensive strategy. Student teams perform field studies based on situations in which
information technology is creating a significant management problem or business opportunity. Case
based. Enrollment limited, consent instructor. Prerequisite: 100 or 203.
4 units, Spr (Tabrizi) MW 8:30-9:45
279. Technology Policy and Management in Newly-Industrializing Countries—(Same as Science, Technology, and Society 279.) Technology is seen as the key to development and prosperity in most parts of the world. Building technological capability in Newly-Industrializing Countries at both the national and firm level. Issues: what makes technology special, government intervention that affects technology, the concept of technology leader and technology follower environments, the transfer of technology from "leader" countries, indigenous technological capability, human capital, culture and innovation, the role of small firms and new enterprises in technological capability. Managing innovation in firms, exploring: how innovation is different in technology-followers, organizing for shop-floor innovation, building an innovation culture, the special role of R&D in followers, the role of design, technology strategy for followers. Cases from Korea, India, Brazil, Singapore and other NICs.
2-4 units, Aut (Forbes) four weeks only
MTWTh 11-12:15, plus F 11-1 (for 3-4 units)
281. Workshop on Technology and Management in Newly-Industrializing Countries—(Same as Science, Technology, and Society 280.) Current work in the field, building on issues covered in IE/STS 279. Weekly readings and discussion. Prerequisite: 279 or substantial prior preparation at discretion of instructor.
1-3 units, Spr (Forbes) four weeks only
291. Directed Study — Directed study on a subject of mutual interest to student and faculty member or curricular practical training involving a summer internship culminating in a written paper. Prerequisite: student must find a faculty sponsor.
1 or more units (Staff) by arrangement
292. Technology Management Seminar — Weekly series covering topics in technology-related fields. Topics: global business management, entrepreneurial management, venture capitalism, industry-specific technology management (computers, semiconductors, communications, defense, aerospace, biotechnology, etc.), organizational behavior, marketing issues, etc. Speakers are primarily from industry, some from academia. Enrollment during Autumn Quarter limited to Engineering Management students. Enrollment during Spring Quarter limited and at discretion of instructor. No letter grades.
1 unit, Spr (Staff) M 4:15-5:45
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 (Sutton) M 9-12
322. Organizations as Social Networks — Social structures can be investigated as social networks. Organizational and inter-organizational structures may be analyzed as patterned relationships among individuals, groups, and other organizations. Such networks appear as predictors of a variety of social dynamics (attitude similarity, the diffusion of innovation, turnover, and the allocation of organizational resources). Methods for collecting and analyzing network data include graph theory, sociometry, clique detection, centrality analysis, blockmodeling, and the quadratic assignment procedure. Readings of recent published research, actual data sets, and relevant computer programs. Prerequisites: one or more courses in organizational behavior, sociology, psychology, anthropology, or political science. Recommended: course in statistics or research methods.
3 units (Barley)
326. Strategy and Organization Doctoral Research Seminar — Review of current research at the interface between strategy/business policy and organization theory. Topics: top management teams and strategic decision making processes; strategic boundary issues (e.g., strategic alliances, vertical integration, and diversification); reward structure and board relationships; evolution of strategies, technology, and populations of organizations. Enrollment limited and at the discretion of instructor. Prerequisite: Sociology 260 or equivalent.
4 units (Eisenhardt)
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 (Eisenhardt)
340. Doctoral Seminar in Risk Analysis — Doctoral study including reading/review of the literature in the fields of engineering risk assessment and management. New methods and topics, emphasizing probabilistic methods and decision analysis. Applications to risk management problems involv-
ing technical, economic, and organizational aspects of engineering system safety. Possible topics: treatment of uncertainties, learning from near-misses, and use of expert opinions. Enrollment limited to doctoral students.

3 units, Spr (Paté-Cornell)

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 (Carlson) W 9-12
alternate years, not given 1996-97

363. Advanced Models for Logistics Planning — Theoretical treatment of advanced models for procurement, transportation, storage, and distribution problems in a production system. Topics: facility location and layout, routing, network flow, material handling, system design, and queuing analysis. Prerequisites: 260 or equivalent, Operations Research 153 or equivalent.

3 units (Brandeau) given 1996-97

364. Single and Multi-Location Inventory Models — Theoretical treatment of the management and control problems of inventory systems in production and distribution with models for single and multi-location systems. Emphasis on operating characteristics, performance measures, and optimal operating and control policies. Prerequisite: Statistics 217 or equivalent.

3 units, Spr (Hausman) TTh 1:15-2:30

365. Applications of Multi-Echelon Inventory Theory — For doctoral students with some background in inventory theory. Seminar. Readings in recent literature dealing with the application of multi-echelon inventory theory to industrial problems. Some theory; focus is on applications issues and opportunities.

3 units (Hausman) given 1996-97


3 units, Win (Brandeau) MW 2:15-3:30
alternate years, not given 1996-97

390. IEEM Doctoral Research Seminar — Presentations of current research papers by speakers from inside and outside the department. Ph.D. students must attend during every quarter in residence. No letter grades or units given.

Aut, Win, Spr (Staff) T 4:15-5:45

MATERIALS SCIENCE
AND ENGINEERING


Chair: William D. Nix

Associate Chair: Bruce M. Clemens


Associate Professor: Bruce M. Clemens

Assistant Professors: Reinhold H. Dauskardt, Shan X. Wang

Professor (Research): Robert S. Feigelson

Consulting Professors: Curtis W. Frank, Huajian Gao

Acting Assistant Professor: Todd C. Hufnagel

Senior Research Scientist/Lecturer: Ann Marshall

The Department of Materials Science and Engineering is concerned with the relation between the structure and properties of materials, factors that control the internal structure of solids, and processes for altering the structure and properties of solids. It brings together in a unified discipline the developments in physical metallurgy, ceramics, and the physics and chemistry of solids. The undergraduate program, described under the “School of Engineering” section of this bulletin, provides training for the materials engineer and also preparatory training for graduate work in materials science. Capable students are encouraged to take at least one year of graduate study to extend their course work. Coterminal degree programs are encouraged both for undergraduate majors in Materials Science and Engineering and for undergraduate majors in related disciplines. Graduate programs lead to the degrees of Master of Science, Engineer, and Doctor of Philosophy.

FACILITIES

The department is based in the Thomas F. Peterson Engineering Laboratory (Building 550). Offices for the chair and most of the faculty, for the administrative and technical staff, and for most graduate students are located there, as are a number of lecture and seminar rooms. Facilities for teaching and research are also available within the Peterson Lab, including equipment for electrical measurements; mechanical testing of bulk and thin film materials; fracture and fatigue of ad-
vance materials; metallography; optical, scanning, and transmission electron microscopy; UHV sputter deposition; vacuum annealing treatments; wet chemistry; and x-ray diffraction. The Peterson Lab is also the home base for the Center for Research on Information Storage Materials (CRISM) with corresponding facilities for magnetic measurements. The Rapid Prototyping Laboratory (RFL), housing material deposition and removal stations, is a joint facility with Mechanical Engineering and is housed next to the Peterson Labs in Building 530. The department also maintains two microcomputer clusters for its students, one with a number of Macintosh computers, and the other with six HP and DEC workstations. Both clusters are linked with the worldwide Internet network.

Depending on the needs of their program, students and faculty also conduct research in a number of other departments and independent laboratories. Chief among these are the Center for Integrated Systems (CIS), the Center for Materials Research (CMR), and the Stanford Synchrotron Radiation Laboratory (SSRL).

The Center for Integrated Systems (CIS) is a laboratory joining government and industrially funded research on microelectronic materials, devices, and systems. It houses a 10,000 square foot, class 100 clean room for Si and GaAs integrated circuit fabrication; a large number of electronic test, materials analysis, and computer facilities; and office space for faculty, staff, and students. In addition, CIS provides start-up research funds and maintains a “Fellow-Mentor” program with industry.

For information on CMR and SSRL, see the “Center for Materials Research” and “Stanford Synchrotron Radiation Laboratory” sections of this bulletin.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

The undergraduate program provides training in solid state fundamentals and in physical metallurgy. Students desiring to specialize in this field during their undergraduate period may do so by following the curriculum outlined in the “School of Engineering” section of this bulletin, as well as the School of Engineering Undergraduate Handbook. The University's basic requirements for the bachelor's degree are discussed in the “Undergraduate Degrees” section of this bulletin. Electives are available so that students with broad interests can combine materials science and engineering with work in another science or engineering department.

GRADUATE PROGRAMS

COTERMINAL B.S./M.S. PROGRAM

Stanford undergraduates who wish to continue their studies for the Master of Science degree in the coterminal program should apply for entrance after the beginning of the eighth quarter of undergraduate work and before the end of the eleventh quarter. The application must give evidence that the student possesses the potential for strong academic performance at the graduate level. Each application is evaluated by the department’s Admissions Committee. Scores from the Graduate Record Exam (GRE) General Test must be reported before action can be taken on an application. Materials Science is a highly integrated and interdisciplinary subject, and so applications from students of any engineering or science undergraduate major are encouraged. Information forms pertaining to the coterminal program may be obtained from the department’s Student Services Manager or from the Graduate Degree Progress Section of the Registrar’s Office, Old Union. Students entering the coterminal program and receiving both their B.S. and M.S. degree in Materials Science and Engineering should also see the “Master of Science for MS&E Coterminal Students” section below.

MATERIALS SCIENCE

The University's basic requirements for the M.S. degree are discussed in the “Graduate Degrees” section of this bulletin. The following are specific departmental requirements.

The Department of Materials Science and Engineering (MSE) requires a minimum of 45 units for a master's degree. Up to 9 units of work done as a graduate student at another institution may sometimes be transferred to give unit credit toward the electives used in acquiring a Stanford degree. Substitution of courses taken for specific Stanford courses is approved on the Master’s Program Proposal. Master’s Program Proposal forms should be filled out, signed by the students’ academic adviser, and submitted to the department Student Services Manager by the end of the first week of the students’ second quarter of study. (Generally, this means by the end of the first week of Winter Quarter.) Final changes to the master’s program must be submitted no later than one academic quarter prior to degree conferral.

Degree requirements (for students entering after September 1, 1995) are as follows:
1. A minimum of 33 units of MSE course work, including cross-listed courses, taken for a letter grade. The following are limitations:
   a) A maximum of 9 units of cross-listed courses may be used in fulfilling this requirement.
   b) One unit seminars and research units cannot be used to fulfill this requirement.
2. Lab courses MSE 161, 162, 163 (which count toward the required 33 units of MSE course work).
   Note: students who have had equivalent lab courses at other universities, equivalent practical experience, or have a materials related degree or background are expected to file a petition with the department’s Student Services Manager to have this requirement waived.
3. Six courses selected from MSE 152, 251, and 201 through 209. These ‘core’ courses count towards the required 33 units of MSE course work, however:
   a) MSE 152 is not an option for students with materials science undergraduate degrees.
   b) MSE 251 may not be used to fulfill this ‘core’ requirement if the student has a materials science undergraduate degree, although it may be applied towards the required 33 units of MSE course work.
   c) It is assumed that students have had an introductory course in thermodynamics. For those who have not, it is strongly recommended that they take Chemistry 171 (Physical Chemistry).
4. Approved course electives to bring total units to 45. Of the 12 units of elective courses:
   a) Nine of the 12 units must be taken for a letter grade.
   b) A maximum of 3 units may be seminars.
   c) If writing a Master’s Research Report, a minimum of 6 and a maximum of 9 units of MSE Research units may be used.
   d) A maximum of 3 units may be undergraduate units (offered at Stanford University).
   e) A maximum of 5 units may be used for a foreign language course (not including any remedial English courses).
   f) The combination of seminar units, undergraduate units, and language units may not exceed 6 units total.
   g) The combination of research units, seminar units, undergraduate units, and language units may not exceed 12 units total. (Research units are only allowed when writing a Master’s Research Report.)
5. A minimum letter grade indicator average (LGI) of 2.75 for course work at Stanford.
   All proposed degree programs are subject to approval by the department’s Academic Degree Committee which has responsibility for assuring that each proposal is a technically coherent program.

**MASTER’S RESEARCH REPORT**

Students wishing to take this option must submit a program of study, including not more than 9 and no less than 6 units of MSE Research units, to the department for approval at least two quarters before the degree is granted. The total combined units of MSE Research units, seminars, language courses, and undergraduate courses cannot exceed 12. If a master’s research report is not to be submitted, units of MSE 200 cannot be applied to the department’s requirement of 45 units for the master’s degree.

The report must be approved by two faculty members. One faculty member will be the student’s research adviser. The other faculty member is assigned by the department. Three copies of the report (one copy for each approving faculty member and the department library), in final form and signed by two faculty members, must be in the hands of the department’s Student Services Manager one week prior to the beginning of the final examination period of the final quarter of the program. The report is not an “official” University thesis but rather is intended to demonstrate to the department faculty an ability to conduct and report directed research. Refer to the *Materials Science and Engineering Student Handbook* for more information and further clarification concerning this report.

**M.S. FOR MSE COTERMINAL STUDENTS**

The University’s basic requirements for the M.S. degree are discussed in the “Graduate Degrees” section of this bulletin. The following are specific departmental requirements.

The Department of Materials Science and Engineering (MSE) requires a minimum of 45 units for a master’s degree. Students who have received or are currently working towards a B.S. degree in Materials Science and Engineering from Stanford and are pursuing a M.S. in Materials Science and Engineering should follow the requirements below in lieu of those stated in the “Master of Science” section listed above. Master’s Program Proposal forms should be filled out, signed by the students’ academic adviser, and submitted to the department’s Student Services Manager by the end of the first week of the students’ second quarter of study. (Generally, this means by the end of the first week of Winter Quarter.) Final changes to the master’s program must be submitted no later than one academic quarter prior to degree conferral.

Degree requirements (for students entering after September 1, 1995) are as follows:
1. A minimum of 21 units of MSE course work taken for a letter grade. Crosslisted courses, 1-unit seminars, research units and/or MSE 400 cannot be used to fulfill this requirement. These 21 units of MSE courses must include:
a) The three remaining core classes (from Chemistry 171, MSE 191/201-199/209) not taken for the B.S. degree in MSE.

b) Twelve units of MSE 300 level courses (not including 300).

2. Approved course electives to bring total units to 45. Of the 24 units of elective courses:

a) Twenty-one of the 24 units must be taken for a letter grade.

b) A maximum of 3 units may be seminars.

c) If writing a Master's Research Report, a minimum of 6 and a maximum of 9 units of M.S. Research units (MSE 200) may be used.

d) A maximum of 6 units may be undergraduate units.

e) A maximum of 5 units may be used for a foreign language course (not including any remedial English courses).

f) The combination of seminar units, undergraduate units, and language units may not exceed 9 units total.

g) The combination of research units*, seminar units, undergraduate units, and language units may not exceed 15 units total. (*Research units are only allowed when writing a Master's Research Report.)

3. A minimum letter grade indicator average (LGI) of 2.75 for course work at Stanford.

See Master's Research Report section listed previously noting the additional unit privileges allotted to coterminal students. See the department's Student Services Manager for more information and/or clarification on what constitutes an approved course.

ENGINEER

The University's basic requirements for the degree of Engineer are outlined in the "Graduate Degrees" section of this bulletin.

A student wishing to enter the Engineer program must have completed the substantial equivalent requirements of the M.S. in Materials Science and Engineering, and must file with the department’s Student Services Manager a petition requesting admission to the program as well as stating the type of research to be done and the professor who will be supervising. Once approved, the Application for Candidacy must be submitted to the department’s Student Services Manager by the end of the second quarter in the Engineer program. Final changes in the Application for Candidacy form must be submitted no later than one academic quarter prior to degree conferral.

A program should include 9 units of graduate non-crosslisted courses in materials science (exclusive of research units, seminars, colloquia, MSE 400 — Participation in Teaching, and so on) beyond the requirements for the M.S. degree, and additional research or other units to meet the 36-unit University minimum requirement. A 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 Academic Council faculty members, one of whom must be a member of the department, and submitted in triplicate. A petition is required for non-Academic Council members.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the Ph.D. degree are outlined in the “Graduate Degrees” section of this bulletin.

Degree requirements (for students entering after September 1, 1995) are as follows:

1. Complete the requirements for the M.S. in Materials Science and Engineering (MSE) unless transferring in a master’s degree from elsewhere.

2. Pass a departmental oral qualifying examination the second year after admission. An LGI of 3.25 from the eight core classes (201-209) is required for admission to the Ph.D. qualifying exam. Students whose LGI is between 3.00 and 3.25 may petition for possible admission to the exam. Students who have passed the departmental oral examination are required to complete the Application for Candidacy for the Ph.D. degree by the end of the quarter in which they pass the exam. Final changes in the Application for Candidacy form must be submitted no later than one academic quarter prior to degree conferral.

3. Submit a program consisting of at least 72 units, which contains a minimum of 12 technical non-crosslisted MSE course units beyond the M.S. degree (exclusive of research units, seminars, colloquia, MSE 400 — Participation in Teaching, and so on), taken for a letter grade. The remaining units may consist of research, seminars, language classes, etc. The program for your M.S. and Ph.D. combined must include the following:

a) MSE 201 through 209 (24 units), except for students who have had equivalent courses at other universities and have successfully petitioned out.

b) A minimum of 12 units of 300-level courses from the MSE faculty (not including MSE 300).

c) A minimum of 12 units of courses taken from one of the following lists of Advanced Specialty Courses (see below).

4. Maintain a letter grade indicator (LGI) of 3.0 for all course work taken as a graduate student at Stanford.
5. Present the result of his or her dissertation at a department seminar immediately preceding the University Oral examination.

† If transferring in a master's degree from another university, your program must still meet the criteria listed in items 3a, b, c above. Transfer units may be applied towards 'a' and 'c,' but not 'b.' The maximum units you may transfer in is 36 units. All transfer courses must meet the same criteria as those given at Stanford.

ADVANCED SPECIALTY COURSES

Materials Characterization: Elect. Engr. 329, 331;
MSE 320, 321, 322, 323, 325
Mechanics of Materials: Aero. & Astro. 252, 256;
Physics of Solids: Elect. Engr. 216, 312, 316, 331;
MSE 332, 334, 335, 340, 342, 343, 347, 348, 349, 359

COURSES PRIMARILY FOR UNDERGRADUATES

50. Introductory Science of Materials — (Enroll in Engineering 50.)
3 units, Win (Bravman) MWF 11
Spr (Sinclair) MWF 11

100. Undergraduate Independent Study — Independent study in materials science under supervision of a faculty member.
1-3 units, any quarter (Staff) by arrangement

150. Undergraduate Research — Participation in a research project.
3-6 units, any quarter (Staff) by arrangement

151. Microstructure and Mechanical Properties — For undergraduates; see 251. Prerequisite: Engineering 50 or equivalent.
3 units, Aut (Dauskardt) MWF 9

3 units, Spr (Staff) MWF 10

2 units, Aut (Hufnagel) W 3:15-5

2 units, Win (Hufnagel) W 3:15-5

163. Materials Science Lab III — Lab on experimental techniques for the study of the mechanical properties of materials, including fracture toughness testing of metallic materials, ductile-to-brittle transition curves, fracture of ceramics using indentation techniques, and effects of grain size on yielding and strain hardening. Prerequisites: 198/208, 151/251, or equivalent.
2 units, Spr (Dauskardt) W 3:15-5

170. Materials Selection in Design — For undergraduates; see 270. Prerequisites: Engineering 14 and 50 or Mechanical Engineering 111.
3 units, Win (Prinz) TTh 7-8:15 p.m.

171. Physical Chemistry — (Enroll in Chemistry 171.)
3 units, Aut (McConnell) MWF 11

191. Mathematical and Computational Methods in Materials Science — For undergraduates; see 201. Prerequisite: familiarity with ordinary differential equations.
4 units, Aut (Barnett) TTh 11-12:15 plus hour by arrangement

193. Atomic Arrangements in Solids — For undergraduates; see 203.
4 units, Aut (Sinclair) MWF 10 plus hour by arrangement

194. Phase Equilibria and Statistical Thermodynamics — For undergraduates; see 204. Prerequisite: introductory course in thermodynamics.
4 units, Win (Hufnagel) TTh 9-10:15 plus hour by arrangement

195. Waves and Diffraction in Solids — For undergraduates; see 205. Prerequisite: 193/203 or equivalent.
4 units, Win (Clemens) MWF 9 plus hour by arrangement

196. Imperfections in Crystalline Solids — For undergraduates; see 206. Prerequisite: 193/203.
4 units, Win (Nix) MWF 10 plus hour by arrangement

197. Rate Processes in Materials — For undergraduates; see 207. Prerequisites: 191/201, 194/204, introductory course in thermodynamics.
4 units, Spr (Clemens) MWF 9 plus hour by arrangement
198. Mechanical Properties of Materials — For undergraduates; see 208. Prerequisites: 193/203, 196/206.
4 units, Spr (Nix) MWF 8
plus hour by arrangement

199. Electrical and Magnetic Properties of Solids — For undergraduates; see 209. Prerequisite: 195/205 or equivalent.
4 units, Spr (Wang) TTh 9-10:30
plus hour by arrangement

PRIMARILY FOR GRADUATES

200. Master's Research — Participation in a research project.
1-15 units, any quarter (Staff) by arrangement

3 units, Aut (Barnett) TTh 11-12:15

203. Atomic Arrangements in Solids — Description of atomic arrangements in perfect and imperfect crystalline solids, defect chemistry, elements of formal crystallography including development of point groups and space groups.
3 units, Aut (Sinclair) MWF 10

204. Phase Equilibria and Statistical Thermodynamics — Principles of heterogeneous equilibria and their application to phase diagrams. Elementary statistical thermodynamics. Prerequisite: introductory course in thermodynamics.
3 units, Win (Hufnagel) TTh 9-10:15

3 units, Win (Clemens) MWF 9

3 units, Win (Nix) MWF 10

3 units, Spr (Clemens) MWF 9

3 units, Spr (Nix) MWF 8

209. Electrical and Magnetic Properties of Solids — Introduction to the electronic, magnetic, optical, and ferroelectric properties of solids. Emphasis on concepts and models of phonons and electronic energy bands and applied to metals, semiconductors, magnetic materials, and insulators. Elementary quantum and statistical mechanics concepts are utilized. Prerequisite: 195/205 or equivalent.
3 units, Spr (Wang) TTh 9-10:30

230. Materials Science Colloquium — (Can be repeated for credit.)
1 unit, Aut (Nix) F 3:30
Win (Bravman, Sinclair) F 3:30
Spr (Dauskardt, Clemens) F 3:30

251. Microstructure and Mechanical Properties — Primarily for students without a materials background. Mechanical properties and their dependence on microstructure in a range of engineering materials. Elementary deformation and fracture concepts, strengthening and toughening strategies in metals and ceramics. Topics: dislocation theory, mechanisms of hardening and toughening, fracture, fatigue, and high-temperature creep. Prerequisite: Engineering 50 or equivalent.
3 units, Aut (Dauskardt) MWF 9

270. Materials Selection in Design — Methods to select materials for engineering applications, emphasizing structural and thermal properties. Fundamentals of interrelation between material parameters. Strategies for optimal selection subject to

3 units, Win (Prinz) TTh 7-8:15 p.m.

299. Practical Training — Provides educational opportunities in high-technology research and development labs in industry. Qualified graduate students engage in internship work and integrate that work into their academic program. Students register in the quarter following internship work, and complete a research report outlining their work activity, problems investigated, key results, and any follow-on projects they expect to perform. Meets the requirements for Curricular Practical Training for students on F-1 visas. Student is responsible for arranging own employment. See department Student Services Manager before enrolling. Can be repeated for credit.

1 unit, any quarter (Fitzpatrick) by arrangement

300. Ph.D. Research — Participation in a research project.
1-15 units, any quarter (Staff) by arrangement

310. Integrated Circuit Fabrication Processes — (Enroll in Electrical Engineering 212.)
3 units, Aut (Saraswat) TTh 1:15-2:30

312. New Methods in Thin Film Synthesis — Techniques to grow thin films on an atomic scale provide the materials base for new classes of coatings and devices. Fundamentals of vacuum growth techniques, molecular beam epitaxy (MBE), chemical vapor deposition (CVD), ion beam assisted deposition, and plasma processes. Relationships between deposition parameters and film properties. Industrial applications of thin film synthesis.

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

313. Synthesis and Processing of Ceramics — Principles and methods involved in the synthesis and processing of oxide and non-oxide ceramics. Fundamentals of compound synthesis, precursor preparation, particle size control, purification, solid and liquid phase sintering, grain growth and densification, impurity effects, and processing related defects. Traditional methods; new processing techniques, e.g., sol-gel, freeze drying, etc., for bulk and thin film preparation. Application of ceramic materials in science and technology.

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


3 units, Aut (Feigelson) TTh 9-10:15

315. Polymer Physics — (Enroll in Chemical Engineering 233.)
3 units, Win, Spr (Frank) alternate years, not given 1996-97

316. Polymer Chemistry — (Enroll in Chemical Engineering 234.)
3 units (Frank) alternate years, given 1996-97

317. Advanced Integrated Circuit Fabrication Process — (Enroll in Electrical Engineering 311.)
3 units, Spr (Saraswat) MW 11-12:15

318. Integrated Circuit Fabrication Laboratory — (Enroll in Electrical Engineering 410.)
3-4 units, Win (Staff) by arrangement

319. Electron and Ion Beams for Semiconductor Processing — (Enroll in Electrical Engineering 217.)
3 units, Spr (Pease) MWF 8 alternate years, not given 1996-97


3 units, Win (Sinclair) TTh 3:15-4:30 alternate years, not given 1996-97

321. Transmission Electron Microscopy — Image formation and interpretation. The contrast phenomena associated with perfect and imperfect crystals from a physical point of view and from a formal treatment of electron diffraction theory. The importance of electron diffraction to systematic analysis and recent imaging developments. Prerequisite: 193/203, 195/205, or equivalent.

3 units (Sinclair) alternate years, given 1996-97

322. Transmission Electron Microscopy Laboratory — Experimental application of electron microscopy to typical problems in materials science, including specimen preparation, microscope operation and alignment, recording and analysis of bright and dark field images and diffraction patterns, dislocation and stacking fault characterization, pre-
234 SCHOOL OF ENGINEERING

precipitate identification. Prerequisites: 321, consent of instructor.
3 units, Spr (Marshall) by arrangement

323. Thin Film and Interface Microanalysis —
The science and technology of a variety of microanalytical techniques, including Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), secondary ion mass spectroscopy (SIMS), ion scattering spectroscopy (ISS), and x-ray photoelectron spectroscopy (XPS or ESCA). Generic processes such as sputtering and high-vacuum generation. Prerequisite: some prior exposure to atomic and electronic structure of solids.
3 units, Spr (Marshall) MWF 2:15

325. X-Ray Diffraction — Diffraction theory and its relationship to structural determination in solids. Focuses on applications of x-rays; concepts can be applied to neutron and electron diffraction. Topics: Fourier analysis, kinematic theory, Patterson functions, diffraction from layered and amorphous materials, single crystal diffraction, dynamic theory, defect determination, surface diffraction, techniques for data analysis, and determination of particle size and strain. Prerequisites: 193/203, 195/205.
3 units, Spr (Marshall) not given 1995-96

332. Photoelectronic and Photovoltaic Materials and Devices — Phenomena involving the interaction between light and electrons in semiconductors. Photoconductivity, recombination, defect analysis, grain boundary effects, amorphous semiconductors, photovoltaic effects and current photovoltaic research, and photoeffects in quantum wells and superlattices. Prerequisite: 209 or equivalent.
3 units, Aut (Bube) TTh 1:15-2:30

334. Basic Physics for Solid State Electronics —
(Enroll in Electrical Engineering 228.)
3 units, Aut (J. Harris) TTh 2:45-4

335A, B. Physics of Semiconductor Devices — (Enroll in Electrical Engineering 328A, B.)
3 units, Win, Spr (J. Harris) MWF 10

340A. Basic Quantum Mechanics —(Enroll in Electrical Engineering 322A.)
3 units, alternate years, given 1996-97

340B. Basic Quantum Mechanics —(Enroll in Electrical Engineering 322B.)
3 units, alternate years, given 1996-97

341. Principles and Models of Semiconductor Devices — (Enroll in Electrical Engineering 216.)
3 units, Aut (Wong) MWF 2:15

342. The Electronic Structure of Surfaces and Interfaces — (Enroll in Electrical Engineering 329.)
3 units, alternate years, given 1996-97

343. The Science of Semiconductor Interfaces —
(Enroll in Electrical Engineering 331.)
3 units, Spr (Helms) TTh 1:30-2:45 alternate years, not given 1996-97

344. Solid-State Sensors and Actuators — (Enroll in Electrical Engineering 312.)
3 units, Win (Kovacs) MWF 1:15

345. Advanced VLSI Devices — (Enroll in Electrical Engineering 316.)
3 units, Spr (Wong) TTh 2:45-4

3 units, Spr (White) TTh 1:15-2:30

3 units, Aut (Wang) TTh 4:15-5:30

349. Introduction to Information Storage Systems — (Enroll in Electrical Engineering 335.)
3 units, Win (Wang) TTh 9:30-10:45

350. Micromechanics — Use of the theory of elasticity to discuss the fields of dislocations, inclusions, inhomogeneities, and their interactions in deformable solids. Applications to the microscopic foundations of macroscopic plasticity, the effects of strain energy on morphologies associated with phase transformations, and the determination of "effective" properties of composite media. Prerequisite: any brief introduction to the theory of elasticity, or consent of instructor.
3 units, Win (Barnett) MWF 1:15 alternate years, not given 1996-97

351. Microstructural Design of Advanced Materials and Composites — Strategies for the control of mechanical properties through microstructural design in a range of engineering materials and their composites. Emphasis is on a fracture mechanics description of strengthening and toughening methods in advanced ceramics and various composites. Structural reliability of brittle materials systems and their relationship to microstructure and processing in terms of fracture statistics, and long term properties in terms of subcritical crack-growth processes
with examples and applications, including cyclic fatigue and high-temperature creep of metals and ceramics. Prerequisites: basic understanding of materials microstructure, mechanical properties and fracture mechanics; 251 and 358, or equivalents.
3 units, Spr (Dauskardt) MWF 11

352. Stress Analysis of Thin Films and Layered Composite Media — Introduction to methods of stress analysis of layered dissimilar media, including thin films deposited on substrates, composite laminates, and stratified anisotropic elastic materials based on techniques pioneered by Stroh. Stress states generated by thermal and elastic mismatch and local stress concentrations at interfacial cracks or corners with applications to integrated circuit devices, aircraft materials, and geophysical media. Prerequisites: introductory course in strength of materials or the theory of elasticity, some familiarity with matrix algebra.
3 units (Barnett)
alternate years, given 1996-97

3 units, Aut (Nix) MWF 9
alternate years, not given 1996-97

354A. Introduction to Fracture Mechanics — (Enroll in Mechanical Engineering 240A.)
3 units, Spr (Gao) MWF 9

354B. Advanced Fracture Mechanics — (Enroll in Mechanical Engineering 240B.)
3 units (Gao) alternate years, given 1996-97

355. Time-Dependent Plasticity — Theories and mechanisms of creep. Temperature and strain rate effects on plastic flow of solids. Relation of high temperature strength and ductility of materials to structure. Prerequisite: 198/208.
3 units (Nix) alternate years, given 1996-97

356. Fatigue Design and Analysis — (Enroll in Mechanical Engineering 245.)
3 units, Win (Nelson) MW 2:15-3:45

3 units, Win (Dauskardt) MWF 11

359. Crystalline Anisotropy — Introductory matrix and tensor analysis with applications to the effects of crystal symmetry on elastic deformation, thermal expansion, diffusion, piezoelectricity, magnetostriction, and thermodynamics, following a treatment at the level of Nye’s text. Homework sets use Mathematica™.
3 units, Spr (Barnett) TTh 11-12:15

360. Techniques of Failure Analysis — (Enroll in Aeronautics and Astronautics 252.)
2 units, Spr (Ross) M 2:15-4:05

361. Mechanics of Composites — (Enroll in Aeronautics and Astronautics 256.)
3 units, Win (Springer) MWF 9

400. Participation in Materials Science Teaching — Can be repeated for credit.
1-3 units, Aut, Win, Spr (Staff) by arrangement

402. Seminar on Advanced Topics in X-Ray Diffraction — Can be repeated for credit.
1 unit, Win (Clemens, Hufnagel) M 4

405. Seminar in Applications of Transmission Electron Microscopy — Can be repeated for credit.
1 unit, Aut, Win, Spr (Sinclair) by arrangement

406. Seminar in Thin Film Science and Technology — Can be repeated for credit.
1 unit, Aut (Clemens) W 4

MECHANICAL ENGINEERING

Chair: Ronald K. Hanson
Associate Chair of Student Services: Dennis R. Carter
Associate Chair/Space: John K. Eaton
Associate Chair/Design: Mark R. Cutkosky
Division Chairs: Craig T. Bowman (Thermosciences), Thomas Hughes (Applied Mechan-
nics); (The Design Division operates without a chair.)

Laboratory Directors: David W. Beach (Program Director, Manufacturing Systems Engineering and Mechanical Engineering Student Shops), J. Edward Carryer (Smart Product Design Laboratory, Center for Design Research), Mark Cutkosky (Manufacturing Sciences Lab and Manufacturing Models Laboratory), John K. Eaton (Heat Transfer and Turbulence Mechanics), M. Godfrey Mungal (High Temperature Gasdynamics), Parviz Moin (Center for Turbulence Research), Friedrich B. Prinz (Rapid Prototyping Laboratory)


Assistant Professors: Kenneth E. Goodson, Jean H. Heegaard, Thomas W. Kenny, Sanjiva Lele, Andrew M. Stuart

Professor (Research): Felix E. Zajac
Professor (Teaching): David W. Beach

Courtesy Professors: George S. Springer, Robert L. Street

Courtesy Associate Professors: Mark Denny, Oussama Khatib, Peter M. Pinsky

Lecturers: Fred Bould, Craig Milroy

Acting Assistant Professors: Scott Abrahamson, J. Edward Carryer

Consulting Professors: Nagi Mansour, Victor Scheinman, Robert L. Taylor

Consulting Associate Professor: Gary Beaupre

Consulting Assistant Professors: Dennis Boyle, William Burnett, Marjolein Van der Meulen

The programs in the Department of Mechanical Engineering (ME) are designed to provide background for a wide variety of careers. The discipline is very broad, but is generally understood to emphasize an appropriate mix of energy science and technology, applied mechanics, and design. Graduates at all degree levels have traditionally entered into energy industries, transportation, product manufacturing industries, government laboratories and agencies dealing with these problems, and a variety of academic positions.

Since mechanical engineering is a broad discipline, the undergraduate program can be a springboard for graduate study in business, law, medicine, political science, and other professions where a good understanding of technology is often important. Both undergraduate and graduate programs provide excellent technical background for work in biomechanical engineering, environmental pollution control, ocean engineering, transportation, and on other multidisciplinary problems that concern our society. Throughout the various programs, considerable emphasis is placed on developing systematic procedures for analysis, effective communication of one’s work and ideas, practical and aesthetic aspects in design, and responsible use of technology. This can provide a student with an approach and a philosophy of great utility, irrespective of an ultimate career.

The department has three divisions: Applied Mechanics, Design, and Thermosciences. Each maintains its own labs, shops, and offices. The Applied Mechanics Division covers biomechanics, dynamics, experimental and computational mechanics, finite element analysis, fluid dynamics, fracture mechanics and micromechanics, and mechanics of deformable solids.

The Design Division emphasizes cognitive skill development for creative R&D in design process and is specifically concerned with automatic control, biomechanics, computer-aided design, design aesthetics, design research, experimental stress analysis, fatigue and fracture mechanics, finite element analysis, human factors, kinematics, manufacturing systems, microcomputers in design, optimization, and robotics. The Design Division offers undergraduate and graduate programs in Product Design (jointly with the Department of Art). The division offers a master’s program in Manufacturing Systems Engineering jointly with the Department of Industrial Engineering and Engineering Management, and the Graduate School of Business.

The Thermosciences Division offers courses and specialized work in acoustics, applied thermodynamics, combustion, computational fluid dynamics, energy systems, fluid mechanics, gas physics and chemistry, heat transfer, laser diagnostics, plasma sciences, and pollution control.

A graduate program in biomechanical engineering is offered with the participation of faculty in the Applied Mechanics Division, Design Division, Department of Biological Sciences, and the Medical School.

Many of the division faculty are involved in advanced mathematical analyses, and the department as a whole provides a number of basic and advanced courses in applied mathematics.

FACILITIES

The department divisions maintain modern laboratories that support undergraduate and graduate instruction and graduate research work.
In the Applied Mechanics Division, qualified students can work as research project assistants, engaging in thesis research in working association with the faculty director and fellow students. Projects include analysis, synthesis, and control of systems; biomechanics; flow dynamics of liquids and gases, including geophysical and astrophysical applications; fracture and micro-mechanics; vibrations, and nonlinear dynamics; and original theoretical, computational, and experimental investigations in the strength and deformability of elastic and inelastic elements of machines and structures.

The 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 autoclave, filament winder, and presses. X-ray, ultrasound, and an electron microscope are available for nondestructive testing. The lab also has environmental chambers, a high speed impactor, and mechanical testers. Lab projects include designing composite structures, developing novel manufacturing processes, and evaluating environmental effects on composites.

Experimental facilities are available through the interdepartmental Structures and Solid Mechanics Research Laboratory, which includes a electrohydraulic materials testing system, a vehicle crash simulator, a shake table for earthquake engineering and related studies, together with highly sophisticated auxiliary instrumentation. Facilities to study micromechanics of fracture area available in the Micromechanics/Fracture Laboratory include a computer controlled materials testing system, a long distance microscope, an atomic force microscope, and other instrumentation. Additional facilities for evaluation of materials are available through the Center for Materials Research, Center for Integrated Circuits, and the Ginzton Laboratory. Laboratories for biological experimentation are available through the School of Medicine. Individual accommodation is provided for the work of each research student.

The Applied Mechanics Division has a Computational Mechanics Lab. Its facilities include a CONVEX CI superminicomputer (a vector machine with CRAY-like architecture), SUN colorgraphics workstations, a cluster of Macintosh II Apple computers, and a variety of terminals, laser printers, and hard copy devices.

Design Division has facilities for lab work in experimental mechanics and experimental stress analysis. Additional facilities, including MTS electrohydraulic materials test systems, are available in the Solid Mechanics Research Laboratory. Laboratories in biomechanical and rehabilitation engineering are available through the School of Medicine and the Palo Alto Veterans Affairs Medical Center.

The division also maintains the Product Realization Laboratory, which includes machine tools, CAD/CAM, foundry, plastics facilities, welding, and wood. The shops offer tools and coaching to support prototype fabrication as an intrinsic part of the design process. The ME 210 Design Project Laboratory has facilities for CAD, assembly, and testing of original designs by master's students in the engineering design program. A Smart Product Design Laboratory supports microprocessor application projects. The Center for Design Research (CDR) has an excellent facility for concurrent engineering research, development, and education. Resources include a network of high-performance workstations. For World Wide Web mediated concurrent engineering by virtual, colocated, design-development teams, visit the CDR URL (http://cdr.stanford.edu) for details. In addition, CDR has several industrial robots for student projects and research. These and several NC machines are part of the CDR Manufacturing Sciences Lab. The Design Division also has a unique "Product Design Loft," in which students in the Product Design program develop graduate design projects.

Research and design/development opportunities in Rehabilitation Engineering and Biomechanics are available at the Veterans Affairs Medical Center in cooperation with the School of Medicine. The program includes graduate assistantships and is led by members of Design Division faculty. Facilities include Ethernet-connected DEC, SUN, and Silicon Graphics workstations; Apple (Macintosh) and IBM personal computers; a Symbolics Lisp machine; and a motion analysis system for collecting biomechanical and kinesiological data. Neuromuscular Biomechanics and Electrophysiology, and experimental mechanics laboratories provide research support.

The Thermosciences Division has two major labs and the Center for Turbulence Research (CTR). The Thermosciences Laboratory is equipped with representative power, fluid handling, heat and mass transfer equipment, refrigeration, and extensive special facilities for advanced graduate research in convective heat transfer and fluid mechanics, internal combustion engine research, turbulence, and other work relevant to energy systems and the environment conducted by the Heat Transfer and Turbulence Mechanics (HTTM) group. The High Temperature Gas-dynamics Laboratory (HTGL) is engaged in research activities in combustion, chemistry of pollutant formation, development of laser-based diagnostics, laser chemistry and processing, plasma sciences, and reactive and nonreactive gas dynamics. The experimental capability of the HTGL includes a central laboratory computer with im-
age processing capability, dedicated minicomputer, diagnostic devices for combustion gases and plasmas, laboratory combustors including a coal combustion facility and supersonic combustion facilities, several advanced laser systems, a variety of plasma facilities, and five shock tubes and tunnels. A wide variety of instrumentation, extensive shop facilities, research space, and utilities are all available within, and shared by, the lab. CTR has direct access to the major computing facilities of NASA-Ames Research Center. Together with others working in computational fluid mechanics, this group uses NASA's CRAY- YMP, CRAY-2, and massively parallel supercomputers. CTR is also equipped with several powerful graphics workstations.

Guidance and Control Laboratory, a joint activity with the Department of Aeronautics and Astronautics and the Department of Mechanical Engineering specializes in construction of electromechanical systems and instrumentation, particularly where high precision is a factor. Work ranges from robotics for manufacturing to feedback control of fuel injection systems for automotive emission control. The faculty and staff work in close cooperation with both the Design and Thermosciences Divisions on device development projects of mutual interest.

Many computation facilities are available to department students. Three of the department's labs are equipped with superminicomputers. Numerous smaller minicomputers and microcomputers are used in the research and teaching laboratories.

Library facilities at Stanford are outstanding. In addition to the general library, there are Engineering, Mathematics, Physics, and other departmental libraries of which engineering students make frequent use.

**UNDERGRADUATE PROGRAMS**

**BACHELOR OF SCIENCE**

Specializing in mechanical engineering (ME) during the undergraduate period may be done by following the curriculum outlined earlier under the "School of Engineering" section of this bulletin. The University's basic requirements for the bachelor's degree are discussed in the "Undergraduate Degrees" section of this bulletin.

A Product Design program is offered by the Design Division and leads to the B.S. degree in General Engineering. It is recommended, however, that this should not be considered a terminal degree and that students who elect this program continue on through the master's degree in this field. Courses taken for the departmental major (math; science; Science, Technology, and Society; engineering fundamentals; and engineering depth) must be taken for a letter grade if the instructor offers the option. An individually designed major in Biomechanical Engineering (B.S.E.: Biomechanical Engineering) is offered and may be appropriate for some students preparing for medical school or graduate bioengineering studies. Information and course suggestions are available from the ME Student Services office.

**Grade Requirements** — To be recommended by the department for a B.S. in Mechanical Engineering, a student must achieve the minimum letter grade indicator (LGI) set by the School of Engineering (2.0 in engineering fundamentals and engineering depth).

**COTERMINAL B.S./M.S. PROGRAM**

Stanford undergraduates who wish to continue their studies for the Master of Science degree in the coterminous program should apply for entrance after the beginning of the eighth quarter of undergraduate work and before the end of the 11th quarter. The application must provide evidence of potential for strong academic performance as a graduate student. The application is evaluated and acted on by the graduate admissions committee of the department. Typically, an LGI of at least 3.25 in engineering, science, and math is expected. Applicants must have completed two of 111, 112, 113, 131A, 131B, 131C, and must take the Graduate Record Examination (GRE) before action is taken on the application. Co-terminal information and forms can be obtained from the ME Student Services office.

**GRADUATE PROGRAMS**

**ADMISSION AND FINANCIAL ASSISTANCE**

To be eligible for admission to the department, a student must have a B.S. degree in engineering (the Ph.D. degree requires the completion of the M.S.), physics, or a comparable science program. Applications for all degree programs are accepted throughout the year, although applications for fellowship aid must be received by January 15 for the next Autumn Quarter.

The department annually awards, on a competitive basis, a limited number of fellowships, teaching assistantships, and research assistantships to incoming graduate students. Research assistantships are used primarily for post-master's degree students and are awarded by individual faculty research supervisors, not by the department. Preference for teaching assistantships is generally given to students who obtain the bachelor's or master's degrees at Stanford.

The basic University requirements for the M.S. degree are discussed in the "Graduate Degrees" section of this bulletin.
MECHANICAL ENGINEERING

Mechanical engineering is a varied profession, ranging from primarily aesthetic aspects of design to highly technical scientific research. Discipline areas of interest to mechanical engineers include biomechanics, energy conversion, fluid mechanics, materials, nuclear reactor engineering, propulsion, rigid and elastic body mechanics, systems engineering, and thermodynamics, to name a few. No mechanical engineer is expected to have a mastery of the entire spectrum.

Master’s degree programs are offered in Mechanical Engineering (M.S.M.E.), Engineering (Manufacturing Systems Engineering) (M.S.E.: M.S.E.), Engineering (Biomechanical Engineering) (M.S.E.: B.M.E.), Engineering (Product Design) (M.S.E.: P.D.), Engineering (M.S.E.).

The following sections list specific requirements for the master’s degrees listed above.

MASTER OF SCIENCE

The master’s program normally consists of three quarters of full-time course work. No thesis is required, although many students become involved in research projects during the master’s year, particularly to explore their interests in working for the Ph.D. degree. Students whose undergraduate backgrounds are entirely devoid of some of the major subject disciplines of engineering (for example, applied mechanics, applied thermodynamics, fluid mechanics, ordinary differential equations) may need to take some undergraduate courses to fill in obvious gaps and prepare themselves to take graduate courses in these areas. Such students may require more than three quarters to fulfill the master’s degree requirements, as the make-up courses may not be used for other than the unrestricted electives (see item 4 below) in the M.S. degree program. However, it is not the policy to require fulfillment of mechanical engineering B.S. degree requirements in order to obtain an M.S. degree; furthermore, students who have already fulfilled certain categories of the M.S. degree requirements as a result of undergraduate work may find they have sufficient time (see item 3 below) to obtain the M.S. degree in the normal three quarters.

MECHANICAL ENGINEERING

The master’s degree program requires 45 units of course work taken as a graduate student. At least 36 of the units must be taken at Stanford; any units transferred from other universities (up to 9 are allowed) must be in graduate-level courses taken while registered as a graduate student and may not be applied toward fulfillment of item 2 below. No thesis is required. However, students who desire some research experience during the master’s year may participate in research through ME 290, 291, and 292.

The department’s requirements for the M.S. in Mechanical Engineering are:

1. Mathematical Competence in Two of the Following Areas: partial differential equations, linear algebra, complex variables, numerical analysis, modern algebra, vector and tensor analysis, or statistics, as demonstrated by completion of two courses from ME 201-208; Math. 106, 109, 113, 131, 132; Computer Science 137, 237A,B,C; Statistics 110, 161. (Requirement: 6 units.)

Students who completed comparable graduate-level courses as undergraduates and who can demonstrate their competence to instructors may be exempted from this requirement by their advisers and the ME Student Services office and place the units in the approved elective category.

2. Eighteen 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. Courses 201-208, 280, and 286-301 may not be counted in these categories.

3. Approved Electives (to bring the total number of units to 39): all these units must have adviser approval. Graduate engineering, math, and science courses are normally approved, and upper-level undergraduate courses may be approved if consistent with the student’s objectives. Of the 39 units, no more than 6 may come from ME 291 and 292, and no more than 3 may come from the other courses numbered 290-299 or other seminars. Students planning a Ph.D. degree should discuss with their adviser the desirability of taking 291 or 292 during the master’s year.

4. Unrestricted Electives (to bring the total number of units submitted for the M.S. degree to 45): students are encouraged to use these units outside of engineering, mathematics, or the sciences. Students should consult their advisers on course loads and on ways to use the unrestricted electives to make a manageable program.

5. Within the courses satisfying the requirements above, there must be at least one graduate-level course dealing with lab studies. The course could be ME 210B,C, 218A, 226B, 225A, 248, 249, 254, 267, 319. ME 292 satisfies the requirement if 3 units are involved in lab ex-
experiments. Students who have had substantial lab experience in an industrial or government research institute may be exempted from the requirement by the ME Student Services office.

Candidates for the M.S. in Mechanical Engineering are expected to have the approval of the faculty, and a minimum letter grade indicator (LGI) of 2.75 in the 45 units presented in fulfillment of degree requirements. All courses used to fulfill requirements 1, 2, 3, and 5 must be graded (excluding seminars and courses for which a Satisfactory/No Credit grade is given to all students).

Students falling below an LGI of 2.50 at the end of 20 units may be disqualified from further registration. Students failing to meet the complete degree requirements at the end of 60 units of graduate registration are disqualified from further registration. Courses used to fulfill deficiencies arising from inadequate undergraduate preparation for mechanical engineering graduate work may not be applied to the 60 units required for graduate registration.

PRODUCT DESIGN

The graduate program leading to an M.S. in Engineering (Product Design) is unique in that it is jointly offered by the Departments of Mechanical Engineering and Art. Students with undergraduate engineering degrees other than Stanford’s B.S. in Product Design spend an additional year taking prerequisite undergraduate and product design courses. The requirements for this degree are:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art 360A, B, C. Master’s Project*</td>
<td>6</td>
</tr>
<tr>
<td>ME 211A, B, C. Master’s Project*</td>
<td>12</td>
</tr>
<tr>
<td>ME 221. Human Factors</td>
<td>3</td>
</tr>
<tr>
<td>ME 313. Ambidextrous Thinking</td>
<td>3</td>
</tr>
<tr>
<td>Approved Electives†</td>
<td>15</td>
</tr>
<tr>
<td>Free Electives</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
</tr>
</tbody>
</table>

* Taken jointly each quarter.
† Students are expected to create a plan of graduate studies suited to their personal needs. The courses listed below are recommended electives and may require enrollment approval by the instructor.

GRADUATE DESIGN OPTIONS

Biomedical Design
ME 280. Biomedical Engineering Seminar
ME 282AB. Special Projects in Biomedical Engineering

Design Management
Indust. Engr. 133. Industrial Accounting
Indust. Engr. 269. Industrial Marketing
Indust. Engr. 271. New Enterprise Management
Indust. Engr. 272. Managing Small Technical Companies

Design Philosophy
ME 215. The Designer in Society

Engineering Design
ME 210A, B, C. Cross-functional Systems, Design, and Rapid Prototyping
ME 222. Kinematic Synthesis of Mechanisms

Visual Design
Art 261. Mechatronic Systems Design
Art 268. Design Synthesis
Art 269. Advanced Creative Studies

Admission requirements and LGI graduation requirements are the same as for the M.S. in Mechanical Engineering described above. Applicants must also submit a portfolio showing evidence of design ability (for example, photos or slides of several art and design projects).

Students with nonengineering undergraduate degrees in design may apply to the Department of Art for a similar graduate design program administered by that department and leading to an A.M. or M.F.A. in Design. Students with non-engineering degrees who wish to earn the M.S. degree should consult with the program adviser.

MANUFACTURING SYSTEMS ENGINEERING

The M.S. in Engineering (Manufacturing Systems Engineering) addresses the need for engineers who combine management and design skills focused on manufacturing. There is a critical need for individuals who can deal directly with product design for manufacturability; design of manufacturing tools; financial, organizational, and strategic management issues; and elements of automation technology such as computer-aided design, computer-aided manufacturing robotics, and microprocessor control.

Manufacturing Systems Engineering (MSE) is offered jointly by two departments: Mechanical Engineering, and Industrial Engineering and Engineering Management. The program seeks high-quality students with strong educational backgrounds in engineering and provides a demanding curriculum strong in both hardware aspects and engineering management.

The hardware and engineering-design aspects of the program include:
ME 210A, B, C. Cross-Functional Systems Design
ME 218A, B, C. Smart Product Design
ME 313. Ambidextrous Thinking
ME 319. Robotics and Vision

The engineering management subjects include:
Indust. Engr. 121. Statistics and Quality Control
Indust. Engr. 203. Organization Behavior and Management
Indust. Engr. 261. Inventory Control and Production Systems
Indust. Engr. 268. Manufacturing Strategy

Hardware and engineering design courses provide hands-on knowledge of these functions and the trade-offs that must be made to take advantage of the relationships between design and manufacturing.
Engineering management subjects provide a suitable perspective for evaluating alternative financial, organizational, and production systems as well as a firm’s manufacturing policy.

Beyond the required core, the curriculum allows for choice from a broad set of relevant electives to provide additional training in engineering management, engineering design hardware, and aspects of computer science. Here a student may tailor the program to meet individual interests and needs.

Students in the MSE program must have faculty approval and a minimum LGI of 3.00 in the 45 units presented in fulfillment of the degree requirements.

**DUAL M.S.E. AND M.B.A. PROGRAM**

Students interested in a career focused on manufacturing management and product development may apply for the Dual Manufacturing Systems Engineering and Master of Business Administration Program. The Dual M.S.E./M.B.A. requires separate applications to each program. Minimum requirements can be met through seven quarters of study if the candidate matriculates to both programs simultaneously. For additional information, contact ME Student Services.

**BIOMECHANICAL ENGINEERING**

Students interested in graduate studies in biomechanical engineering can choose one of the programs below. Admission and program requirements for both degrees are:

1. **M.S. in Mechanical Engineering**: students who apply and are admitted to the M.S.E. program can elect to take biomechanical engineering courses as part of their M.S.M.E. requirements. These courses are usually applied towards the student’s engineering breadth or technical electives.

2. **M.S. in Engineering: Biomedical 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 M.S.E.: B.M.E. degree program allows students more flexibility in taking courses in the life sciences and generally emphasizes a more interdisciplinary curriculum. Minimum graduation LGI requirements are the same as for the M.S. in Mechanical Engineering.

A Ph.D. in Biomechanical Engineering is not offered. Students from either master’s degree path (Mechanical Engineering or Biomechanical Engineering) receive their Ph.D. degrees in Mechanical Engineering. The Ph.D. qualifying examinations are flexible enough to accommodate students with either master’s degree preparation. In extraordinary circumstances, a student may design an interdisciplinary Ph.D. degree to be pursued through Graduate Special Program. See the “Graduate Special Program” section of this bulletin.

**ENGINEERING**

As described in the “School of Engineering” section of this bulletin, each department in the school may sponsor students in a more general degree, the M.S. in Engineering. Sponsorship by the Department of Mechanical Engineering (ME) requires (1) filing a petition for admission to this program on the day before instruction begins, and (2) that the center of gravity of the proposed program lies in ME; no more than 18 units used for the proposed program can have been previously completed. The program must include at least 9 units of graduate-level work in the department other than ME 200-208 and 290-292. The petition must be accompanied by a statement explaining the program objectives and how it is coherent, contains depth, and fulfills a well-defined career objective. The grade requirements are the same as for the M.S. in Mechanical Engineering.

**POST-MASTER’S DEGREE PROGRAMS**

The department offers two post-master’s degrees: Engineer and Doctor of Philosophy. Students anticipating working for a post-master’s degree should arrange to do some research work under ME 291 or 292 prior to attempting to make a supervision arrangement. Faculty members supervising post-master’s research generally require some evidence that a student has research potential before committing themselves to supervision and a research assistantship. It is most efficient to carry out this preliminary research effort during the M.S. degree year.

In their first post-master’s registration, students seeking post-master’s degrees must report their status of faculty supervision to the department. A student who has not arranged for faculty supervision must petition for registration after completing 45 units of graduate work at Stanford.

**ENGINEER**

The basic University requirements for the degree of Engineer are discussed in the “Graduate Degrees” section of this bulletin. This degree represents an additional year of study beyond the M.S. degree and includes a research thesis. The program is designed for students who wish to do professional engineering work upon graduation and who want to engage in more specialized study than is afforded by the master’s degree alone.

Admission standards are substantially the same as indicated under the master’s degree. However,
since thesis supervision is required and the availability of thesis supervisors is limited, admission is not granted until the student has personally engaged a faculty member to supervise a research project. This frequently involves a paid research assistantship awarded by individual faculty members (usually from the funds of sponsored research projects under their direction) and not by the department. Thus, personal arrangement is necessary. Students studying for the M.S. degree at Stanford and desiring to continue to the Engineer degree ordinarily make such arrangements during the M.S. degree year. Students holding master’s degrees from other universities are invited to apply and may be admitted providing they are sufficiently well qualified and have made thesis supervision and financial aid arrangements.

Department requirements for the degree include an acceptable thesis; up to 18 units of credit are allowed for thesis work. In addition to the thesis, 27 units of approved advanced course work in mathematics, science, and engineering are expected beyond the requirements for the M.S. degree; the choice of courses is subject to approval of the adviser. Students who have not fulfilled the Stanford M.S. degree requirements are required to do so (with allowance for approximate equivalence of courses taken elsewhere).

Candidates for the degree must have faculty approval and have a minimum letter grade indicator (LGI) of 3.0 for all courses (exclusive of thesis credit) taken beyond those required for the master’s degree.

Product Design — A special two-year program in the field of Product Design leads to the degree of Engineer in Mechanical Engineering. It is intended for students who wish to augment in-depth graduate engineering study with education in the aesthetic and human qualities essential in new product development.

A typical program represents course and thesis content equivalent to the M.S. in Mechanical Engineering plus the M.S. in Engineering (Product Design). Alternatively, a program of interdisciplinary graduate study may be devised according to guidelines described in the “School of Engineering” section of this bulletin (for example, in Biomedical Design, Computer-Based Design, or Man-Machine Systems).

The 90-unit total can be completed in two academic years. Students deficient in prerequisite areas may take more time. Those who fulfill program requirements are awarded the M.S. in Engineering (Product Design) and the degree of Engineer in Mechanical Engineering (Product Design) simultaneously.

Admission follows the same requirements as for the master’s degree in Product Design.

DOCTOR OF PHILOSOPHY

The basic University requirements are discussed in the “Graduate Degrees” section of this bulletin. The Ph.D. degree is intended primarily for students who desire a career in research, advanced development, or teaching; for this type of work a broad background in math and the engineering sciences, together with intensive study and research experience in a specialized area, are the necessary requisites.

The department allows a minor field but does not require one. However, if a minor is waived, the candidate must show breadth of training by taking a group of courses in one or more related fields or departments as noted below.

A student studying for the Ph.D. degree ordinarily will not take an Engineer degree, although this is not precluded. However, the student must have a master’s degree, and must fulfill in essence the requirements for the Stanford M.S. degree in Mechanical Engineering.

In special situations dictated by compelling academic reasons, Academic Council members who are not members of the department’s faculty may serve as the principal dissertation adviser when approved by the department. In such cases, a member of the department faculty must serve as program adviser and member of the reading committee, and agree to accept responsibility that department procedures are followed and standards maintained.

Admission involves much the same consideration described under the Engineer degree. Since thesis supervision is required, admission is not granted until the student has personally engaged a member of the faculty to supervise a research project. Once a student has obtained a research supervisor, this supervisor becomes thereafter the student’s academic adviser. Research supervisors may require that the student pass the departmental oral examination before starting research and before receiving a paid research assistantship. Note that research assistantships are awarded by faculty research supervisors and not by the department.

Prior to being formally admitted to candidacy for the Ph.D. degree, the student must demonstrate knowledge of engineering fundamentals by passing a qualifying oral examination. The academic level and subject matter of the examination correspond approximately to the M.S. program described above. The form and timing of the examination differs for the three divisions of the department. Information may be obtained from the division or department offices.

Normally, the qualifying examination is taken during the first post-master’s year. A student must have the written approval of a tentative dissertation supervisor (sponsor) in order to take the examination. (Sponsorship carries no implication of financial support.) To apply for the examina-
a student must have a Stanford graduate letter grade indicator (LGI) equivalent of at least 3.25. Courses used in the LGI evaluation are the same as those that would be used to meet the M.S. LGI requirement. Students entering Stanford with an M.S. from another school must have a 3.25 LGI in that school’s M.S. program to take the examination in their first quarter at Stanford. After the first quarter at Stanford, such a student must meet the LGI of 3.25 for courses taken at Stanford.

Ph.D. candidates must complete a minimum of 36 units of approved formal course work (excluding research, directed study, and seminars) in advanced study beyond the M.S. degree. The courses should consist primarily of graduate courses in engineering and sciences, although the candidate’s reading committee may approve a limited number of upper-division undergraduate courses and courses outside of engineering and sciences, as long as such courses contribute to a strong and coherent program. In addition to this 36-unit requirement, all Ph.D. candidates must participate each quarter in one of the following (or equivalent) seminars: ME 280, 290, 294, 295, 296, 298; Aeronautics and Astronautics 296 or 297.

The Ph.D. thesis normally represents at least one full year of research work and must be a substantial contribution to knowledge. Students may register for course credit for thesis work (ME 301) to help fulfill University residence requirements, but there is no minimum limit on registered dissertation units. Candidates should note that University residence requirements (see the “Graduate Degrees” section of this bulletin) are expressed in terms of equivalent full-time registration and not in terms of units per se; questions on this should be addressed to the Manager of Student Services.

The department has a breadth requirement for the Ph.D. degree. This may be satisfied either by a formal minor in another department or by course work that is approved by the dissertation reading committee.

The final University oral examination is conducted by a committee consisting of a chair from another department and four faculty members of the department or departments with related interests. Usually, the committee includes the candidate’s adviser and two faculty members chosen to read and sign the candidate’s dissertation. The examination consists of two parts. The first is open to the public and is scheduled as a seminar talk, usually for one of the regular meetings of a seminar series. The second is conducted in private and covers subjects closely related to the dissertation topic.

A student wishing to complete the Ph.D. requirements in four years should ordinarily complete the M.S. by the Spring Quarter of the first year, pass the qualifying examination by the Autumn Quarter of the second year and complete the course work, demonstrate feasibility of research methods, and obtain approval of the dissertation proposal by the end of the third year.

COMBINED Ph.D./M.D. DEGREE PROGRAM

Students interested in a career oriented towards biomechanical research and clinical medicine can pursue the combined Ph.D./M.D. degree program.

The Ph.D. degree is administered by the Department of Mechanical Engineering of the School of Engineering. To be formally admitted as a Ph.D. degree candidate in this combined degree program, the student must apply through normal department channels and must have earned an M.S. in Mechanical Engineering, an M.S. 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 department requirement that the 36 units applied towards the Ph.D. degree (beyond the master’s degree level) be formal course work. Consistent with the University Ph.D. requirements, the department may instead accept 36 units consisting of courses, research, or seminars that are approved by the student’s Ph.D. thesis reading committee and the department chair. For further information, consult the Manager of Student Services.

Ph.D. MINOR

Students who wish a Ph.D. minor in ME should consult the 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.
COURSES
PRIMARILY FOR UNDERGRADUATES

Note 1 — The following are especially suitable for freshmen.

101. Visual Thinking
103. Manufacturing and Design

Note 2 — Lab sections in experimental engineering are assigned in groups. If the lab schedule permits, students are allowed, with due regard to priority of application, to arrange their own sections and lab periods. Enrollment with the instructor concerned, on the day before instruction begins or the first day of University instruction, is essential in order that the lab schedule may be prepared. Enrollment later than the first week is not permitted.

30. Engineering Thermodynamics — (Enroll in Engineering 30.)


4 units, Win (Ferziger) MWF 11
lab MTWTh 1:15-3:05 or 3:15-5:05, or a two-hour lab by arrangement

99. Mechanical Dissection — Series of mechanical dissection labs to resolve common questions of everyday products and provide confidence in "hands-on" skills. Students choose a current product, track its history, obtain samples (current and "antique"), disassemble, and explore functions. Formal and informal presentations. Enrollment limited to 20. Prerequisite: keen sense of curiosity.

3 units. Win (Staff) MF 3:15-4
lab W 3:15-4:30


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

103. Manufacturing and Design — (Graduate students register for 303.) Emphasis on prototype development techniques as an intrinsic part of the design process. Fundamentals of machining, welding, and casting introduced in lecture and supported by lab experience. Manufacturing processes through lecture, films, and field trips. Design aspects developed in an individual term project chosen, designed, and fabricated by students. 103D is normally taken concurrently unless student has prior drafting experience. Limited enrollment.

4 units, Aut, Win (Beach) TTh 9-10:50
lab by arrangement

103D. Engineering Drawing — Fundamentals of engineering drawing including orthographic projection, dimensioning, sectioning, exploded and auxiliary views, and assembly drawings. Designed to accompany 103. Homework drawings are of parts fabricated by the student in the shop. Major assignments in 103 are supported by material in 103D and assignment dates are sequenced on the assumption that the student is enrolled in both courses simultaneously.

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.)

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

109. Computer Aided Design of Model Yachts — Hands-on introduction to the art and science of engineering and manufacturing. Students design and construct free sailing model yachts to a high standard of craftsmanship using Computer Aided Design and Manufacturing (CAD/CAM). Theory (aerodynamics and hydrodynamics of sailboats), model yachts design (nomenclature, scaling issues, lofting, history of rating rules, yacht aesthetics, tradeoffs between speed and control), the use of MaxSurf, Vellum, and laser-cutter (design and manufacturing systems), necessary construction techniques (forming hull casting ballast, sewing sails finishing, and rigging), and sailing practice and tuning for performance. Limited enrollment to 30.

4 units, Spr (Faste, Milroy, Dammerman) TTh 3:15-5:30 plus field trips

111. Stress, Strain, and Strength — Review of free body diagram and basic elastic stress. Static failure
Potential design projects for 116C, 211, and beyond. Students identify and engage in human needs in design. Societal trends, current affairs, and personal values are requisites: 115B, Art 160. Projects carried to a high degree of refinement. Anyone wishing to improve freehand drawing skills. Provide subject matter, but the class is open to concurrent assignments in 115A.B. Sketching —Freehand sketching, rendering, and design development. Work is guided by instructors. Concurrent assignments in 116A provide subject matter. Prerequisite: 115C or consent of instructor based on drawing skill. 1 unit, Aut (Staff) W 7:30 p.m.

117. An Introduction to Sensors — (Graduate students register for 220.) Sensors are widely used in scientific research and as an integral part of commercial products and automated systems. Basic principles for sensing displacement, force, pressure, acceleration, temperature, optical radiation, nuclear radiation, and other physical parameters. Performance, cost, and operating requirements of available sensors. Elementary electronic circuits which are typically used with sensors. Lecture demonstration of a representative sensor from each category elucidates operating principles and typical performance. Lab experiments with off-the-shelf devices. 3 units, Aut, Spr (Kenny) MW 9-10:50

118. Introduction to Mechatronics — Open to undergraduate and graduate students. Introduces technologies involved in mechatronics (Intelligent Electro-Mechanical Systems) and the techniques necessary to apply this technology to mechatronic system design. Topics: electronics — A/D, D/A converters, op-amps, filters, power devices; software program design, event-driven programming; hardware and DC Stepper Motors, solenoids, and robust sensing. Lab component of structural assignments and open-ended team project. Limited enrollment. Prerequisites: Engineering 40, Computer Science 106, or equivalent. 4 units, Win (Carreyr, Kenny) MWF 1:15-3:05

119. Precision Engineering — Lectures, lab experiences, field trips, individual design and fabrication projects, current topics of interest in manufacturing, emphasizing precision engineering. What concepts and technologies enable microinch resolution and repeatability? What are the applications for ultra-precision machining and measuring systems? Students select projects from the “customers” with research applications on campus and pursue them to hardware. Final project presentation should demonstrate the application of design skills to some problem in precision engineering. Limited enrollment. 3 units, Spr (Beach) TTh 9-10:50

120. History and Philosophy of Design — Major schools of 19th- and 20th-century design including Arts-and-Crafts Movement, Bauhaus, Industrial Design, Post-Modernism are analyzed in terms of their continuing cultural relevance. Relation of design to art, technology, and politics; readings from theories. Buckling (column, plate, local). Fatigue failure criteria and life prediction methods. Introduction to fracture mechanics, corrosion, and residual stresses. Contact stresses and surface failures (fretting, pitting, wear). Homework assignments emphasize applications to mechanical design.

3 units, Aut (Staff) MW 1:15-2:40

112. Mechanical Systems — Emphasizes functional aspects of the design process. Applications of basic principles and empirical relationships in the evolution of conceptual design to detailed specification of critical components. Individual and group design projects apply principles to develop a mechanical system to meet specified functional goals. Corequisites: 101, 103, 111.

3 units, Spr (Staff) TTh 1:15-2:40

113. Engineering Design — Application of information from various sources to create designs and models of new mechanical devices. Design is studied as a process, and experienced by students as they work on a team design project. Final project results are presented to a professional jury. Prerequisites: 101, 103, 111, 112.

3 units, Spr (Staff) TTh 2:15-5:05

one evening lab by arrangement

115A. Human Values in Design — Active encounters with human values in design. Lectures survey central philosophy of product design program, emphasizing the relation between technical and human values, the creative process, and design methodology. Lab exercises include development of simple product concepts visualized in rapidly executed three-dimensional mockups. Prerequisite: 101.

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

one evening lab by arrangement

115B. Expression of Function — Numerous tightly constrained projects requiring reconciliation of manufacturing, human factor, and aesthetic concerns; solutions presented in a variety of design media. Prerequisites: 103, 115A; Art 60.

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

115C. Design Sketching — Freehand sketching, rendering, and design development. Work is guided by instructors. Concurrent assignments in 115A,B provide subject matter, but the class is open to anyone wishing to improve freehand drawing skills.

1 unit, Win, Spr (Staff) W 7:30-10 p.m.

116A. Advanced Product Design — Small-scale projects carried to a high degree of refinement. Emphasis on craftsmanship and aesthetics. Prerequisites: 115B, Art 160.

3 units, Aut (Kelley) TTh 9-11

116B. Advanced Product Design — The perception and engagement of human needs in design. Societal trends, current affairs, and personal values as sources for design inspiration. Students identify potential design projects for 116C, 211, and beyond.

3 units, Win (Faste, Turnbull) TTh 11-1:05

116C. Advanced Product Design — Summary project utilizing knowledge, methodology, and skills obtained in 101, 103, 115A,B, and 116A,B. Final presentation to professional jury. Prerequisite: 116B.

3 units, Spr (Staff) TTh 11-1:05

116D. Advanced Design Sketching — Freehand sketching, rendering, and design development. Work is guided by instructors. Concurrent assignments in 116A provide subject matter. Prerequisite: 115C or consent of instructor based on drawing skill.

1 unit, Aut (Staff) W 7:30 p.m.

116E. Advanced Design Sketching — Emphasizes functional design projects, current topics of interest in manufacturing, emphasizing precision engineering. What concepts and technologies enable microinch resolution and repeatability? What are the applications for ultra-precision machining and measuring systems? Students select projects from the “customers” with research applications on campus and pursue them to hardware. Final project presentation should demonstrate the application of design skills to some problem in precision engineering. Limited enrollment.

3 units, Spr (Beach) TTh 9-10:50

116F. Advanced Design Sketching — The perception and engagement of human needs in design. Societal trends, current affairs, and personal values as sources for design inspiration. Students identify potential design projects for 116C, 211, and beyond.

3 units, Win (Faste, Turnbull) TTh 11-1:05

116G. Advanced Design Sketching — Summary project utilizing knowledge, methodology, and skills obtained in 101, 103, 115A,B, and 116A,B. Final presentation to professional jury. Prerequisite: 116B.

3 units, Spr (Staff) TTh 11-1:05

116H. Advanced Design Sketching — Emphasizes functional design projects, current topics of interest in manufacturing, emphasizing precision engineering. What concepts and technologies enable microinch resolution and repeatability? What are the applications for ultra-precision machining and measuring systems? Students select projects from the “customers” with research applications on campus and pursue them to hardware. Final project presentation should demonstrate the application of design skills to some problem in precision engineering. Limited enrollment.

3 units, Spr (Beach) TTh 9-10:50

116I. Advanced Design Sketching — The perception and engagement of human needs in design. Societal trends, current affairs, and personal values as sources for design inspiration. Students identify potential design projects for 116C, 211, and beyond.

3 units, Win (Faste, Turnbull) TTh 11-1:05

116J. Advanced Design Sketching — Summary project utilizing knowledge, methodology, and skills obtained in 101, 103, 115A,B, and 116A,B. Final presentation to professional jury. Prerequisite: 116B.

3 units, Spr (Staff) TTh 11-1:05

116K. Advanced Design Sketching — Emphasizes functional design projects, current topics of interest in manufacturing, emphasizing precision engineering. What concepts and technologies enable microinch resolution and repeatability? What are the applications for ultra-precision machining and measuring systems? Students select projects from the “customers” with research applications on campus and pursue them to hardware. Final project presentation should demonstrate the application of design skills to some problem in precision engineering. Limited enrollment.

3 units, Spr (Beach) TTh 9-10:50

116L. Advanced Design Sketching — The perception and engagement of human needs in design. Societal trends, current affairs, and personal values as sources for design inspiration. Students identify potential design projects for 116C, 211, and beyond.

3 units, Win (Faste, Turnbull) TTh 11-1:05

116M. Advanced Design Sketching — Summary project utilizing knowledge, methodology, and skills obtained in 101, 103, 115A,B, and 116A,B. Final presentation to professional jury. Prerequisite: 116B.

3 units, Spr (Staff) TTh 11-1:05
130. Internal Combustion Engines — Internal combustion engines including conventional and turbocharged spark ignition engines, diesel, and gas turbine engines. Lectures: basic engine cycles, engine components, methods of analysis of engine performance, pollutant emissions, and methods of engine testing. Lab involves hands-on experience with engines and test hardware. Limited enrollment. Prerequisite: Engineering 30, 131A (or concurrent enrollment in 131A), or equivalent.

3 units, Spr (Katz) F 10-12

131A. Heat Transfer — (Graduate students register for 250). First of three-quarter sequence. Topics: fluid mechanics, heat transfer, and thermodynamics with emphasis on basic principles used in the energy sciences and their application in man-made systems. Lab is devoted to demonstration and experiments in the specific lecture area and covers basic experimental procedure, including measurement techniques, experiment design, data collection, processing, and evaluation. Prerequisites: 33, Engineering 30. Recommended: intermediate calculus, ordinary differential equations.

5 units, Aut (Goodson) MWF 10
lab one afternoon by arrangement

131B. Fluid Mechanics — Continuation of 131A.
3 units, Win (Lele) MWF 10

131C. Thermodynamics — Continuation of 131B.
3 units, Spr (Mitchell) MWF 11

132. Thermosciences Laboratory — Demonstrates the utility of experimentation in thermosciences and introduces modern lab techniques, e.g., A/D converters for digital data acquisition. Two introductory experiments are selected from vehicle aerodynamics, compressible fluid flow, and turbo-machinery. Major experiment involves an internal combustion engine. Communication of results in written and oral reports and evaluation of data using formal methods of uncertainty analysis emphasized. Enrollment limited to 30 preregistered students. Prerequisites: 33, 131A, and Engineering 30.

3 units, Win, Spr (Abrahmason) lec. T 9
lab four hours weekly by arrangement

161. Dynamic Systems — Linear modeling, analysis, and measurement of mechanical and electromechanical systems. Topics: resonance, damping, stability, harmonic analysis, and force transmission. Extensions to multiple degrees of freedom using computers. Demonstrations and practical examples. Assumes a background in dynamics and math. Enrollment limited to 60. Prerequisites: Engineering 12, Math. 43, or equivalent; Math. 113 and Engineering 40, or equivalent (can be taken concurrently).

4 units, Aut (Staff) TTh 1:15

180. Form and Function of the Musculoskeletal System — Lecture and laboratory studies of musculoskeletal anatomy and biomechanics. Limited enrollment.

2 units, Spr (Carter, Chase, Dolph) F 2:15-4:05

191. Engineering Problems and Experimental Investigation — Directed study and research for undergraduates on a subject of mutual interest to student and staff member. Student must find faculty sponsor and have approval of the adviser.

1-5 units, any quarter (Staff) by arrangement

UNDERGRADUATE AND GRADUATE

The following are especially suitable for advanced undergraduates and graduates and may be used to satisfy the M.S. requirement, item 3, approved electives.

103. Manufacturing and Design
105A. Feedback Control Design — (Enroll in Engineering 105A)
113. Engineering Design
138. Noise Pollution — (Enroll in Aeronautics and Astronautics 138)
161. Dynamic Systems Design
255. Gasdynamics
250. Introduction to Heat Transfer

PRIMARILY FOR GRADUATES

ENGINEERING MATHEMATICS

201A, B, C are intended for students in the master's program with some proficiency in undergraduate engineering mathematics and computing. Students enrolling in this sequence should have had some exposure to elementary linear algebra (for example, elementary operations with matrices), ordinary differential equations (for example, Math. 130), partial differential equations, and computer programming. Students who do not meet these guidelines should be prepared to devote additional remedial time to these courses or consider satisfying their mathematics requirements through Math. 113 and 131, and Computer Science 137.

210A. Cross-Functional Systems Design Framework — Industry-sponsored projects develop knowledge of and skill at applying structured concurrent engineering design methodology. Corporate representatives deliver project specific technology while the teaching team focuses on methodology. Three short design exercises sharpen methods awareness and develop team design skills in preparation for the sponsored project. The design team refines the problem statement; develops detailed functional, physical, and user requirements; and identifies design approach alternatives, supported by a design coach, corporate liaison, and faculty advisers. Possible projects: mechanism design, automation design, manufacturing process design, consumer product, and biomedical device design. Three-quarter series. Students may take 210A only. Enrollment limited to 45.

4 units, Aut (Leifer) TTh 3:15-5:05

210B. Cross-Functional 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, communication, modeling and internet services facilities. Enrollment limited to 45.

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

210C. Cross-Functional Systems Design: Functional Assessment — Continuation of 210B. One or more leading design alternatives are developed into full-scale functional product prototypes. Emphasis on oral and written presentation skills. Final designs and function prototypes are presented to corporate sponsors at the Design Affiliates Conference the first week in June. Enrollment limited to 45.

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

211 A.B.C. Product Design Master's Project — For Product Design or Design (Art) majors only. Three-quarter graduate design projects taught jointly with Department of Art faculty. Entails identifying and engaging needs, exploration of design in two and three dimensions, construction of working prototypes that synthesize human, aesthetic, and technological concern, and presenting the result to a professional jury. Corequisite: Art 360.

211A. 2-4 units, Aut (Faste, Kelley) T 7-10 p.m.
211B. 2-4 units, Win (Faste, Kelley) T 7-10 p.m.
211C. 2-4 units, Spr (Faste, Kelley) T 7-10 p.m.
213. Computer-Aided Prototyping — Prototype design and fabrication emphasizing the use of computer supported tools in the design process. Students choose, design, and build individual projects. The tool set includes Hewlett Packard and Apple 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.

3 units, Spr (Milroy, Martin) MW 10
lab by arrangement

214. Quality and the Products of Technology — (Same as Industrial Engineering 214; Science, Technology, and Society 118.) “Quality” has acquired a specific and limited meaning in many manufacturing organizations (decreased variation, increased efficiency). True product quality includes relatively tangible characteristics (performance, economy, and reliability), and factors such as emotional response of the user, cultural consistency, craftsmanship, elegance, symbolism, 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 increase it. Readings, lectures, projects, papers, and field trips. Not a quality assurance or quality control in production course. Enrollment limited.

4 units, Win (Adams) TTh 11:15-1:05

215. The Designer in Society — Open to graduate students from all disciplines. Participants’ career objectives and psychological orientation are compared with existing social values and conditions. Emphasis is on assisting individuals in assessing their roles in society. Readings on political, social, and humanistic thought related to technology and design. Term project. Enrollment limited to 20.

3 units, Win (Roth) W 1:15-4:05

216. Introduction to Aircraft Design Synthesis and Analysis — (Enroll in Aeronautics and Astronautics 241A.)

217A. Design for Manufacturability — Methodology — Addresses systematic methodologies to define, develop, and produce competitive products. Methods cover characterization of user values, design for manufacturability, and life-cycle values (reliability, serviceability, environmental compatibility), key issues for product competitiveness. Student teams identify opportunities for improvement and develop a comprehensive product definition. Lectures on design for value, functional analysis, quality function deployment, value engineering, design for assembly, product line structuring, process and material selection, design for productibility, failure modes and effects analysis (FMEA), design for serviceability, environmental product design, and organizational issues for simultaneous engineering.

4 units, Win (Ishii) MW 4:15-5:30

217B. Design for Manufacturability — Building on the product definition process in 217A,B, focuses on the implementation of competitive product design. Student groups apply structured methods to optimize the design of an improved product, and plan for its manufacture, testing, and service. The deliverable project is a comprehensive product and process specification. Lectures on concept manufacturing process, design for robustness, Taguchi Method, SPC, and six sigma processes, tolerance analysis, flexible manufacturing, product testing, rapid prototyping. Prerequisite 217A.

4 units, Win (Ishii) MW 4:15-5:30

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 at the beginning of Autumn Quarter. Lab fee.

4 units, Aut (Carryer) TTh 11:15-1:05

218B. Smart Product Design Applications — Lab design problem lecture series on programmable electromechanical systems design methodology. Fundamentals and advanced topics are introduced in the lab assignments and projects. Topics: advanced digital and analog circuits, signal conditioning and analysis, software requirements for embedded systems, sensors, actuators, and real-time operating systems. Prerequisite: passing of the Smart Product Design Fundamentals proficiency examination.

4 units, Win (Carryer) TTh 11:15-1:05

218C. Smart Product Design Practice — Project-driven lecture and case study deals with advanced design and the development of real smart-product prototypes. Student teams carry design from concept to functional prototypes. Continuing review of advanced technology issues. Topics: product specification, development environment selection, design team management, scheduling, and documentation design.

4 units, Spr (Carryer) TTh 11:15-3:15

218D. Smart Product Design Projects — Industrially sponsored project is the culmination of the Smart Product Design sequence. Student teams take an industrial project that requires the application and extension of the knowledge gained in the prior three quarters, including prototyping of a final solution with hardware, software, and professional
documentation and presentation. Lectures extend the students’ knowledge of electronic and software design and electronic manufacturing techniques. Topics: chip level design of microprocessor systems, real time operating systems, alternate microprocessor architectures.

4 units, Aut (Carreyer) TTh 3:20-4:20

219. Introduction to Robotics — (Enroll in Computer Science 223A.)

220. Introduction to Sensors — See 117.

221. Materials Selection in Design — (Enroll in Material Science and Engineering 270.)

222. Kinematic Synthesis of Mechanisms — The rational design of linkages. The problem of determining linkage proportions to fulfill various design requirements, treated analytically. Topics: two-dimensional displacements and motions, the theory of higher plane curves, higher-order path-curvature analysis, circle and center-point theory.

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

223. Creativity and Innovation in Organizations — (Enroll in Industrial Engineering 201.)

225A. Control System Design and Simulation — (Enroll in Engineering 206.)

225B. Nonlinear Control — (Enroll in Engineering 209.)

226A. Linear Dynamical Systems — (Enroll in Engineering 208A.)

226B. Modern Control Design I — (Enroll in Engineering 208B.)

226C. Modern Control Design II — (Enroll in Engineering 208C.)

227A. Optimal Control of Dynamic Systems — (Enroll in Aeronautics and Astronautics 278.)

MECHANICS OF SOLIDS

230. Advanced Kinematics — Kinematics from mathematical viewpoints. Introduction to algebraic geometry of point, line, and plane elements. Emphasis is on basic theorems which have potential application to mechanical linkages, computational geometry, and robotics.

3 units, Aut (Roth) MW 2:15-3:30


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


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

233A. Dynamical Systems — Dynamical systems are governed by mappings or ordinary differential equations and used in making predictions concerning the long-time behavior of such systems. Problems arise in applications such as weather prediction, turbulence, and planetary interactions. Topics: long time behavior, stability, bifurcation, chaos, invariant manifolds, attractors, and Hamiltonian systems. Theory illustrated with examples from mechanics. Prerequisites: Math. 130, consent of instructor.

3 units (Staff) given 1996-97

233B. Numerical Analysis of Dynamic Systems — The design and analysis of numerical methods for the simulation of ordinary differential equations exhibiting complicated dynamical behavior. Problems arise in applications such as weather prediction, turbulence, and planetary interactions. Topics: Runge Kutta and multistep methods, convergence of invariant sets, long-time numerical stability, integration, and Hamiltonian problems. Prerequisite: 233A or Math. 276.

3 units (Staff) given 1996-97


3 units (Hughes) given 1996-97

234B. Finite Element Methods in Fluid Mechanics — Continuation of 234A.

3 units (Hughes) given 1996-97

234C. Finite Element Methods in Fluid Mechanics — Continuation of 234B.

3 units (Hughes) given 1996-97

235A. Finite Element Analysis — Emphasis on fundamental concepts and techniques of “primal” finite element methods. Method of weighted residuals, Galerkin’s method, and variational equations. Linear elliptic boundary value problems in one, two, and three space dimensions; applications in structural, solid, and fluid mechanics, and heat transfer. Properties of standard element families, numerically integrated elements including reduced integration. Mixed penalty and generalized displacement methods for application to constrained
field theories such as classical plate theory, incompressible elasticity, Stokes flow, etc. Thick and thin beams, plates, and shells. Implementation of the finite element method. Compacted column equation solver, assembly of equations, and element routines. Comparison of finite element results with exact solutions. Brief treatment of the mathematical theory of finite elements.

3 units, Aut (Hughes) TTh 2:45-4


3 units, Win (Hughes) TTh 2:45-4


3 units, Spr (Hughes) TTh 2:45-4

236. Wave Propagation—(Enroll in Math. 274.)

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 (Stuart) MWF 9

238B. Theory of Elasticity—Foundations and applications for the linear theory of elasticity to engineering design problems. Basic concepts of stress and strain and their mathematical representation of tensors. Emphasis is on formulation and solution of problems in two-dimensional elastostatics (plane stress and plane strain), including torsion, bending, voids, inclusions, interfaces, thermal stress, and possibly dislocations, cracks, and elastic waves.

3 units, Aut (Herrmann) TTh 9:30

238C. Boundary Integral Methods—Integral equation methods for numerically solving problems in elasticity and fracture. Prerequisite: 238B.

3 units (Gao, Barnett) not given 1995-96

240A. Introduction to Fracture Mechanics—Linear and non-linear analysis of crack-tip stress fields; energy concepts and crack growth criteria; conservation integrals; fracture behaviors under small scale or large scale plastic yielding; aspects of fatigue, dynamic fracture, and micromechanisms of fracture. Prerequisite: 238A or equivalent.

3 units, Spr (Gao) MWF 9

240B. Advanced Fracture Mechanics—Continuation of 240A. Three-dimensional crack analysis, interfacial cracks, viscoelastic crack analysis, numerical methods in fracture mechanics, and crack interactions with other material defects such as dislocations and inclusion. Applications of fracture mechanics to composite materials. Prerequisite: 240A.

3 units, Spr (Gao) given 1996-97

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 (Staff) MWF 1:15

241B. Theory of Shells—Axisymmetric deformation of shells of revolution. Asymptotic expansions, direct and bending stress. Application to design of domes, pressure vessels, expansion joints and pressure sensing devices. Use of asymptotic solutions for “very large finite element computation.” Prerequisite: 111 or Civil Engineering 114.

3 units, Win (Staff) MWF 1:15

241C. Theory and Numerical Simulation of Shells—Basic results on differential geometry and tensor analysis, and derivation of the linear and nonlinear shell equations from the three dimensional theory. Galerkin formulation of the shell equations for the static and dynamic problems. Prerequisites: 235A, 241A or equivalent.

3 units, Spr (Steele) TTh 1:15-2:30

Traveling loads on stationary and rotating shells and discs.
3 units (Steele) given 1996-97

243. Micromechanics — (Enroll in Material Science and Engineering 350.)

242. Classical Dynamics — (Enroll in Aeronautics and Astronautics 242.)

3 units, Win (Nelson) MW 2:15-3:45

247A. Microstructure and Mechanical Properties — (Enroll in Materials Science and Engineering 251.)

3 units, Spr (Nelson) M 2:15-5:05 plus lab by arrangement

249. Experimentation in Aeronautics and Astronautics — (Enroll in Aeronautics and Astronautics 131.)

HEAT TRANSFER, FLUID MECHANICS, AND HIGH TEMPERATURE GAS DYNAMICS

250. Introduction to Heat Transfer — For graduate students; see 131A.

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. 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 (Staff) MWF 11

252A. Radiative Heat Transfer — Fundamentals of thermal radiation heat transfer; analysis of radiative exchange between black and non-black surfaces and enclosures; radiation from gases at high temperature, and particulate-laden gases; combined radiation and conduction. Advanced material for students with interests in heat transfer, as applied in high-temperature energy conversion systems; take 252A,B, to obtain depth in convective heat and mass transfer. Prerequisites: graduate standing, an undergraduate course in heat transfer. Recommended: some computer skills.
3 units, Aut (Mitchell) MWF 10

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

252C. Heat Transfer in Microdevices — Application-driven introduction to the thermal design of electronic circuits, sensors, and actuators that have dimensions comparable to or smaller than one micrometer. Impact of thin-layer boundaries on thermal conduction and radiation. Convection in microchannels and micro-heat pipes. Thermal property measurements for microdevices. Emphasis on Si/GaAs semiconductor devices and layers of unusual, technically-promising materials, e.g., high-temperature superconductors and chemical-vapor-deposited (CVD) diamond. Final project can be based on student research interests. Prerequisite: 250 or equivalent or consent of instructor.
3 units, Spr (Goodson) TTh 2:15-3:30
energy. Examples and applications from areas of equilibrium chemical composition. Maxwellian and Boltzmann distributions of velocity and molecular thermodynamic properties, law of mass action, and properties of gases and gas mixtures. Transport and view. Introductory kinetic theory, chemical thermodynamics, and statistical mechanics as applied to chemically reacting gases from a molecular point of view.


263. Partially Ionized Plasmas and Gas Discharges — Introduction to partially ionized gases and the nature of gas discharges. Topics: fundamentals of plasma physics emphasizing collisional and radiative processes, equilibrium and non-equilibrium plasmas; plasma diagnostics, application to energy conversion devices, and materials processing. Prerequisite: 262A or consent of instructor.

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.

265. Gasdynamics — Recommended for students with little experience in compressible flow. Introduction to compressible flow. Sound waves and normal shock-waves. Quasi-one-dimensional steady flows in variable area ducts with friction, heating, and cooling; unsteady one-dimensional flow, two-dimensional supersonic flow; oblique shock waves, Prandtl-Meyer expansions, detonation waves. Method of characteristics.

266. Computational Methods in Fluid Mechanics — The analytical framework of homogeneous turbulence, turbulent transport, rational modeling of turbulence in flows of engineering interest, zonal models for turbulent flows and sub-grid scale and near-wall modeling for large eddy simulation. Prerequisites: 261A, graduate sequence in fluid mechanics.


268. Fluid Mechanics — 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.


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. Modern computational equations of state. Thermodynamics of condensed phases. Prerequisites: undergraduate background in engineering thermodynamics and computer skills.


3 units (Heegaard) given 1996-97

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)

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

293A. Design of Inactive Devices — Open to students from Computer Science, the Design Division, the Social Sciences, Business, Medicine, and Education. Two-quarters. Small, interdisciplinary teams observe and analyze people in work or play situations, designing physical objects whose functionality is significantly determined by their embedded software. Prototypes are submitted to an international design competition. Focus is on computer interfaces, interaction, design aesthetics, and the underpinnings of successful design: a reflective, interactive design process, group dynamics of effective multi-disciplinary team work, and working with users. Limited enrollment. Prerequisite: depth knowledge in one of the relevant disciplines mentioned above.

3 units, any quarter (Staff) by arrangement

293B. Design of Inactive Devices — Continuation of 293A. Students taking 293A given priority. Limited enrollment.

3 units, Spr (Kelley, Winograd) TTh 4:15-5:30

294. Design Forum — Invited speakers address issues of interest to designers. Brief presentation followed by open discussion.

1 unit, Aut, Win, Spr (Staff) 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 (Staff) Th 4:15-5:30

1 unit, Aut, Win, Spr (Staff) F 3:15

297. Design Theory and Methodology Forum — A mixture of research reports, literature reviews, and designer interviews promote vigorous examinations of the cognitive basis for designer behavior and design tool development.
1 unit, Aut, Win, Spr (Leifer) W 5:15-6:15 p.m.

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

299. Teaching Participation — Credit is given for assisting a professor in the teaching of a mechanical engineering course. Prerequisite: consent of the supervising instructor.
1-3 units, Aut, Win, Spr (Staff)

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

301. Thesis — Dissertation for the degree of Ph.D.
2-15 units, any quarter (Staff) by arrangement

302. Manufacturing and Design — (Same as 103.)

303. Ambidextrous Thinking — Visual and kinesthetic thinking skills developed and exercised in the context of solving design problems. Quickly executed perspective, orthographic, diagrammatic, and three-dimensional sketches emphasized. Exercises to appreciate and develop the entire body's role in creative thinking. Emphasis on fluent and flexible idea production. Enrollment limited to 60.
3 units, Aut (Faste) lecture/lab MW 3:15-5:05

310A,B. Integrated Design, in Marketing, and Manufacturing — (Same as Business 309, 310.) Teams of students (two engineers and two MBAs) work an integrated exercise in market research, product design, prototype manufacturing, and product management in a specified market domain. IDMM integrates depth in the market research technique, conjoint analysis, with education in prototyping methods supported by the Product Realization Laboratory. "Customer ready prototypes" are launched to perspective customers whose attribute and product based preferences are encoded to form the basis of a computer simulated market. Teams compete for profitability by managing the price and production quantities of their products in the market. IDMM aims to graduate leaders in product development. Students must enroll both quarters. Limited enrollment.
4 units. Aut, Win (Beach, Srinivasan) lecture/lab MW 1:20-3:05 plus lab by arrangement

311. Robotics and Vision Lab — For graduate students with some familiarity in robotics who want project experience with robotic and vision systems. Recent 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:
350A. Advanced Fluid Mechanics — Introduction to boiling and condensation heat transfer, and fluid mechanics of two-phase flow. Topics include: the two-phase flow fundamentals and modeling, wave propagation in two-phase fluid media, interfacial transport phenomena, thermofluid dynamics instabilities of two-phase flows, characteristics of two-phase flow regimes, applications of boiling, condensation, and two-phase flow in energy, chemical, and other industrial systems. Prerequisites: elementary fluid mechanics, heat transfer, and thermodynamics.

3 units (Kim) alternate years, not given 1996-97

ADVANCED FLUID MECHANICS

351A. Advanced Fluid Mechanics — For advanced students specializing in fluid mechanics. Topics: kinematics (analysis of deformation, critical points and flow topology, Helmholtz decomposition); constitutive relations (viscous and visco-elastic flows, non-inertial frames); vortex dynamics; circulation theorems, vortex line stretching and rotation, vorticity generation mechanisms, vortex filaments and Biot-Savart formula, local induction approximation, impulse and kinetic energy of vortex systems, vorticity in rotating frame. Prerequisite: graduate-level courses in compressible and viscous flow.

3 units (Lele) given 1996-97

351B. Advanced Fluid Mechanics — Waves in fluids: surface waves, internal waves, inertial and acoustic waves, dispersion and group velocity, wave trains, transport due to waves, propagation in slowly varying medium, wave steepening, solitons and solitary waves, shock waves. Stability of fluid motion: dynamical systems, bifurcations, Kelvin-Helmholtz instability, Rayleigh-Benard convection, energy method, global stability, linear stability of parallel flows, necessary and sufficient conditions for stability, viscosity as a destabilizing factor. Focus is on flow instabilities. Prerequisites: graduate-level courses in compressible and viscous flow.

3 units (Lele) given 1996-97


3 units (Moin) alternate years, given 1996-97

390. Teaching Assistant Practical Training — For two-year Teaching Assistants. Student obtains summer employment in research or relevant industry. Grading based on a report to be submitted at the end of the summer. Consult the ME Student Services Manager and the Mechanical Engineering Graduate Handbook.

1 unit, Aut, by arrangement
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, queuing, reliability theory, and simulation methodology; linear, nonlinear, and integer programming; optimization under uncertainty; networks and combinatorial optimization; nonlinear equations; equilibrium programming; 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, and so on.

Office facilities are available for doctoral students. In addition, the department has its own remote-access computer terminals, microcomputers, and computer workstations.

The department maintains close contacts with industry and government through an active Industrial-Affiliates and Corporate-Friends Program with about a dozen current participating firms; grants and contracts from government agencies, research institutes and large companies; student projects in companies and other agencies; semiannual Workshops for OR Managers; and faculty consulting. These activities provide students valuable real-world experience and often provide employment opportunities. The 1994 US Statistical Abstracts projects, in that regard, U.S. civilian employment of operations research analysts will rise 61 percent 1992-2005, the second largest growth rate in all fields of science and engineering.

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.

OR 152 introduces linear, nonlinear, and dynamic programming for students familiar with calculus. OR 153 introduces stochastic processes and models in operations research for students with a knowledge of calculus and undergraduate level probability theory.

OR 241 is a first course in linear programming; matrix algebra is a corequisite. OR 242 explores shortest paths, dynamic programming, convexity, inventory, and production. OR 243 emphasizes the use of integer and nonlinear programming. OR 251 and 252 introduce probabilistic models in operations research. OR 241, 242, and 243 are a more extensive and higher-level presentation of topics in 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, 356, 358, and 359.

UNDERGRADUATE PROGRAM

BACHELOR OF SCIENCE IN MATHEMATICAL AND COMPUTATIONAL SCIENCE

Although the department does not have an undergraduate degree program, it participates with the Departments of Computer Science, Mathematics, and Statistics in a program leading to a B.S. in Mathematical and Computational Science. See the "Mathematical and Computational Science" section of this bulletin.

GRADUATE PROGRAMS

MASTER OF SCIENCE

The M.S. program in Operations Research (OR) prepares individuals for high-level professional work applying operations research. Thus, the program emphasizes a solid foundation for a lifelong professional career formulating, analyzing, and using operations research models of complex systems to address problems in business or government.

In addition to the University's basic requirements for the master's degree discussed in the "Graduate Degrees" section of this bulletin, a candidate must complete an approved course program of 45 units. This program normally can be completed in one academic year (three academic quarters) of full-time work. A number of operations research practitioners in local industry also attend the program part time under the Honors Cooperative Program, taking one or two daytime courses per quarter.

Each student normally fulfills the following requirements for the M.S. degree:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR 241. Linear Programming</td>
<td>3</td>
</tr>
<tr>
<td>OR 242. Network Programming</td>
<td>3</td>
</tr>
<tr>
<td>OR 243. Nonlinear and Integer Programming</td>
<td>3</td>
</tr>
<tr>
<td>OR 251. Stochastic Decision Models in Operations Research</td>
<td>3</td>
</tr>
<tr>
<td>OR 252. Stochastic Models in Operations Research</td>
<td>3</td>
</tr>
<tr>
<td>OR 253. Simulation</td>
<td>3</td>
</tr>
<tr>
<td>OR 281. Cases in Operations Research</td>
<td>4</td>
</tr>
<tr>
<td>OR 282. Projects in Operations Research</td>
<td>3</td>
</tr>
<tr>
<td>Stat. 200. Introduction to Statistical Inference*</td>
<td>3</td>
</tr>
<tr>
<td>Stat. 217. Introduction to Stochastic Processes</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
</tr>
</tbody>
</table>

Background — Students are presumed to have taken at least one year of calculus. In addition, they are expected to have a background in linear algebra, probability theory, and computer programming equivalent respectively to Math. 103 (or 113), Statistics 116, and Computer Science 106A (or 105A or 106X). Deficiencies in these areas may be removed by taking these courses at Stanford. Up to 7 units of the last three courses may be counted towards the 14 units of electives.

A required course may be waived when evidence is provided that the student has mastery of the subject. Courses that are waived may not be counted towards the M.S. degree. Instead, students may substitute electives. Also, up to 3 units of credit earned while a graduate student at another institution, and not counted towards a degree there, may be used to reduce the 45-unit requirement for the M.S. degree.

Electives — Electives allow students freedom to pursue their special interests. These might include courses to broaden their knowledge in engineering, business, computer science, statistics, economics, mathematics, psychology, and so on; to deepen their knowledge in operations research; or to improve their communication skills. For example, students might wish to pursue interests in operations research with spreadsheets, decision analysis, numerical analysis, financial engineering, manufacturing, applied statistics, or supply chains. Electives are chosen freely by students with their advisers' advice from 100 or higher level courses (or Engineering 60) in any Stanford department subject only to the requirements of being professionally relevant, including 2 units of OR 290, and not being more elementary than a course required for the M.S. degree in Operations Research in the area of that course. Thus, any graduate (200 or higher level) course offering in the department would be appropriate as would many undergraduate and graduate courses in other departments.

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. No thesis is required. A minimum letter grade indicator (LGI) of 2.75 is required.

Projects — The case and projects courses, OR 281 and 282, provide students with experience in identification, modeling, and solution of real-world problems. Of particular importance in these courses are the experiences of defining problems, gathering data, working in teams, interacting with clients, managing time, and communicating effectively. Recent student projects at various international, Fortune-500, and Silicon Valley firms and institutions include: scheduling for a container-shipping company, organizational analysis and materials management for a local hospital, tanker routing at an oil company, partitioning mortgage pools at a bank, management of inventories and rework for an airline, power-demand management at a local city, supply-chain management at an agricultural feeds company, international location of router-maintenance depots at a computer-networking firm, long-term water planning for a local city, hedge-fund risk evaluation for a mutual fund, scheduling of integrated circuit fabrication at a computer company, pension-fund management for a local consulting company, retirement policies at Stanford University, circuit-board inventory management at an electronics firm, train make-up for a railroad, process simulation at an oil company, and crew scheduling at an airline.

ENGINEER

The Engineer degree in Operations Research is for students desiring additional academic preparation beyond the master's degree for a career of professional practice in operations research.

The degree nominally represents an additional academic year of full-time study beyond the M.S. in Operations Research, and includes a thesis. The thesis normally is in the form of a technical report on a successful contribution to (and participation in) an applied project, such as those being carried out in the department's Systems Optimization Laboratory or Energy Studies Project.

Since thesis supervision is required, and the department gives priority to providing thesis advisers for qualified students in the Ph.D. program, the availability of thesis supervisors for the Engineer degree is very limited. Therefore, before being permitted by the department to continue study after the M.S. degree, the student must have personally arranged for a faculty sponsor for thesis supervision and, if financial support is needed, for a research assistantship for the thesis project. These arrangements are then subject to the approval of the department's Admissions and Financial Aid Committee.

The University's basic requirements for the Engineer degree are outlined in the "Graduate Degrees" section of this bulletin.

DOCTOR OF PHILOSOPHY

The program leading to a Ph.D. in Operations Research is for students primarily interested in a career of research, teaching, or high-level technical work in universities, business, or government. Therefore, the Ph.D. program emphasizes the scientific foundations of operations research. In particular, the program is focused on:

1. The study of the abstract mathematical structure of models derived from real life situations such as allocation models of an enterprise or an economy, energy modeling, network flow.
models of transportation and communication systems, reliability models of complex engineering systems, 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, models for conflict resolution, and optimization under uncertainty.

2. The development of the mathematical theory and algorithms necessary for the study of these models.

Examples of the disciplines studied include energy and economic modeling, mathematical programming, dynamic programming, stochastic systems, stochastic processes, simulation methodology, network and combinatorial theory, reliability, queueing theory, inventory theory, game theory, and optimizing large-scale dynamic stochastic linear programs.

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 51 or 202. Students lacking background in some of these areas can include appropriate courses in their program at Stanford.

2. Requirements in Operations Research: at least five of the courses in Group 1 (340, 341, 342, 343, 345, 348); all of Group 2 (351, 353, 356, 358, 359); 381 and a total of 13 other courses chosen from Groups 1, and 3 (for example, 344, 346, 363, 371, 382).

A doctoral candidate must also fulfill several University requirements, as described in the "Graduate Degrees" section of this bulletin. These include passing a University oral examination and completing a dissertation that represents an original contribution to knowledge expressed in a satisfactory form. The department also requires that candidates successfully complete two written comprehensive examinations. For the first examination, the students are normally examined on their selection of three of the following courses: 340, 341, 342 or 348, 345. Similarly, for the second examination, students normally select three of the following courses: 351, 353, 356, 358, 359. The options may vary from year to year according to what courses are actually offered.

A student performing satisfactorily in the Ph.D. program normally is eligible to receive the M.S. in Operations Research, if desired, after completing 45 units of course work.

Ph.D. MINOR

Doctoral students in other departments may obtain a minor in Operations Research by completing 20 units of 200 or higher-level courses in the department with an average letter grade indicator (LGI) of 3.0 or higher. The courses normally include OR 241, 243, 251, and 253 or approved substitutes.

FELLOWSHIPS AND ASSISTANTSHIPS

Financial aid is available on a competitive basis for qualified doctoral candidates. This includes a number of fellowships as well as some research assistantships supported by departmental research grants and contracts. Although these research assistants work closely with the faculty on their research projects, they usually are able to take close to a full course load. Supplementary financial aid can sometimes be obtained by grading, assisting in special projects, or from University loans.

All applicants for financial assistance must take the General Test and the Subject Test (in a field of the applicant’s choosing) of the Graduate Record Examination.

Applications for fellowships and assistantships should be made to the Graduate Admissions, Registrar's Office by February 15.

COURSES

PRIMARILY FOR UNDERGRADUATES

152. Introduction to Operations Research I — (Enroll in Engineering 62.) DR:6(8)
4 units, Aut, Spr (Staff) MWF 1-2:05

4 units, Win (Iglehart) MTWTh 11:15-12:05

PRIMARILY FOR MASTER'S CANDIDATES

These courses are oriented toward applications. Operations Research (OR) 241, 242, 243, 251, 252, 253, 281, and 282 form a basic one-year core program aimed at students who desire a professional career involving application of operations research in business, government, or industry.

3 units, Aut (Cottle) TTh 2:45-4

242. Network Programming — Introduction to modeling and solving optimization problems on networks. Shortest paths, dynamic programming, present value of money, critical paths, convexity and extreme points, unimodularity, critical paths
with cost benefit, minimum cost flows, inventory and production scheduling, minimum spanning trees, complexity, software (AMPL/MINOS). Corequisite: 241 or equivalent.

3 units, Aut (Eaves) TTh 1:15-2:30


3 units, Win (Eaves) TTh 10:30-11:45

251. Stochastic Decision Models in Operations Research — Stochastic decision models in operations research. Markov decision chains and stochastic programming. Applications from production and inventory control, yield management, scheduling, capacity planning, transportation, emergency services, reliability/quality control/maintenance, finance, and health care. Structure and computation of optimal policies. MATLAB is used. Prerequisites: Statistics 116 and basic linear programming, or equivalent.

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


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

253. Simulation — Generation of uniform and non-uniform random numbers, discrete-event simulations, simulation languages, design of simulations, statistical analysis of the output of simulations, variance reduction, optimization via simulation, applications to modeling stochastic systems in computer science, engineering, and operations research. Prerequisites: a working knowledge of FORTRAN, PASCAL, or C; Statistics 217 or equivalent.

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

281. Case Studies in Operations Research — (Ph.D. students register for 382.) Student teams engage in case studies integrating (and enhancing) problem identification, case definition, case selection, case analysis, teamwork, project scheduling, task definition, task allocation and amalgamation, group behavior, technical writing, public speaking, presentation and questioning skills, and software and library usage, etc., as they relate to the effective use of operations research. Enrollment limited. Prerequisites: 241, 242, consent of instructor. Corequisites: 243, 251, or equivalents.

4 units, Win (Staff) TTh 2:45-5

282. Projects in Operations Research — (Ph.D. students enroll in 382.) Student groups identify, develop, solve, and report on operations research field projects from business, institutions, and government. Emphasis on problem solving; involves interaction, formulation, analysis, data collection, report writing, and discussion and presentation to problem sponsor. Enrollment limited. Prerequisites: 281, consent of instructor. Corequisites: 252, 253.

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

283. Operations Research with Spreadsheets — Reexamines OR techniques introduced in 240 and 250 sequences, e.g., linear and integer programming, network flow problems, inventory theory, and forecasting the simulation techniques in the environment of the spreadsheet. Emphasis is on extending the applicability of these techniques through integration with existing business data structures rather than exploring the underlying mathematical theory.

3 units, Win (Savage) by arrangement

290. Colloquium — Presentation of current research in operations research.

1 unit, Aut, Win, Spr (Staff) W 4:30-5:30

299. Independent Study — Intensive study of literature of special topics.

any quarter (Staff) by arrangement

PRIMARILY FOR DOCTORAL STUDENTS

These advanced courses are concerned with the development of the mathematical theory of operations research and sophisticated applications thereof.

340. Linear Programming — Basic theory plus lab for learning about the numerical, software, and applicational aspects of the field. Formulation of standard linear programming models. Alternative techniques for solving linear programs. Theory of polyhedral convex sets, linear inequalities, alternative theorems, and duality. Variants of the simplex method, dual simplex method, product form of the inverse. Upper bounding, sensitivity analysis, economic interpretations. Large-scale linear programming, decomposition principle. Prerequisite: Math. 113 or consent of instructor.

4 units, Aut (Dantzig) TTh 1:15-2:30

lab (Thapa) Th 4:15-5:30


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

342. Equilibrium Programming — Development and application of the solution of equations (mod-
els) through piecewise linear deformations and curve following. Topics: models of economies and conflict, subdivisions, piecewise linear maps, regularity, degree, fixed point theorems, general and special case algorithms.

3 units, Spr (Eaves) TTh


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, not given 1995-96

345. Network Optimization — (Enroll in Computer Science 363.)

3 units, Win (Plotkin)

alternate years, not given 1996-97

348. Linear Complementarity — Theory of the linear complementarity problem, its applications, and algorithms for its solution. Elements of quadratic programming theory. Pivotal algebra, Schur complements, and matrix classes. Analytic existence theorems. Lemke’s algorithm, the principal pivoting method and degeneracy resolution techniques. Indirect algorithms. Prerequisite: 341 or consent of instructor.

3 units, not given 1995-96

351. Dynamic Programming and Stochastic Control — Sequential decisions under uncertainty, emphasizing Markov branching decision chains. Finite stage models. Discount and Cesaro overlapping optimality for infinite stage models. Successive approximation, policy improvement, and linear programming methods of solution. Team decisions, quadratic costs and certainty equivalents. Maximum principle. Controlled diffusions. Examples from inventory, queueing, reliability, finance, pricing, and stopping problems. Prerequisites: Math. 113, 115; Statistics 217; or consent of instructor.

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


1 unit, not given 1995-96

354. Stochastic Models of Processing Networks — Processing network models may represent service delivery systems, multistage manufacturing processes, or data processing networks. Response time analysis of processing networks, and understanding the factors that contribute to congestion and delay in the operation of a physical system. Applications of processing network theory, especially information systems and manufacturing organizations. Prerequisites: Statistics 217 and 218. Recommended: prior exposure to stochastic models, and queueing theory.

3 units, Spr (Bertimas, Harrison)


1 unit, not given 1995-96

358. Queueing Theory — Advanced nonmeasure theoretic course on the foundation of queueing theory. Topics: Markovian queues, embedded Markov chains, general single server queue and random walk theory, Jackson networks, loss systems, multiple channel queues in heavy traffic, and diffusion approximations. Prerequisite: 359 or equivalent.

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


3 units, Win (Iglehart) TTh 9:30-10:45

361A. Advanced Algorithms — (Enroll in Computer Science 361A.)

3 units, Win (Motwani) F 2:15-4:05

alternate years, not given 1996-97
361B. Advanced Algorithms — (Enroll in Computer Science 361B.)

3 units (Plotkin)
alternate years, given 1996-97

366. Interdisciplinary Seminar on Conflict Resolution — (Same as Economics 386, Law 325, Psychology 283.) Addresses problems of conflict resolution and negotiation from an interdisciplinary perspective. Presentations by faculty and by scholars from other universities.
1-2 units, Win (Arrow, Tversky, Ross, Wilson, Alexander)

367. Welfare Economics — (Enroll in Economics 280.)

5 units, Win (Hammond)

368. Economic Applications of Game Theory — (Same as Business 608.) Reviews recent contributions to game theory and their applications to topics in economic theory, e.g., strategic models of bargaining, trading, pricing, industrial competition, and contracting. Examinations of working papers and journal articles from the current literature chosen partly to elaborate research topics suitable for dissertations. Grading based on term paper. Recommended: familiarity with game theory at level of Business 613.
4 units, Spr (Wilson) MF 3:20-5:05

370. Topics in Mathematical Programming — Seminar with presentations by students and invited speakers. Introduction to techniques for solving structured linear programs. Sparse matrix methods, basis factorization, comparison of exterior and interior methods, generalized linear programming, decomposition principle, convex programming, integer programming, multicommodity problems, stochastic programming. Prerequisite: 340.
3 units, Aut (Dantzig, Infanger) WF 12-2

371. Optimization Under Uncertainty — A fundamental problem of the Decision Sciences is finding an "optimal" solution when some of the parameters of a planning or design problem (e.g., coefficients and right-hand sides of a linear program) are not known with certainty. Such problems, when converted to deterministic equivalent, were too large to solve in practice. Seminar discusses recent breakthroughs that now make it possible to solve on personal computers important classes of stochastic programs using decomposition and importance sampling.
3 units, Win (Dantzig, Infanger) WF 12-2

3 units, Spr (Dantzig, Infanger) WF 11-1

381. Case Studies in Operations Research — (Same as 281.)
4 units, Win (Staff) TTh 2:45

382. Projects in Operations Research — (Same as 282.)
3 units, Spr (Staff) TTh 2:45-4:15

395. Practical Training — Students obtain summer employment in relevant industrial or research activity. A report on the experience is required early in the Autumn Quarter.
1 unit, Aut (Staff) by arrangement

399. Research — Research in department.
any quarter (Staff) by arrangement

emeriti: (Professors) W. Bliss Carnochan, Raymond E. Clayton, Edwin M. Good, Eric Hutchinson, Alex Inkeles, Stephen J. Kline, Bernard Siegel, Walter G. Vincenti

Acting Chair: Robert McGinn
Associate Chair: Robert E. McGinn
Advisory Committee: James L. Adams (Industrial Engineering and Engineering Management), Stephen Barley (Industrial Engineering), Joseph J. Corn (History), David Freyberg (Civil Engineering), Stephen Haber (History), Gabrielle Hecht (History; on leave Winter, Spring), John W. Rick (Anthropology), Nathan Rosenberg (Economics), Scott Sagan (Political Science), Sheri Sheppard (Mechanical Engineering), Terry Winograd (Computer Science)

Professors: James L. Adams (Industrial Engineering and Engineering Management), John H. Barton (Law), Barton J. Bernstein (History), Stephen Haber (History), Timothy Lenoir (History), John McCarthy (Computer Science), Nathan Rosenberg (Economics), Paul S. Seaver (History)

Associate Professors: Stephen Barley (Industrial Engineering and Engineering Management), David Freyberg (Civil Engineering), Clifford L. Nass (Communication), Scott Sagan (Political Science)

Assistant Professor: Gabrielle Hecht (History)

Professor (Research): Michael May (Engineering-Economic Systems)

Professors (Teaching): Gilbert Masters (Civil Engineering), Robert E. McGinn (Industrial Engineering and Engineering Management, and by courtesy, Civil Engineering)

Associate Professor (Teaching): Eric Roberts (Computer Science)

Senior Lecturer: Joseph J. Corn (History)

Lecturer: Paul Edwards (STS, and Computer Science)

Acting Associate Professor: Ben Crow (Human Biology)

Consulting Professor: Richard Meehan (STS, and Civil Engineering)
Technology and science are activities of central importance in modern life, intimately bound up with industrial society's evolving character, problems, and potentials. If scientific and technological pursuits are to further enhance human well-being, they and their effects on society and the individual must be better understood by nontechnical professionals and ordinary citizens as well as by engineers and scientists. Issues of professional ethics and social responsibility confront technical practitioners. At the same time, lawyers, public officials, civil servants, and business people are increasingly called upon to make decisions requiring a basic understanding of science and technology and their ethical, social, and environmental consequences. Ordinary citizens, moreover, are being asked with increasing frequency to pass judgment on controversial matters of public policy related to science and technology. These circumstances require education befitting the complex sociotechnical character of the contemporary era.

Science, Technology, and Society (STS) is an interdisciplinary program devoted to understanding the nature, consequence, and shaping of technological and scientific activities in modern industrial society. Achieving this understanding requires critical analysis of the interplay of science and technology with human values and world views, political and economic forces, and cultural and environmental factors. Hence, students in STS courses study science and technology in society from a variety of perspectives in the humanities and social sciences. To provide a basic understanding of technology and science, technical literacy courses are also included among STS offerings and are requirements in some program curricula.

GENERAL INFORMATION

Selected STS courses may be used, individually or in groups, for various purposes:
1. To satisfy University Distribution Requirements.
2. To satisfy the Technology in Society Requirement of the School of Engineering.
3. To comprise parts of student-designed concentrations required for majors in Human Biology and Public Policy.
4. To satisfy the requirements of the STS honors program complementing any standard major (see below).
5. To satisfy requirements for majors in STS (see below).

STS courses are particularly valuable for undergraduates planning further study in graduate professional schools (for example, business, education, engineering, law, journalism, medicine) and for students wishing to relate the specialized knowledge of their major fields to broad technology- and science-related aspects of modern society and culture.

WALTER G. VINCENTI PRIZE

An annual prize is awarded to the author of the best student essay written in STS 1, 2, 3. This prize honors engineer and historian of technology Professor Walter G. Vincenti, founding member and the first chair of the STS program.

UNDERGRADUATE PROGRAMS

Degree programs in STS are interdisciplinary curricula devoted to understanding the nature and significance of technology and science in modern society. Majors analyze phenomena of science and technology in society from ethical, aesthetic, historical, economic, and sociological perspectives. In addition, students pursuing the A.B. degree study a technical field in sufficient depth to obtain a grasp of basic concepts and methods and complete a concentration on a theme, subarea, or problem related to science and technology in society. Those seeking the B.S. degree complete at least 50 units in technology, science, and mathematics. The particular technical courses chosen reflect the student's special interest in science and technology in society. Specific requirements for the bachelor's degree in STS are as follows:

BACHELOR OF ARTS

1. STS Core (8 courses):
   a) Foundational course (STS 101)
   b) Disciplinary Analyses (five courses with no more than two courses in each category):
      1) Philosophical perspectives (STS 110, 118)
      2) Historical perspectives (STS 121, 122, 130, 131)
      3) Social Science perspectives (STS 107, 142, 162, 172)
   c) Advanced courses (one course in each category):
      2) Core Seminar (STS 200)

2. Technical Literacy (5 courses):
   a) Computer literacy, normally demonstrated by successfully completing Computer Science 106A or its equivalent.
   b) Science or engineering literacy demonstrated by one of the following:
      1) Completing a four-course sequence (minimum of 12 units) in one field of engi-
neering or science (sample sequences available in the STS office).
2) Completing the program's technical literacy sequence (STS 51, 52, 53) and one other complementary technical course chosen in consultation with the program or associate chair.
3) Completing four of the following "Engineering Fundamentals" courses: Engineering 14, 15, 20, 30, 40, 50, 60, 70 (see descriptions in the "School of Engineering" section of this bulletin.

3. Thematic Concentration (minimum of 20 units, at least five courses, one each from among those designated on the appropriate concentration course list as "foundational" and "advanced"). Thematic Concentrations are organized around a science- or technology-related problem or area. The following Thematic Concentration topics have been pre-approved: the intersections of technology and science with aesthetics, development, history and philosophy, public policy, social change, and work and organizations.

Course lists for these concentration topics are available in the STS office. A student selecting one of the certified topics may include one or more courses not on the corresponding course list if they are germane to the concentration and meet the student's special interests. Alternatively, the student may choose to design a Thematic Concentration topic and course package subject to program approval. Each Thematic Concentration, certified or self-designed, requires the signature of an appropriate faculty adviser. See the associate chair for details.

BACHELOR OF SCIENCE

The student pursuing the B.S. degree shall complete the STS Core and a package of at least 50 units of technical courses designed to impart not only an understanding of, but an ability to work with, basic concepts of engineering and science. Introductory courses in mathematics or physics (for example, Math. 19 or Physics 19) are normally not counted as parts of this technical depth component. The B.S. candidate follows one of two models as guidelines for fulfilling the minimum 50-unit requirement:
1. "Focused depth": at least 24 units and seven courses in a single field of science or engineering, with the remaining units (except for two stand-alone courses at most) grouped in clusters of at least three courses each in other fields of science or engineering. For example, a Focused Depth package might contain eight industrial engineering, three physics, three mathematics, and three computer science courses, and one course each in electrical engineering and chemistry.
2. "Clustered depth": Two or more clusters of at least five courses and 15 units each in different fields of science or engineering, with at most two stand-alone courses, and remaining courses, if any, in sequences of three or more courses. For example, a Clustered Depth package might contain five courses each in computer science, electrical engineering, physics, and one course each in industrial engineering and earth sciences, and three courses in civil engineering.

It is strongly recommended that B.S. majors complete Computer Science 106A or its equivalent.

HONORS PROGRAM

STS offers a limited number of students the opportunity to achieve honors in STS by enriching their education through in-depth study of the interaction of science and technology with society. The honors program is open to students majoring in any field (including STS). Students accepted for this program carry out an honors project, the work for which normally begins in Spring Quarter of the junior year and is completed by mid-May of the senior year. Usually, this project entails writing an honors essay, although occasionally students have chosen to produce a technical artifact or carry out some other work that itself represents original thinking. When a project results in a work other than an essay, students must also submit an accompanying written explanation of the work.

ADMISSION

Application for admission to the STS honors program is typically made during the student's junior year. By May 15 of that year, interested students must have completed at least two of the first four course requirements listed below for honors and have submitted a detailed formal proposal for their project to the STS Honors Committee (for details on submitting a proposal, see the brochure, "Honors Program Requirements," available in the STS office). Students whose proposals are approved may then take from 12 to 15 units of credit for work on the honors project, distributed so as best to support the student's academic progress. Under exceptional circumstances, students may be admitted to the honors program in Autumn Quarter of the senior year. STS majors pursuing honors in STS or another honors program take the STS Core Senior Colloquium for 2 units instead of 4 and do not write a research paper for this course.
REQUIREMENTS

1. Foundational Course: STS 101.
2. Philosophical and Ethical Perspectives: STS 110.
3. Historical Perspective: STS 121 or 122.
4. Social Science Perspective: STS 107, 142, 162, 171, or 172.
5. Honors Project: an original critical essay or investigative project with accompanying explanatory essay on an STS topic of general importance (12 to 15 units). Past honors projects are on file in the STS library.

To earn honors, the project must receive a grade of at least 'B.' The student must also achieve a letter grade indicator (LGI) of at least 3.3 in the courses taken to satisfy requirements 1 to 4 above. In the case of STS majors, the student must compile an LGI of at least 3.3 in the entire major curriculum. If all these requirements are met, the designation "Honors Program in Science, Technology, and Society" is affixed to the student's permanent record and appears in the commencement program. Failure to complete honors thesis will require completion of additional research work for the Senior Colloquium.

COURSES

51. The Nature of Engineering — (Same as Engineering 1.) The engineering process and the people and organizations involved in engineering. Topics: some history; nature and source of engineering problems; interaction between engineering, science, mathematics, and business; the nature of the intellectual disciplines involved in engineering; and specific aspects of the engineering process, e.g., design, development and test, production, research. Examples from engineering programs at Stanford. Lectures, problem sets, design exercises, writing assignments, and field trips. DR:6(8)

3 units, Aut (Freyberg) MWF 2:15

52. An Introduction to Physics (Physics for Poets) — (Enroll in Physics 19.) Non-technical survey of the methodology of physics and some of the achievements in understanding the physical world. Topics: classical conservation laws, relativity, nuclear, and particle physics, the Standard Model and where we are today. High school algebra and trigonometry are used. DR:5(7)

3 units, Aut (Susskind) MWF 1:15

53. The Nature of Mathematics — (Enroll in Math. 53.) Introduction to the history, methods, results, and applications of mathematics. Possible topics: from geometry and calculus to the structure of the universe; the potentialities and limitations of computation; topology, knots, and DNA; symmetry in mathematics, art, and nature; uses and misuses of statistics; logic and the philosophy of mathematics. DR:4(6)

3 units, Aut (Osgood) TTh 11-12:15

101. Science, Technology, and Contemporary Society — (Graduate students register for 201; same as Engineering 130.) Analysis of the interplay of science, technology, and society in the contemporary U.S. Topics: key social, cultural, and values issues raised by contemporary scientific and technological developments; distinctive features of science and engineering as socio-technical activities; major influences of scientific and technological developments on 20th-century society, including transformations and problems of work, leisure, human values, the fine arts, and international relations; ethical conflicts in scientific and engineering practice; and the social shaping and management of contemporary science and technology. DR:9(5)

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

optional section for extra unit

107. Technology and Economic Change — (Same as Economics 113.) The economic causes and consequences of technological change. The historical experience of advanced industrial countries and the more recent experience of less developed economies. Topics: origins of modern industry in the U.S. and Europe, technology and the growth of large-scale organization, late comers to industrialization (Japan and newly industrializing countries), economic growth and slowdown in mature industrial countries, and present concerns and future prospects (the influence of technology on employment, civilian "spillovers" from military R&D, and coping with rapid technological change). DR:9(5)

5 units, Spr (Rosenberg) MWF 10

optional section for extra unit

110. Ethics and Public Policy — (Same as Public Policy 103B.) Ethical issues in science- and technology-related public policy conflicts. Develops the capacity for rigorous critical analysis of complex, value-laden policy disputes. Topics: the nature of ethics and morality; the nature of and rationales for liberty, justice, and human rights; and the use and abuse of these concepts in recent and current policy disputes. Cases from: biomedicine, environmental affairs, the technical professions, communications, and international relations. A Writing Across the Curriculum course. DR:8(3)

5 units, Win (McGinn) MW 2:15-3:30

plus two-hour section by arrangement

114. Environmental Ethics — For sophomores only. Analysis of ethical issues raised by the ways humans have altered the environment in contemporary Western societies. Attention to natural and human-made environments. Topics: endangered species, wilderness preservation, climate change, cross-border pollution, toxic waste disposal, population growth, genetically engineered animals, traffic congestion, the proliferation of tall buildings, the technological "soundscape," and urban public space. Enrollment limited to 12.

3-4 units, Aut (McGinn) M 3:15-5:05
114A. Classical Professionalism — For sophomores only. Careers in engineering, medicine, and law in the classic professional style compared with the prevailing, post-modern, marketing model. Possibilities of heroism. Bill Gates, Herbert Hoover. Readings from Aristotle, Cicero, Jane Austen, Steven Berkoft, Cormac McCarthy, Alistair MacIntyre.
3-4 units, Win (Mechan) Th 8:30-10:50

115. Ethical Issues in Engineering — (Same as Engineering 131.) Examination of ethical issues in contemporary engineering practice. Topics: moral rights and responsibilities of engineers in relation to society, employers, colleagues, and clients; cost-benefit-risk analysis, safety, and informed consent; the ethics of whistleblowing; ethical conflicts of engineers as expert witnesses, consultants, and managers; ethical issues in engineering design, manufacturing, and operations; ethical issues arising from engineering work in foreign countries; and ethical implications of the social and environmental contexts of contemporary engineering. Use of real-life case studies, guest practitioners, and field research. Limited enrollment. DR:8(3)
4 units (McGinn) given 1996-97

116. War and Technology — The role of technology, military and civil, in human conflict; theories of aggression; origins of organized violence and the changing relationship between specific technological innovations and warfare in history.
4 units (Adams) given 1996-97

118. Quality and the Products of Technology — (Same as Industrial Engineering 214, Mechanical Engineering 214.) “Quality” has acquired a specific and limited meaning in many manufacturing organizations (decreased variation, increased efficiency). True product quality includes relatively tangible characteristics (performance, economy, and reliability), and factors such as emotional response of the user, cultural consistency, craftsmanship, elegance, symbolism, 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 increase it. Readings, lectures, projects, papers, and field trips. Not a quality assurance or quality control in production course. Enrollment limited.
4 units, Win (Adams) TTh 11:15-1:05

121. Technology and Culture in 19th-Century America — (Same as History 115; History and Philosophy of Science 121.) Social and cultural aspects of technological change from the American Revolution through WW I. Emphasis is on technologies of production and consumption (armory practice, department stores); of temporal and spatial transformation (telegraphic time signals, railroads), simulation and reproduction (photography, phonograph) and communication and control (telephone, scientific management.) DR:9(5)
4-5 units, Win (Corn) TTh 10 optional section Th 4:15-6:05

122. Technology and Culture in 20th-Century America and Europe — (Same as History 234A, History and Philosophy of Science 122.) Undergraduate colloquium on the history of 20th-century Western technology. Topics: the rise of the engineering profession, labor and technological change, gender and technology, the emergence of technocratic ideologies, and the rise of large-scale technological systems.
5 units (Hecht) not given 1995-96

130. The Darwinian Revolution — (Enroll in History 133, History and Philosophy of Science 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 (1800 to 1836). Voyage of the Beagle and the formation of Darwin’s thought in terms of its broader intellectual and social context. The Origin of Species. Descent of Man. Difficulties the theory had to overcome and their resolution in the union of evolutionary biology and population genetics in the 1930s and 40s. DR:9(4)
4 units, Aut (Lenoir) TTh

131. The Industrial Revolution: Historical and Cultural Perspectives — (Enroll in History 134A.) The technological changes that constituted the Industrial Revolution in Europe and America within the context of social, political, economic, and cultural developments. The contemporary relevance of these historical studies to industrialization in certain Third World nations. DR:9(5)
5 units (Hecht) not given 1995-96

142. Seminar: Managing Hazardous Technologies — (Enroll in Political Science 142S.) The political and organization dimensions of efforts to manage hazardous technologies. Problems of international cooperation, risk perception, and organization learning. Nuclear power, space shuttles, oil tanker accidents, commercial airlines, and nuclear weapons. Research paper required.
5 units (Sagan) not given 1995-96

145. Wom en and Technology — (Same as Feminist Studies 147B, History and Philosophy of Science 123.) Seminar on current and historical intersections between technologies and women’s lives. Themes: the role of technologies, especially reproductive and visual technologies, in constructing the roles of women; women as developers and users of technology; gendered descriptions of technology, technological professions and the process of technology development; women at work and women’s work in different historical periods. Discussion based on novels, reports and historical literature, commercials, and films.
5 units, Win (Courey) W 2:15-4:05

146. Modernization, Technology and Culture in Germany, 1900-1945 — (Enroll in German Studies 175/175A, History and Philosophy of Science 148.) 4 units, Aut (Lowood)
150. Seminar: Gender-Specific Perspectives on Birth Control — (Enroll in Human Biology 150.)
DR: 1 unit, Spr (Djerassi) TTh 1:15-4:05

160. Technological Opportunities for Humanity — Opportunities for new technologies in daily life based on present science. Criteria for technological advances to be useful and wanted by individuals. Obstacles to implementation and use of different kinds of technologies. Products vs. systems. Discrepancies between what people want and use and what is thought to be good. Technology in fiction, especially science fiction. Futurism. Antitechnological attitudes and movements. Technologies include computers, transportation of goods and people, medicine, utilities, space travel.
3 units, Win (McCarthy) TTh 3:15-4:30

161. History of Computers — The evolution of concepts and devices in computing from the 19th century to the present, focusing on the social, political, and cultural context of digital computer development from 1940 onward. Topics: relationships between the Cold War and computer research; the rise of hacker culture; economic impacts of computers; IBM, Apple, and other major corporate developers; science fiction about computers and networks. Emphasis on the relationship between the micro level of engineering and the macro levels of economic, governmental, and social forces. Prerequisite: familiarity with basic concepts of computation.
4-5 units, Win (Edwards) TTh 1:15-2:30

162. Communication, Technology, and Society — (Same as Communication 169/269.) Methods for analyzing and addressing the question: Does technology drive societal change or does society drive technological change? Three case studies: computers and the self, mass media and community, and the information economy. DR:9(5)
4 units, Spr (Nass) not given 1995-96

163. The Nuclear Age — (Enroll in History 239S.)
5 units (Hecht) not given 1995-96

170. Work, Technology, and Society — (Enroll in Industrial Engineering 150.) DR:9(5)
4 units, Spr (McGinn) MW 2:15-4:05

171. The Role of Technology in National Security — (Same as Engineering-Economic Systems 170.) Examines critical decisions made by the U.S. in selected security and space programs, emphasizing current issues. Case studies illustrate the process by which technical issues, along with political and economic issues, are brought into the policy process; particularly, the way in which technical organizations in government, government committees, and science advisory boards interact to bring advice to senior policymakers. Examination of some case decisions in other countries.
3 units, Aut (May) MW 4:15-5:30

172. The Role of Technology in Policy Decisions — (Enroll in Engineering-Economic Systems 171.) Same objectives as Engineering-Economic Systems 170, with case studies primarily from recent and current energy and environmental policy decisions, e.g., air quality standards, development of future energy technologies, and management of environmental hazards. Case studies illustrate the process of integrating technical information with economic and political considerations, with emphasis on differing roles and points of view among government experts, scientific advisory boards, and interested/affected parties among the public.
3 units, Spr (North, May) MW 4:15-5:30

174. Ethical Issues in Civil Engineering — (Enroll in Civil Engineering 174.)
3-4 units, Spr (McGinn) TTh 3:15-4:45

180. Dispute Resolution for Engineers — Role of technical experts in managing uncertainty arising from conflicting interests, perceptions, culture, reasoning, and rhetoric. Insurance, litigation, ADR, negotiation. Active participation in simulated and real disputes required. Enrollment limited to 20.
3-4 units, Spr (Meehan) TTh 9-11

184. Technology, the State, and Social Order in Modern France — (Enroll in History 231A.)
5 units, Aut (Hecht) Th 1:15-3:05

190A. B.C. Honors Project — Project for students in STS honors program.
190A. Submission of Proposal
2-5 units, Spr (Staff) by arrangement
190B. Continued Study and Writing
2-5 units, Aut (Staff) by arrangement
190C. Final Work on Project
2-5 units, Win (Staff) by arrangement

195. Honors Tutorial
1 unit, Aut (Staff) by arrangement

199. Individual Work
1-5 units, Aut, Win, Spr (Staff) by arrangement

200. Senior Colloquium — Reading/discussion of key analytical and theoretical texts treating the nature and relationship of science, technology, and society. Prerequisite: senior standing and four STS core courses, or consent of the instructor.
4 units, Win (Edwards) M 3:15-5:05

ADVANCED UNDERGRADUATE AND GRADUATE

201. Science, Technology, and Contemporary Society — (Same as Engineering 130.) See 101.
4-5 units, Aut (McGinn) TTh 2:15-4:05 optional section for extra unit

207. Science and Technology in Economic Growth — (Same as Economics 224.) Upper-division undergraduates may attend with consent of instructor. The roles played by the growth of scien-
tific 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.

5 units, Win (Rosenberg) MW 11-12:50

210. Ethics and the Built Environment — Seminar on ethical and values issues raised by the constitution and transformation of the built environment in urban industrial societies. Analysis of built-environment-related ethical issues that confront architects, city planners, civil engineers, and ordinary citizens. Consideration of ethical issues raised by material structures (tall buildings, highways, houses), traffic (vehicles, pedestrians, tourists), “signage” (billboards, shop signs, graffiti), the “soundscape” (technological noise, natural sounds), and public social spaces (streets, plazas, malls, and playgrounds). Limited enrollment.

3-4 units (McGinn) given 1996-97

215. Computers, Ethics, and Social Responsibility — (Enroll in Computer Science 201.) Primarily for majors entering computer-related fields. Analysis of ethical and social issues related to the development and use of computer technology. Introduction to relevant background in ethical theory, and social, political, and legal considerations. Analysis of scenarios in specific problem areas: privacy, reliability and risks of complex systems, and the responsibility of professionals for their applications and consequences of their work. Prerequisite: Computer Science 106B or 106X.

3 units, Spr (Roberts) MW 11

219. Management and Organization of Research and Development — Focuses on the organization of R&D in industry and the problems of the technical labor force. Relevant theoretical perspectives from sociology, anthropology, and management theory on the social pragmatic issues that surround technical innovation and the employment of scientists and engineers. Possible topics: organization of scientific and technical communities, industrialization of research, nature of scientific and technical work, strategies for fostering innovation, careers of scientists and engineers, and managerial problems characteristic of R&D settings.

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

220. Graduate Colloquium: The Process of Industrialization — Europe, The United States, and Latin America — (Same as History 303C.) Introduction to comparative economic history for graduate students. The literature on the transition to industrial societies during the 19th and 20th centuries in a variety of national contexts. Readings from the institutionalist, cliometric, and Marxist schools of economic history.

4-5 units (Haber) not given 1995-96

221. Seminar: The Automobile Industry In 20th-Century America — (Same as History 263A.) Colloquium examines one of the nation’s major industries from the perspective of its products, workers, and wide-ranging influences. Topics: origins and consequences of the industry’s geographical concentration in Michigan; evolution of assembly line work and other forms of automotive labor; influence of automobiles on the built and natural environments; cars and government regulation; and recent challenges to the industry stemming from technological change, foreign competition, and environmentalism.

5 units, Aut (Corn) T 1:15-3:05

222. Science and High-Technology in Silicon Valley, 1930-80 — (Same as History 262S, History and Philosophy of Science 147/247; graduate students register for 247.) Research seminar. Technological, political, economic, and spatial dimensions of the rise of Silicon Valley from 1930s-1980s. How did Silicon Valley arise? What sustained its growth? How did it function? How did it evolve? Archival research and oral history. Focus is on radiotubes, microwave devices, semi-conductors, and computers; economies of skills; university-industry relations; political dissent and the counter-culture; and the techno-scientific policies of the Cold War state. Comparison with Route 128 and other high-tech regions.

5 units, Spr (Lenoir) W 1:15-4:05

231. Technology and Work — (Enroll in Industrial Engineering 223.) Theory and research of the social implications of technology and technological change for workers at all levels. Alternate conceptions of technology as social phenomenon, approaches to the study of technology in the workplace, reactions of individuals and groups to technological change, the construction of a technology’s social meaning, and the management of technological change. Emphasis is on automation, electronic data processing, and sophisticated microelectronic technologies, including CAD-CAM systems, telecommunication networks, medical imaging technologies, artificial intelligence, and personal computers.

4 units, Spr (Barley) MW 3:30-4:45

232. Science, Technology, and Society — (Enroll in Anthropology 232, History and Philosophy of Science 232.)

5 units (Fujimura)


4-5 units, Aut (Hecht) T 1:15-3:05
250. The Politics of Technical Decisions — Many public choices involve decisions where technical or technological issues are inseparable from political factors. Seminar covers technical policymaking since WW II in the political, social, cultural, and economic context. Technical decisions within regulatory agencies, origins and functioning of key institutions (National Science Foundation, Environmental Protection Agency, Department of Defense). Historical and contemporary case studies of particular technical issues, such as the national Information Infrastructure, global warming, AIDS research, race and intelligence testing, or nuclear missile defense. Case studies are chosen in consultation with students. Enrollment limited to 15 advanced undergraduates and graduates.

4-5 units. Aut (Edwards) TTh 3:15-4:45

253. Body Works: Medicine, Technology, and the Body in Late 20th-Century America — (Same as History and Philosophy of Science 153/253.) Advanced undergraduate/graduate seminar. The influence of new medical technologies (organ transplantation, endoscopic surgery, genetic engineering, computer-aided tomography, medical imaging) on the American imagination between WW II and the 1990s.

5 units. Win (Lenoir)

255. Biotechnology: Legal and Policy Issues — (Same as Law 604.) Open to all graduate and professional students, and by consent of instructors, to qualified undergraduates. Interdisciplinary exploration of legal and policy issues raised by the biotechnology industry. Materials on biological science and technology for non-scientists and on law for non-law students. Topics: patenting, corporate organization and funding, conflicts of interest, regulatory approvals, health care financing issues, tort liability, and the prospects for and implications of the biotechnology revolution. Hypothetical problems, class presentations by interdisciplinary student teams. Enrollment limited to 40. Non-law students receive 5 units of credit for the Spring Quarter.

5 units, Spr semester (Barton, Botstein, Greely) TW 11-12:15

270. Poverty, Technology and Rural Industrialization — (Same as Human Biology 137.) Can technical change reduce rural poverty in developing countries? Ways of understanding rural poverty, technical change, and the relationship between them. Debates about large- and small-scale technologies, industrialized and peasant agriculture, alternative and appropriate technology, connections between industry and agriculture, indigenous and western knowledge, gender and the control of technology, and forms of labor mobilization. Case studies from Asia, S.E. Asia, Africa, and Latin America. Collective research project explores a debate about technical change within a social context. Seminar, limited enrollment.

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

271. Third World Development — (Same as Human Biology 145.) Interdisciplinary introduction to the issues of Third World development, differences in approach, and contributions of different academic disciplines. The diversity of the developing world, the growing gap between rich and poor, industrialization, agrarian change, the role of the state in development, the relationship between environment and development, and questions relation to gender and development.

5 units, Aut (Crow) TTh 9-11

279. Technology Policy and Management in Newly-Industrializing Countries — (Same as Industrial Engineering 279.) Technology is seen as the key to development and prosperity in most parts of the world. Building technological capability in Newly-Industrializing Countries at both the national and firm level. Issues: what makes technology special, government intervention that affects technology, the concept of technology leader and technology follower environments, the transfer of technology from "leader" countries, indigenous technological capability, human capital, culture and innovation, the role of small firms and new enterprises in technological capability. Managing innovation in firms, exploring: how innovation is different in technology-followers, organizing for shop-floor innovation, building an innovation culture, the special role of R&D in followers, the role of design, technology strategy for followers. Cases from Korea, India, Brazil, Singapore and other NICs.

2-4 units, Aut (Forbes) four weeks only MTWTh 11-12:15, plus F 11-1 (for 3-4 units)

279I. Technology and Industrialization in India — No country has paid attention to the role of technology and science in industrialization as has India. In no country is the gap between what has been and what might have been achieved as wide. Seminar traces India's policies and performance of technology and science from independence to 1991. Technology and industrial competitiveness in India today following four years of liberalization. Prerequisite: 279, or consent of instructor based on substantial prior preparation.

2-3 units (Forbes) given 1996-97

280. Workshop on Technology and Management in Newly-Industrializing Countries — (Same as Industrial Engineering 281.) Current work in the field, building on issues covered in IE/STS 279. Weekly readings and discussion. Prerequisite: 279 or substantial prior preparation at discretion of instructor.

1-3 units, Spr (Forbes) four weeks only
299. Individual Graduate Work
1-5 units, Aut, Win, Spr (Staff)
by arrangement

RELATED DEPARTMENT OFERINGS

ANTHROPOLOGY
160. Gender and Science — (Same as Feminist Studies 147A, History and Philosophy of Science 160, Human Biology 170.)
5 units, Aut (Fujimura)

162A. Topics in Socio-Cultural Studies of Biotechnology — (Same as History and Philosophy of Science 162, Human Biology 164.)
5 units, Win (Fujimura)

ECONOMICS
303A,B,C. Workshop in the Economics of Science and Technology
10 units, Aut, Win, Spr (Staff)
by arrangement

HISTORY
152. Introduction to Material Culture: The History of the Built Environment — (Same as American Studies 152.)
5 units, Spr (Corn) TTh 1:15-3:05

261. Undergraduate Colloquium: Nuclear Weapons — Theories and History — (Same as Political Science 246.)
5 units (Bernstein, Holloway)
not given 1995-96

334A. Technology and Society
4-5 units (Hecht) not given 1995-96

434A. Topics in the History of Technology
4-5 units (Hecht) not given 1995-96

HISTORY AND PHILOSOPHY OF SCIENCE

154. The Rise of Scientific Medicine — (Same as History 133A, Human Biology 151.)
4 units, Spr (Lenoir)

155/255. The Sociology of Scientific Knowledge — (Same as History 133B.)
4 units (Staff) not given 1995-96

168. History of Physics — (Same as History 139A)
3-5 units, Win (Staff) MTWTh 10

POLITICAL SCIENCE

125. The Rise of Industrial Asia — (Same as Economics 130.)
5 units, Aut (Okimoto, Lau, Raphael, Rohlen)

OVERSEAS STUDIES

Descriptions of these courses are in the "Overseas Studies" section of this bulletin or at the Overseas Studies office, 126 Sweet Hall.

117V. Industrial Revolution and Its Impact on Art, Architecture, and Theory — Berlin. (Same as Art 173Y.) DR:7(2)
4 units, Win (Neckenig)

SCIENTIFIC COMPUTING AND COMPUTATIONAL MATHEMATICS PROGRAM

Director: Gene Golub
Core Faculty: Gene Golub (Computer Science), Robert Dutton (Electrical Engineering), George M. Homsy (Chemical Engineering), Joseph B. Keller (Mathematics, emeritus), Walter Murray (Operations Research), Joseph Oliger (Computer Science), George Papanicolaou (Mathematics), Andrew Stuart (Computer Science and Mechanical Engineering)

Associate Faculty: Khalid Aziz (Petroleum Engineering), Joel Ferziger (Mechanical Engineering), Thomas J. Hughes (Mechanical Engineering), Thomas Kailath (Electrical Engineering), T. P. Liu (Mathematics)

Affiliated Faculty: S. Boyd (Electrical Engineering), J. Cioffi (Electrical Engineering), R. Cottle (Operations Research), T. Cover (Electrical Engineering), G. Dantzig (Operations Research), S. Doniach (Applied Physics), D. Donoho (Statistics), C. Eaves (Operations Research), J. Friedman (Statistics), I. Johnstone (Statistics), J. Koseff (Civil Engineering), K. Law (Civil Engineering), R. MacCormack (Aeronautics and Astronautics), P. Moin (Mechanical Engineering), W. Reynolds (Mechanical Engineering), B. Roth (Mechanical Engineering), M. Saunders (Operations Research), C. Steele (Mechanical Engineering), R. Street (Civil Engineering)

The Scientific Computing and Computational Mathematics Program (SC/CM) is interdisciplinary and leads to the M.S. and Ph.D. degrees. It is designed for students interested in studying and developing computational tools in those aspects of applied mathematics central to modeling in the physical and engineering sciences. Graduates of this program are expected to be able to deal with a scientific problem from its formulation, moving through its mathematical analysis to algorithm development and implementation. The symbiosis of applied mathematics and numerical computing is stressed.

The program prepares students for research in the rapidly expanding field of supercomputing.
GRADUATE PROGRAMS
MASTER OF SCIENCE

A candidate must complete a program of 46 units of courses numbered 100 or greater. In addition, a number of courses at the 200 level or above are required. At least 36 of these units must be graded units, passed with a letter grade indicator (LGI) of 3.0 (B) or better. The core curriculum is common to all degrees offered by the program but is adapted according to the interests and prior education of the student. Deviations from the core curriculum must be justified in writing and approved by the student’s adviser and the SC/CM Committee. Courses that are waived rather than taken may not be counted towards the master’s degree. The student must fulfill credit requirements in each of the categories listed below.

CORE CURRICULUM

1. **Mathematics** (18 units): students are required to take Math. 220A, B, C. Nine additional units in mathematics are required with at least 6 units at the 200 level. Suggested courses are Math. 173, 205A, B, C, 224, 230, 236, 237, 256A, B, C, 274, 276A, B; Statistics 300A, B, C, 305, 306A, B, 310A, B, C. Other courses can be substituted with consent of the adviser and the SC/CM Committee. Students should take those courses most suitable to their areas of specialization.

2. **Numerical Analysis** (12 units): students are required to take Computer Science (CS) 237A, B, C and 3 units of one of the advanced courses in numerical analysis: CS 335, 336, 337, 339; Mechanical Engineering (ME) 233B, 235A, B, C; Statistics 327.

3. **Computer Science** (6-9 units): students can take a selection of courses from CS 109A, B, 212, 248, 260. This must include a course at the 200 level.

4. **Application Area** (9 units): students must take a focused program in an applications area such as fluid mechanics, operations research, or statistics. Courses must be at the 200 level or higher, and the program of concentration must be approved by the adviser and committee. The following courses meet the requirements: Aeronautics and Astronautics 210A, B, 214A, B, C; Civil Engineering 212; Electrical Engineering 363, 364, 365, 378A, B; ME 238A, B, 251A, B, 269.

5. **Seminar** (1 unit): students are required to regularly attend the Scientific Computing/Computational Mathematics seminar for one quarter. The seminar is held weekly during the academic year.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the Ph.D. (residence, dissertation, examination, and so on.) are discussed in the “Graduate Degrees” section of this bulletin. The following are the program’s requirements:

1. Plan and successfully complete a coherent program of study covering the basic areas of Scientific Computing and Computational Mathematics. It must at least satisfy the requirements for the M.S. degree in SC/CM. It is important that the student be able to exhibit depth in some area of application. The student’s adviser has the primary responsibility for the adequacy of the program, which must meet the approval of the SC/CM Committee.

2. To be admitted to candidacy for the Ph.D. degree, a student must have successfully completed 27 units of graduate courses (200 level and above) with at least an LGI of 3.0. In addition, a student must pass a qualifying examination and give a presentation on his or her chosen research area. The qualifying examination must be taken within one year of admission into the Ph.D. program, and the research presentation must be completed within one year of successfully passing the Ph.D. qualifying examination. Detailed information about the scope of the Ph.D. qualifying examination may be obtained from the program.

3. Beyond the requirements for candidacy, the student must complete a focused course of study of at least 48 units. The program should be designed to develop a deep, focused background in the research area to be pursued in the dissertation. Approval of the program must be obtained from the SC/CM Committee.

4. In addition, the student must have an adequate knowledge of a coherent area of application and must complete at least 12 units in that area.

5. The most important requirement for the Ph.D. is the dissertation. Within a reasonable period after passing the qualifying examination, the student must obtain the agreement of a faculty member to be the dissertation adviser. A reading committee must be selected before the student is admitted to Terminal Graduate Registration (TGR), and this committee should be frequently consulted by the student before the University oral examination. Upon completion of a draft of the dissertation, the student must pass a University oral examination in defense of the dissertation.

Ph.D. MINOR

Students wishing to obtain a Ph.D. minor in the Scientific Computing and Computational Mathematics Program should consult the department office for designation of a minor adviser. A minor in SC/CM may be obtained by complet-
ing 20 units of course work, including the sequences Math. 220 A, B, C and Computer Science 237 A, B, C; these particular courses must be taken for a letter grade and an LGI 'B' average or better must be maintained.

The student's Ph.D. Reading Committee and University Oral Committee must include one faculty member who is associated with the SC/CM program.

COURSES


220A. 3 units, Aut (Zhang) TTh 9:30-10:45
220B. 3 units, Win (Papanicolaou) TTh 9:30-10:45
220C. 3 units, Spr (Keller) TTh 9:30-10:45

237A, B, C. Advanced Numerical Analysis — (Enroll in Computer Science 237A, B, C.) Three-quarter graduate sequence designed to acquaint students in mathematical and physical sciences and engineering with the fundamental theory of numerical analysis. Examples from applications.

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

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


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


3 units, Aut (Olsson) MW 11-12:15

336. Advanced Methods in Matrix Computation — (Enroll in Computer Science 336.)

not given 1995-96

337. Numerical Methods for Initial Boundary Value Problems — (Enroll in Computer Science 337.)

not given 1995-96

338A. Dynamical Systems — (Enroll in Mechanical Engineering 233A.)

3 units (Staff) given 1996-97

338B. Numerical Analysis of Dynamic Systems — (Enroll in Mechanical Engineering 233B.)

3 units (Staff) given 1996-97

339. Parallel Methods in Numerical Analysis — (Enroll in Computer Science 339.)

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

398. Curricular Practical Training — Provides students with on-the-job training under the guidance of experienced, on-site supervisors. Students must register the quarter after their training. Students receive credit and a grade after submitting a concise report detailing work activities, problems worked on, and key results. Prerequisite: written consent of adviser.

1 unit, any quarter (Staff) by arrangement

399. Independent Project

any quarter (Staff) by arrangement

499. Advanced Reading and Research — Prerequisites: majoring in Scientific Computing and Computational Mathematics; consent of instructor.

any quarter (Staff) by arrangement
Dean: John B. Shoven
Associate Deans: John W. Etchemendy, Stephen H. Haber, Ramon Saldívar, David O. Siegmund
Associate Dean for Development: Chris Ponce
Associate Dean for Finance: Nancy J. Padgett
Assistant Deans: Judith Cain, Roni Holeton, Stephanie Kalfayan, Joan Minor, Ellen Woods

Department Chairs: Lucius Barker (Political Science), Russell A. Berman (German Studies), John I. Brauman (Chemistry), Gunner E. Carlsson (Mathematics), Christopher D. Chafe (Music), Eve V. Clark (Linguistics), Frederick Dretske (Philosophy), Gregory Freiden (Slavic Languages and Literature), Jay W. Fliegleman (English), Thomas W. Hare (Asian Languages), Stephen E. Harris (Applied Physics), Ralph Hester (French and Italian), Iain M. Johnstone (Statistics), Patricia P. Jones (Biological Sciences), Charles R. Lyons (Drama), Ellen M. Markham (Psychology), Norman M. Naimark (History), Douglas Osheroff (Physics), Scott R. Pearson (Food Research Institute), Dennis A. Powers (Hopkins Marine Station), Mary L. Pratt (Spanish and Portuguese), Cecilia A. Ridgeway (Sociology), Donald F. Roberts (Communication), Renato I. Rosaldo (Anthropology), Jeffrey T. Schnapp (Comparative Literature), David A. Starrett (Economics), Susan A. Stephens (Classics), Richard E. Vinograd (Art), Lee H. Yearley (Religious Studies)

The School of Humanities and Sciences, with over 40 departments and interdepartmental degree programs, is the primary locus for the superior liberal arts education offered by Stanford University. Through exposure to the humanities, undergraduates study the ethical, aesthetic, and intellectual dimensions of the human experience, past and present, and so are prepared to make thoughtful and imaginative contributions to the culture of the future. Through the study of social, political, and economic events, they acquire theories and techniques for the analysis of specific societal issues, as well as general cross-cultural perspectives on the human condition. And through exposure to the methods and discoveries of mathematics and the sciences, they will become better-informed participants and leaders in today’s increasingly technological societies.

Further, the exciting research environment within the school offers both undergraduates and graduate students the intellectual adventure of working on their own research projects side by side with the school’s distinguished faculty. While a few of the school’s graduate programs offer professional degrees such as the Master of Fine Arts, most are academic and research programs leading to the Ph.D. Doctoral programs emphasize original scholarly work by the graduate students, often at the frontiers of knowledge, and normally require the students to participate in the supervised teaching of undergraduates. Indeed, in the school, as in the University more broadly, graduate students are of central importance in developing a community of scholars.

The fact that so many different disciplines lie within the same organization is one reason why the school has had great success in promoting interdisciplinary teaching and research programs. Whether engaged in studies as wide ranging as ethics, policy, and technological issues, or by applying contemporary social and philosophical theories to classical literature, our undergraduates, graduate students, and faculty are challenging the barriers among scholarly disciplines. The school will continue to strive for a balance between teaching and research, the academy and society.

ORGANIZATION

The School of Humanities and Sciences includes the Departments of Anthropology, Applied Physics, Art, Asian Languages, Biological Sciences (and the Hopkins Marine Station), Chemistry, Classics, Communication, Comparative Literature, Drama, Economics, English, Food Research, French and Italian, German Studies, History, Linguistics, Mathematics, Music, Philosophy, Physics, Political Science, Psychology, Religious Studies, Slavic Languages and Literatures, Sociology, Spanish and Portuguese, and Statistics.


In addition, the school sponsors programs that do not currently grant degrees: African Studies, Astronomy, Black Performing Arts, Ethics in Society, History and Philosophy of Science, Jewish Studies, Medieval Studies, Overseas Studies, and Undergraduate Research Opportunities.

Faculty and academic staff of the School of Humanities and Sciences are listed under the respective departments or programs.
DEGREES OFFERED
Candidates for the degree of Bachelor of Arts, Bachelor of Science, Bachelor of Arts and Sciences, Master of Arts, Master of Fine Arts, Master of Science, Doctor of Musical Arts, or Doctor of Philosophy should consult appropriate sections of the announcements following. They should consult also the department or program in which they intend to specialize.

For regional or area studies and other special programs leading to the degree of Doctor of Philosophy, refer to the "Graduate Special Programs" section of this bulletin.

UNDERGRADUATE PROGRAM IN AFRICAN AND AFRO-AMERICAN STUDIES

Director: to be announced
Steering Committee: David Abernethy (Political Science and African Studies), Earl Black (African and Afro-American Studies), Sandra Drake (English), James Gibbs (Anthropology), John Rickford (Linguistics), Arthur Walker (Physics and Applied Physics), Sylvia Wynter (emerita), one representative from the Black Student Union.

Participating Faculty: Lucius Barker (Political Science), Clay Carson (History), Sandra Drake (English), Harry Elam (Drama), John Gill (Electrical Engineering), Sharon Holland (English), Kennell Jackson (History), Horace Porter (English), John Rickford (Linguistics), Ewart Thomas (Psychology), Arthur B. C. Walker (Physics and Applied Physics), Sylvia Wynter (emerita)

UNDERGRADUATE PROGRAM

The African and Afro-American Studies (AAAS) program provides an interdisciplinary introduction to (I) the field of Afro-American history, literature, and culture as a central component of American culture; and (II) to the field of African history, literature, and culture as well as the history, literature, and culture of people of African descent. Department majors are expected to develop some knowledge in both fields but with a special emphasis on either (I) or (II).

All majors and double majors are expected to take a total of 55 to 60 units, of which 25 to 30 must be selected from the core courses. AAAS 105 is mandatory. Additionally, 25 to 30 units are to be selected from (I), (II), or a special program devised by the student (III). Each of these options consolidates as well as broadens the work of the core.

If they choose option III, students majoring in AAAS may devise a program with a special theme. This choice allows the student to focus 25 to 30 units on developing previous work in the major or exploring new areas. In organizing this plan, the student works with an adviser on the chosen theme and must have prior written approval from the director of the program. Honors work is possible with this option.

AAAS majors have numerous opportunities to obtain academic advising. The director advises all majors, and their progress is closely followed by the program coordinator. When the time comes to choose between the three options for study, students can turn to faculty with expertise in the different areas. The program gives the students a chance to discuss academic choices with the program’s many faculty and aims to provide them with the best possible advising.

REQUIREMENTS

CORE COURSES
(25-30 units)

Course No. and Subject | Units
--- | ---
AAAS 105. Introduction to African and Afro-American Studies | 5
Anthropology 130. Film Images of African-American Culture | 5
English 161C. 20th-Century Afro-American Fiction | 5
History 148. Introduction to African History | 5
History 164. Race and Ethnicity in American Experience | 5
Psychology 127. Afro-American Psychology | 3
Sociology 144. Social Mobility | 5

(I) AFRO-AMERICAN HISTORY, LITERATURE, CULTURE, AND SOCIETY
(25-30 units)

Course No. and Subject | Units
--- | ---
AAAS 118. Race in American Sport | 5
Drama 155. Black Drama | 5
History 200M. Undergraduate Directed Research: Martin Luther King, Jr. Papers Project | by arrangement
History 264S. Undergraduate Research Seminar: The Papers of Martin Luther King, Jr. and the Modern Civil Rights Movement | 5
Political Science 181. African-Americans and the Political System | 5
Psychology 127. Afro-American Psychology | 3
Sociology 144. Social Mobility | 5
### AAAS PROGRAM OFFERINGS

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropology 234. Seminar on African Law</td>
<td>5</td>
</tr>
<tr>
<td>History 148C. Africa in the 20th Century</td>
<td>5</td>
</tr>
<tr>
<td>History 149. Africa Since 1935</td>
<td>5</td>
</tr>
<tr>
<td>Political Science 118A. Political Change in Tropical Africa</td>
<td>5</td>
</tr>
</tbody>
</table>

### DOUBLE MAJORS

Many students in the program are double majors. Over the years, students have found that continuing a major in one field with a strong 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 student must take the core courses (25 to 30 units). In addition, the student must choose 25 to 30 units from various departmental offerings. Thus, the total number of units required for a double major in this field is 55 to 60. To determine the additional units, the prospective double major should consult with the director of the program.

### HONORS

Majors may receive a maximum of 10 units for completing an honors thesis or project of comparable quality by the end of the senior year. The essay or project is intended to enable students to synthesize several of the skills they have acquired and to produce a document or project demonstrating some measure of competence in their specialty. The honors project must be discussed with and approved by the major adviser and program director. A written proposal must be submitted for consideration no later than Autumn Quarter of the senior year.

### DIRECTED READING

Directed reading allows students to focus as many as 15 units of work on a special topic of interest. In organizing this plan, the student consults with the program director and one or more faculty members specializing in the area or discipline.

### UNDERGRADUATE SCHOLARS PROGRAM (USP)

USP is an innovative project that brings together faculty and students for research on an intensive, individual basis. Each student receives a research stipend and a certificate on completing the program. USP is listed as a specific course (Afro-American Studies 198A, 3 to 5 units, Winter and Spring Quarters) on the student’s transcript. A special, high-quality video advertising the program is available for interested applicants to view. Kennell Jackson, Jr., in the Department of History, is the head of the USP.

### COURSES

#### AAAS PROGRAM OFFERINGS

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>59A,B,C. Dance Theater Production</td>
<td>1-5 units, Aut, Win, Spr (Staff)</td>
</tr>
<tr>
<td>105. Introduction to African and Afro-American Studies</td>
<td>5 units</td>
</tr>
</tbody>
</table>

#### ANTHROPOLOGY

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>108B. Africa: Gender and Representation</td>
<td>5</td>
</tr>
<tr>
<td>History 148C. Africa in the 20th Century</td>
<td>5</td>
</tr>
<tr>
<td>History 149. Africa Since 1935</td>
<td>5</td>
</tr>
<tr>
<td>Political Science 118A. Political Change in Tropical Africa</td>
<td>5</td>
</tr>
</tbody>
</table>

#### AFFILIATED DEPARTMENT OFFERINGS

See respective department listings for course descriptions and Distribution Requirements (DR) information.

#### ANTHROPOLOGY

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>108. African Societies in a Changing World</td>
<td>5 units, Aut (Gibbs)</td>
</tr>
<tr>
<td>108B. Africa: Gender and Representation</td>
<td>3 units (Ebron) not given 1995-96</td>
</tr>
<tr>
<td>130. Film Images of African-American Culture</td>
<td>5 units, Win (Gibbs)</td>
</tr>
<tr>
<td>234. Seminar on African Law</td>
<td>5 units (Gibbs)</td>
</tr>
</tbody>
</table>

#### DANCE

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>78. Afro-Brazilian and Afro-Peruvian Dance</td>
<td>1 unit, Win (Cashion)</td>
</tr>
<tr>
<td>182. Jazz Dance II</td>
<td>1 unit, Aut, Win, Spr (Moses)</td>
</tr>
<tr>
<td>183. Jazz Dance III</td>
<td>1 unit, Aut, Win (Moses)</td>
</tr>
<tr>
<td>185. African-Caribbean Roots of American Jazz Dance</td>
<td>2 units, Spr (Moses)</td>
</tr>
</tbody>
</table>
DRAMA
151. Performance and the Body Politic — DR:7(2)
   4 units, Aut (Elam, Rehm)
155. Black Drama
   4 units, Spr (Elam)

ENGLISH
   5 units, Aut (Drake)
163J. 19th- and 20th-Century African-American Writers
   5 units, Spr (Holland)
186G. Seminar: Race and American Fiction, 1845-1945
   5 units, Spr (Porter)
   5 units, Win (Porter)
187T. Seminar: Contexts of African-American Intellectual History
   5 units, Aut (Drake)

HISTORY
   5 units (Carson) not given 1995-96
148. Introduction to African History — DR:2(*)
   5 units, Aut (Jackson)
148C. Africa in the 20th Century — DR:2(*)
   5 units, Spr (R. Roberts)
149. Africa since 1935
   5 units (Jackson) not given 1995-96
149A. East Africa in History
   5 units (Jackson) not given 1995-96
   5 units, Aut (Carson)
164. Introduction to Race and Ethnicity in the American Experience — DR:3
   5 units, Spr (Camarillo, Fredrickson)
200M. Undergraduate Directed Research: Martin Luther King, Jr. Papers Project
   units by arrangement (Staff)
246A. Undergraduate Colloquium: African History and African Novel
   5 units (Jackson) not given 1995-96
246B. Undergraduate Colloquium: Mau-Mau Uprising — Kenya in 1950s
   5 units (Jackson) not given 1995-96
246S. Undergraduate Research Seminar: East Africa in Transition — 1880s-1920s
   5 units (Jackson) not given 1995-96
247. Greater East Africa and its Historical Writing — (Same as 347)
   5 units, Spr (Jackson)
247A. Undergraduate Colloquium: African Identity in a Changing World
   3-5 units (R. Roberts) not given 1995-96
247S. Undergraduate Research Seminar: Fieldwork in Africa — Oral History, Life, and Family History — (Same as 447A)
   5 units (Jackson) not given 1995-96

LINGUISTICS
73. African American Vernacular English — DR:3 or 9(4)
   4 units, Aut (Rickford)
150. Introduction to Sociolinguistics
   4-6 units, Win (Rickford)

MUSIC
18. Jazz History
18A. Ragtime to Bebop (1900-1945)
   3 units, Win (Sales)
18B. Bebop to Present (1945-)
   3 units, Spr (Sales)
20A. Jazz Theory
   3 units, Win (Nadel)
**AFRICAN STUDIES**

**Emeriti:** Raymond D. Giraud, Joseph H. Greenberg, Hans N. Weiler, Bruce F. Johnston, Sylvia Wynter  
**Chair:** Richard Roberts  
**Professors:** David B. Abernethy (Political Science), Jean-Marie Apostolides (French and Italian), Paul F. Basch (Medicine), Russell Berman (Comparative Literature), Joan Bresnan (Linguistics), Martin Carnoy (Education), Walter P. Falcon (Food Research Institute), James Lowell Gibbs, Jr. (Anthropology), Carl Gotsch (Food Research Institute), William B. Gould (Law, on leave), William R. Leben (Linguistics), Valentin Mudimbe (French and Italian, and Comparative Literature), Scott R. Pearson (Food Research Institute), Pan A. Yotopoulos (Food Research Institute)  
**Associate Professors:** Sandra E. Drake (English and Comparative Literature), Kennell A. Jackson, Jr. (History), Elisabeth Mudimbe-Boyi (French and Italian), Horace A. Porter (English, and African and Afro-American Studies), Richard Roberts (History)  
**Assistant Professors:** Paulla A. Ebron (Anthropology), Marcel Fafchamps (Food Research Institute), Akhil Gupta (Anthropology), Frederic Zimmerman (Food Research Institute)  
**Senior Lecturer:** Khalil Barhoum (Linguistics)  
**Curators:** Peter Duignan (Senior Fellow Emeritus, Hoover Institution), Karen Fung (Deputy Curator, Hoover Institution), Lewis Gann (Senior Fellow, Hoover Institution), David Rozkuszka (Librarian, Green Library Government Documents), Thomas Seligman (Director, Stanford Museum of Art)  
**Senior Research Fellow:** Larry Diamond (Hoover Institution)

The Committee on African Studies coordinates an interdisciplinary program in African Studies for undergraduate and graduate students from various departments. Under special arrangement with the Stanford/Berkeley Joint Center for African Studies, it is possible to incorporate courses from both institutions into one's program. Contact the center at 415-723-0295 for a listing of courses offered at University of California at Berkeley.

Courses in African Studies are offered by departments and programs throughout the University. A sampling of these is listed at the end of this section. Each year the committee sponsors a seminar to demonstrate to advanced undergraduate and graduate students how topics of current interest in African Studies are approached from different disciplinary perspectives. Each week's presentation is conducted by a different professor in African Studies; the first hour is a lecture, followed by a one-hour seminar discussion.

Course offerings in African languages are also coordinated by the Committee on African Studies. Along with regular courses in several levels of Swahili and Arabic, the committee arranges with the Special Language Program in the Department of Linguistics to offer instruction in other African languages. In recent years, the Special Language Program has offered courses in Afrikaans, Bambara, Hausa, Igbo, Oshivambo, Shona, Wolof, Yoruba, and Zulu.

The Committee on African Studies does not sponsor degree programs, but undergraduates and graduate students can specialize in African Studies under a number of arrangements listed below.

**UNDERGRADUATE STUDY**

Undergraduates may choose an African Studies focus among several alternatives:

1. A major in a traditionally defined academic department (for example, Anthropology, History, Political Science, and so on). These departments afford ample opportunity to enroll in courses outside the major, leaving the student free to pursue the interdisciplinary study of Africa.

2. Interdepartmental majors, such as African and Afro-American Studies or International Relations, which offer coordinated and comprehensive interdisciplinary course sequences, permitting a concentration in African Studies.

3. An individually designed major in African Studies. Under the supervision of a faculty adviser and two other faculty members, the student can plan a program of study focused on Africa that draws courses from any depart-
ment or school in the University. If approved by the Dean's Advisory Committee on Indi-
vidually 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 major-
ing in any field qualify for this certificate by meeting the following requirements:

1. Taking at least 25 units of "significant African content" (at least one course should be a
   survey course).
2. Designating a focus of study (an academic discipline, a region of Africa, or a topical theme).
3. Attaining competence in a language other than English that is spoken in Africa (minimum of
   three quarters in one African language or the equivalent of six quarters of French, Arabic,
   or Portuguese).
4. Writing a research paper (normally an extension of a term paper written for an African Studies
course).

The certificate is awarded directly to the student by the Committee on African Studies and
does not appear on a student's transcript or diploma. For more information, call the Center for
African Studies at 415-723-0295.

GRADUATE STUDY

At the graduate level, Stanford offers the following possibilities for those who wish to be-
come specialists in African Studies:

1. African Studies can be designated a field of concentration within the regular master's and
doctoral programs of some academic departments. Students in the Departments of Anthro-
pology, History, Political Science, and Sociology, and in the School of Education, may
declare African Studies as the area of specialization for their master's and Ph.D. thesis work.
Some other departments, programs, and institutes such as International Policy Studies, the
Stanford International Development Education Committee, and the Food Research Insti-
tute also permit students to specialize in African Studies.

2. Through the Graduate Special Program administered by the Committee on Graduate Studies.
The student seeking a Ph.D. may, with approval, form a committee of four faculty members representing at least two academic departments and pursue an individually tai-
lored graduate program that includes African Studies.

COURSES

246B. Everyday Life in Contemporary Africa—
Often, our understanding of today's Africa is in an outdated framework. What is the experience
of lived history in contemporary Africa? Themes: the culture of communication (language, film,
radio, TV, records); the citizen and the state; women and men; the culture of money, success,
and poverty; and today's rural and urban life. Aim is to locate the ordinary people on a grid of choices
and outcomes.
5 units, Aut (Jackson, Leben)

AFFILIATED DEPARTMENT
OFFERINGS

See respective department listings for course descriptions and Distribution Requirement (DR)
information.

AFRICAN AND AFRO-
AMERICAN STUDIES

105. Introduction to African and Afro-Ameri-
can Studies
5 units, Win (Staff)

ANTHROPOLOGY

6. Human Origins — (Same as Human Biology
6.)
5 units, Win (Klein)

11C. Gender in Cross-Cultural Perspective
5 units (Ebron) not given 1995-96

60. Environmental Problems and Development
3-5 units, Spr (Gupta)

5 units, Aut (Gibbs)

108B. Africa: Gender and Representation
5 units (Ebron) not given 1995-96

128. Ethnographic Film
5 units (Gibbs) not given 1995-96

130. Film Images of African-American Culture
5 units, Win (Gibbs)

133A,B,C. Ethics of Development in a Global
Environment (EDGE) — (Same as Political Sci-
ence 140A,B,C, Engineering 297A,B,C.)
1-4 units Aut, Win, Spr (Gupta, 
Lusignan, Packenham)

151A. Comparative Cultural Studies
5 units (Ebron) not given 1995-96

242. Reading Theory Through Ethnography
5 units (Ebron)

243. Culture as Commodity
5 units (Ebron) not given 1995-96

250. Nationalism and Gender
5 units, Spr (Mankekar)
256. Imaginary Homelands: Constituting Diasporic Communities
5 units (Ebron) not given 1995-96

DANCE
78. Afro-Brazilian and Afro-Peruvian Dance
1 unit, Win (Cushion)

185. African-Caribbean Roots of American Jazz Dance
2 units, Spr (Moses)

FOOD RESEARCH
103/203. The World Food Economy — (Same as Economics 106.)
4 units, Spr (Falcon, Naylor) MW 9-10:50

119/219. Development and Population Interactions in the Third World — (Same as Economics 119.)
5 units, Win (Yotopoulos) TTh 1:15-3:05

136. Population Perspectives in the Third World — (Same as Economics 133, Human Biology 136.)
5 units, Spr (Arthur) by arrangement

149/249. Development Theory at Work: Can Africa Succeed? — (Same as Economics 125.)
5 units, Aut (Fafchamps) TTh 11-12:50

FRENCH AND ITALIAN
133. Literature and Society in Africa and the Caribbean
3-5 units, Spr (Mudimbe-Boyi)

170E. Introduction to African Systems of Thought
4 units, Win (Mudimbe)

278. Topics in French and Francophone Literature: The Discourse of (Self) Representation
3-5 units, Win (Mudimbe-Boyi)

HISTORY
148. Introduction to African History
5 units, Aut (Jackson)

148C. Africa in the 20th Century
5 units, Spr (Roberts) MWFTh 10

247/347. Greater East Africa and Its Historical Writing
5 units, Spr (Jackson)

248A/348A. The End of Slavery: Africa and the Americas
5 units, Aut (Roberts)

248/348D. Law and Colonialism in Africa
5 units, Spr (Roberts)

347B. Graduate Core Colloquium in African History — The Colonial Period
4-5 units, Win (R. Roberts)

349. Graduate Core Colloquium: Precolonial Africa
4-5 units (R. Roberts) not given 1995-96

LINGUISTICS

LANGUAGE PROGRAMS
605A, B, C. Beginning Manika
605A. 3 units, Aut (Staff)
605B. 3 units, Win (Staff)
605C. 3 units, Spr (Staff)

606A, B, C. Beginning Swahili
606A. 4 units, Aut (Mugane)
606B. 4 units, Win (Mugane)
606C. 4 units, Spr (Mugane)

607A, B, C. Intermediate Swahili
607A. 3 units, Aut (Mugane)
607B. 3 units, Win (Mugane)
607C. 3 units, Spr (Mugane)

608A, B, C. Advanced Swahili
608A. 3 units, Aut (Mugane)
608B. 3 units, Win (Mugane)
608C. 3 units, Spr (Mugane)

620A, B, C. Beginning Arabic
620A. 4 units, Aut (Barhoum)
620B. 4 units, Win (Barhoum)
620C. 4 units, Spr (Barhoum)

621A, B, C. Intermediate Arabic
621A. 4 units, Aut (Barhoum)
621B. 4 units, Win (Barhoum)
621C. 4 units, Spr (Barhoum)

622A, B, C. Advanced Arabic
622A. 4 units, Aut (Barhoum)
622B. 4 units, Win (Barhoum)
622C. 4 units, Spr (Barhoum)

POLITICAL SCIENCE
25. Colonialism and Nationalism in the Third World
5 units (Abernethy) given 1996-97

116L. Social Foundations of Democracy
5 units (Diamond)
alternate years, given 1996-97

118A. Political Change in Tropical Africa
5 units, Spr (Abernethy)

118B. The Politics of Race and Class in Southern Africa
5 units (Abernethy) given 1996-97

AMERICAN STUDIES
Administrative Committee: (Chair) Albert Gelpi (English); Barton Bernstein (History), Rudy Busto (Religious Studies), Joseph Corn (American Studies Program Coordinator), Wanda Corn (Art), George Fredrickson (History), Richard Gillam (American Studies Program Coordinator), Alexander Nemerov (Art), Horace A. Porter (English, and African and Afro-American Studies), Jack Rakove (History), Karen Sawislak (History), William Solomon (English)
The American Studies program is administered through the Department of Humanities Special Programs.

UNDERGRADUATE PROGRAMS
BACHELOR OF ARTS

The purpose of the American Studies program is to provide students with a comprehensive and critical interdisciplinary understanding of the American experience. The program builds on a series of core courses emphasizing intellectual and cultural as well as historical and legal analysis. American Studies is also a broadly multicultural major that gives serious curricular attention to issues of diversity, especially as raised by distinctions of race, class, ethnicity, and gender. All majors take an intensive seminar on Perspectives on American Identity that explores the tension between commonality and difference, society and group, from a variety of disciplinary perspectives. The program stresses the study of multiculturalism in depth as well as breadth by requiring students to take at least two approved classes focusing specifically on race and ethnicity. Majors who take five or more such courses have the option of graduating with a race and ethnicity specialization in American Studies.

All American Studies majors work closely with a faculty coordinator to develop an independent study plan consisting of fourteen (or more) courses totaling at least 60 units. All are to be taken for a letter grade. Study plans must emphasize one of three general concentrations or areas of interest (Thought and Imagination, Social Organization and Behavior, and Policy and Institutions) and satisfy the following requirements:

Distribution of Courses — All students must take a minimum of five courses in their primary concentration, plus at least three courses in each of the other two areas. Of these eleven courses, three are specifically required of all students: American Studies 150 in the Thought and Imagination concentration and History 165A and 165B in the Social Organization and Behavior concentration. All majors are expected to obtain a solid grounding in their five-course concentration. For those concentrating on Policy and Institutions, this ordinarily means taking Political Science 1 and 10 as two of the five courses in their concentration.

Seminars — In addition to satisfying the 5-3-3 course concentration requirements described above, all majors must take American Studies 200, Perspectives on American Identity, and a second seminar (or colloquium) requiring a substantial paper. Students who complete more than the two required seminars may count any additional seminars under the appropriate concentrations. Most courses that fulfill the second seminar requirement are so noted in the up-to-date list available at the program office. There may be other courses that also fulfill this requirement; students should consult one of the program coordinators. Seminars taken at Stanford in Washington also fulfill the second seminar requirement.

Race and Ethnicity Component — All students must take American Studies 164. This course, like the two core seminars, is to be taken in addition to the eleven courses that fulfill the 5-3-3 distribution requirement. Majors must also take a second race and ethnicity course as part of their eleven course, 5-3-3 concentration requirement. A list of courses satisfying the race and ethnicity component in American Studies may be obtained from the program administrator.

Optional Specialization in Race and Ethnicity — Students who take at least five approved race and ethnicity courses graduate with an American Studies specialization in race and ethnicity. This is noted on the final undergraduate transcript.

HONORS PROGRAM

Preferably during the junior year and no later than the second week of the third full quarter before graduation, majors with a letter grade indicator (LGI) of 3.5 in American Studies may apply to seek honors by writing a senior thesis for 10 to 15 units of credit. This application is to include the topic and a proposed outline of the senior thesis. The program may approve or disapprove the application or request resubmission with revisions. The finished essay must be submitted six weeks before the date of graduation. Units for the honors project must be in addition to the 60-unit major.

AMERICAN STUDIES HOUSE

This undergraduate residence in Governor’s Corner offers educational opportunities in American Studies to majors whether they are residents or not. Residents are assigned through the draw for undergraduate housing.

CORE

AMERICAN STUDIES

150. American Literature and Culture to 1855 — (Same as English 121.) Required for the American Studies major. Detailed study of important representative works of American cul-
ture from 1630 to 1855. Close textual readings are supplemented with discussions of the intellectual, theological, and political history of the period. (Thought and Imagination)

5 units, Win (Fliegelman)

151. The Transformation of American Thought and Culture, 1865 to the Present — Persistent strains and tensions in American intellectual life and culture over the past century and a quarter. Readings include autobiographies, novels, documentary works, and historical and theoretical analyses that bear on issues of technology and culture, consumerism, mass society, gender, sexuality, violence, political extremism, and power. (Thought and Imagination or Social Organization and Behavior.) DR:8(3)

5 units, Win (Solomon)

152. Introduction to Material Culture: The History of the Built Environment — (Same as History 152.) American history through the evidence of things, e.g., spaces, buildings, and landscapes of the “built environment.” How to “read” such artifacts using methods and theories from anthropology, cultural geography, history, and other disciplines. (Thought and Imagination or Social Organization and Behavior)

5 units, Spr (J. Corn)

179. Introduction to American Law — (Same as Law 106, Political Science 182F.) American law for undergraduates. The structure of the American legal system, including the courts; American legal culture; the legal profession and its social role; the scope and reach of the legal system; the background and impact of legal regulation; the relationship between the American legal system and American society in general. (Social Organization and Behavior or Policy and Institutions) DR:9(5)

5 units, Aut (Friedman)

RACE AND ETHNICITY

164. Introduction to Race and Ethnicity in the American Experience — (Same as History 164.) Required of all majors (does not count toward concentration). How factors of race and ethnicity influenced the American experience and how prevailing attitudes about racial and ethnic groups over time have affected the historical and contemporary reality of the nation’s major minority populations. Focuses on the past two centuries. DR:3

5 units, Aut (Fredrickson, Camarillo)

Students must take a second course in Race and Ethnicity besides 164, selected from the list available in the program office. This second course counts in one of the concentrations.

SEMINAR ON PERSPECTIVES ON AMERICAN IDENTITY


5 units, Win (Solomon)

Spr (Gillam)

AMERICAN THOUGHT AND IMAGINATION

150. American Literature and Culture to 1855 — (Same as English 121.) See “Core Lectures.”

151. The Transformation of American Thought and Culture, 1865 to the Present — See “Core Lectures.”

152. Introduction to Material Culture — (Same as History 152; Science, Technology, and Society 124.) See “Core Lectures.”

AFRICAN AND AFRICAN-AMERICAN STUDIES

105. Introduction to African and Afro-American Studies

ART

130D. American Art since 1945

134A/234A. Photography in America

134B/234B. Ethnicity and Dissent

135. Beyond Tradition: Innovation in Native American Art

136. The Chicano/o Art Movement: 1965 to the Present

233F. Undergraduate Seminar: Work and Play in Antebellum Painting and Literature

CHICANO STUDIES

110. Introduction to Chicano Life and Culture — (Same as Spanish 180.)

CLASSICS

121. Slavery, Ancient and Modern

COMPARATIVE LITERATURE

141. Self as Other: Interpellating Minority Subjectivities

142. Ethnic Memory and Cultural Nationalism

DRAMA

65. American Musical Theater

154A. Early 20th-Century American Drama

154B. Late 20th-Century American Drama

155. Black Drama
ENGLISH
79E/179E. Hemingway and Fitzgerald
112. Masterpieces of American Literature
125. American Literature, 1890-1940
127D. American Literature, 1820-1865
156. Whitman and Dickinson
160D. Cinema and Literature
161A. African-American Writing, 1950-1970
163J. 19th- and 20th-Century African American Writers
163K. Contemporary Latina Culture
186. Seminar: Art and Democracy in 19th-Century America
186A. Seminar: Psychological Themes in American Fiction
186G. Seminar: Race in American Fiction, 1845-1945
187C. Seminar: William Carlos Williams: His Work and Influence
187N. Seminar: African American Autobiography
187T. Seminar: Contexts of African-American Intellectual History
189A. Seminar: Second Wave of U.S. Feminism
229E. The Harlem Renaissance: Failure or Success?
256B. California Poets
291. Innovative American Fiction since 1945

LINGUISTICS
73. African American Vernacular English

MUSIC
5A. Music in America
18A. Ragtime to Bebop, 1900-1945
18B. Bebop to Present (1945-)

PHILOSOPHY
177. Anti-Racism, Multi-Culturalism, and Common Humanity

RELIGIOUS STUDIES
143. Chicano/a Religious Traditions
163. Religion and Ethnicity
253. Religion in the American West
255. Asian American/Pacific Islander Religious Traditions

SPANISH
132B. Mexican and Chicano Cultural Perspectives
180. Introduction to Chicano Life and Culture—(Same as Chicano Studies 110.)
285. Chicana Expressive Culture

AMERICAN SOCIAL ORGANIZATION AND BEHAVIOR
120. The Process and Practice of Community Service—The values, traditions, policies, and politics of community service. Topics: social responsibility; altruism v. obligation; servant leadership; community development; civic education and democratic citizenship; professional and voluntary service. Concurrent participation in community service required.
4 units, Win (Stanton)
151. The Transformation of American Thought and Culture, 1865 to the Present—See “Core Lectures.”
152. Introduction to Material Culture—(Same as History 152; Science, Technology, and Society 124.) See “Core Lectures.”
179. Introduction to American Law—(Same as Law 106, Political Science 182F.) See “Core Lectures.”
214. The American 1960s: Thought, Protest, and Culture
5 units, Aut (Gillam)

ANTHROPOLOGY
130. Film Images of African-American Culture
145. Person, Gender, and Family in Welfare Policy

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

HISTORY
75S. Introductory Seminar: Technology in the 20th-Century America
115. Technology and Culture in 19th-Century America—(Same as History and Philosophy of Science 121; Science, Technology, and Society 121.)
159. Introduction to Asian American History
165A. Colonial and Revolutionary America—Required for the American Studies major.
165B. 19th-Century America—Required for the American Studies major.
165C. The United States in the 20th Century: Great Issues and Problems
173C. Introduction to Feminist Studies
207. Undergraduate Colloquium: Topics in Comparative Women's History
251A. Undergraduate Colloquium: Poverty and Homelessness
252S. Undergraduate Research Seminar: Museums and History
259. Undergraduate Colloquium: Black and White in the United States and South Africa
259S. Undergraduate Research Seminar: The United States and the Vietnam War
263. Undergraduate Colloquium: The Implication of Print in Early America
263A. Undergraduate Colloquium: The Automobile Industry in 20th-Century America
275. Labor and Leisure in 19th-Century Urban America
290. Undergraduate Colloquium: The United States and Japan

SCIENCE, TECHNOLOGY, AND SOCIETY

101. Science, Technology and Contemporary Society
170. Work, Technology, and Society

AMERICAN POLICY AND INSTITUTIONS

179. Introduction to American Law — (Same as Law 106, Political Science 182F.) See "Core Lectures."

ANTHROPOLOGY

145A. Person, Gender, and Family in Welfare Policy

COMMUNICATION

1. Mass Communication and Society
110. Communication and Law
125. Perspectives on American Journalism

EDUCATION

105. American Education and Public Policy — (Same as History 158B, Political Science 186K.)
141. Children, Civil Rights, and Public Policy in the U.S.
220B. Introduction to the Politics of Educational Analysis — (Same as Political Science 187.)

ENGINEERING-ECONOMIC SYSTEMS

170. The Role of Technology in National Security

INDUSTRIAL ENGINEERING

107. Work, Technology, and Society

POLITICAL SCIENCE

1. Major Issues of American Public Policy
10. American National Government
60. The American Dream
101P. Politics and Public Policy — (Same as Public Policy 101.)
104. Seminar: Urban Policy
134B. America and the World Economy
134C. Seminar: America and the World Economy
157. Seminar: On Privacy
163M. Seminar: On Thatcherism and Reaganism
171. Judicial Politics and Constitutional Law: Civil Liberties
181. African Americans and the Political System
184M. Politics and Election Campaigns
194M. Seminar: Media and Politics
194R. Seminar: Law of Politics and Elections
195. Seminar: Race and the American Creed
196. Seminar: Issues of Race in American Politics
289. Seminar: Congress and Congressional Policy Making
292A,C. Seminar: American Political Institutions
296. Seminar: Racial and Ethnic Politics in the U.S.

SCIENCE, TECHNOLOGY, AND SOCIETY

172. The Role of Technology in Policy Decisions — (Same as Political Science 136P, Engineering Economic Systems 171.)

INDIVIDUAL WORK

195. Directed Research
   1-5 units (Staff) by arrangement
199. Directed Reading
   1-5 units (Staff) by arrangement
250. Senior Research Project — Prerequisite: consent of department chair.
   1-15 units, any quarter (Staff)
ANTHROPOLOGY


Chair: Renato I. Rosaldo


Associate Professors: Carol L. Delaney, James A. Fox, Joan H. Fujimura, John W. Rick

Assistant Professors: Paula Ebron (on leave), Akhil Gupta, Purnima Mankekar

Affiliated Faculty: Shirley Brice Heath (English), Susan Cashion (Dance Division), Raymond McDermott (Education), Hazel R. Markus (Psychology), Thomas P. Rohlen (Education)

Lecturers: Amy Borovy, Amy Burce, Robert Francis, Hill Gates, Bill Maurer

Consulting Assistant Professor: Dominique Irvine

Teaching Fellow: Margaret Karalis

The courses offered by this department are designed to (1) provide undergraduates with instruction in anthropology, a discipline treating humanity with regard to the processes shaping culture, society, biological heritage, and personhood; (2) provide undergraduate majors in anthropology with a program of work leading to the bachelor's degree; and (3) prepare candidates for advanced degrees in the discipline.

The department is currently developing two foci. One focus is on Comparative Cultural Studies, the differences of race, class, national origin, gender, sexual orientation, and religion as they are shaped by the experiences (education, history, and migration) through which people in contemporary societies define themselves in relation to others. This can be pursued through the curriculum and degree requirements described below.

A second focus on Human Biocultural Evolution (HBE) emphasizes the biological and cultural aspects of human evolution and their interaction during the last few hundred thousand years. Course work and training is provided in paleoanthropology, prehistoric archaeology, and evolutionary theory, with attention to the origins and biocultural evolution of modern Homo sapiens.

The department is developing HBE in collaboration with the Program in Human Biology. This focus can be pursued in undergraduate or master's level study under current guidelines.

The Department of Anthropology is responsible for collections of historic and prehistoric cultural material from all over the world, most notably from Native North America, the Pacific, Central and South America, and Africa. Some of these objects are used in anthropology courses.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The Department of Anthropology offers two programs leading to the A.B. degree: the major in Anthropology and an interdisciplinary program, the major in Social Sciences (Anthropology). An honors program is offered in both majors. The major in Social Sciences (Anthropology) allows a candidate to combine a concentration in anthropology with a selection of courses from economics, history, political science, psychology, and sociology. Students who want a program that includes more than 10 units from a non-social science field (for example, classics) are advised to petition for an Individually Designed Major.

To declare the major, a student must fill out the Declaration of Major form in the Registrar's Office, obtain the signature of their new Anthropology adviser, and contact the Department of Anthropology's student program coordinator who will explain the degree requirements and give general guidance. It may be helpful for students to meet with the chair of the Undergraduate Committee for initial academic advising and assistance in choosing an appropriate adviser in the department.

Majors in anthropology are required to meet with their advisers at least once every quarter. Each student's progress towards fulfilling the major requirements is recorded in a file kept in the student program coordinator's office. It is the student’s responsibility to see that this file is kept up to date.

The major in Social Sciences (Anthropology) requires a written application. The student must submit to the Undergraduate Committee a tentative list of courses worked out with a faculty adviser and a brief statement that presents an intellectual rationale for the proposed program of study. Application forms may be obtained from the student program coordinator. Students must return the completed application to the student program coordinator no later than the beginning of the Winter Quarter of the junior year.

The Honors Program in Anthropology is open to all majors in the department. Candidates of sophomore or junior standing should submit an application to the student program coordinator no later than the end of the fourth week of the Spring Quarter. It must include a brief statement of the project, a transcript, a short paper, and a letter of recommendation from the professor who is to supervise the honors thesis. The Undergraduate Committee will review applications and notify accepted students.
All majors in the Department of Anthropology must fulfill the following requirements:

1. Competence in a foreign language beyond the first-year level. Such competence is usually demonstrated by completing a course at the second-year level with a letter grade indicator (LGI) of 'C-' or better, but the requirement may be met by special examination, presentation of superior foreign language placement scores, or certification in writing from an appropriate department.

2. A passing grade in Anthropology 90. This course is required of all anthropology majors and should be taken before the end of the junior year. It introduces students to anthropological theory and prepares them for upper-division courses in the department.

The remaining requirements for the two degree programs are as follows:

**Major in Anthropology** — 60 units, with at least 40 in anthropology. The remaining 20 units may be taken from courses in related departments; such outside courses must be approved by the student’s adviser. Students whose programs require additional language study as part of a geographical or linguistics focus may petition the Undergraduate Committee to count up to 10 units of language courses toward the degree if such courses are at the second-year level or are in a second language. The units in anthropology must include at least one course in four of the five following topical categories: (1) area studies (102-126, 182B); (2) Social and Cultural Anthropology (1, 4, 7-18, 128-169); (3) Linguistic Anthropology (4, 5, 18, 71, 167, 170A-178); (4) Archaeology (3, 91/191, 182A, 184, 185, 186A, 187); (5) Biological or Biocultural Evolutionary Anthropology (5, 6, 180B, 180C, 181, 181A, 188A, 194, 196). Courses listed in two topical areas, the student may use the course to meet the requirement in either area, but not in both. In addition, students must choose an area of concentration, taking at least 15 units or three courses in that field. Possible areas of concentration include anthropological linguistics, archaeology, biological anthropology, and specialized areas within sociocultural anthropology such as health and nutrition, gender studies, economic development, symbolic systems, or a particular culture area. Students must have their areas of concentration approved by their advisers. Finally, anthropology majors are urged to take a field work course in archaeology, sociocultural anthropology, or museum methods and to enroll in at least one department seminar in addition to Anthropology 90.

**Major in Social Sciences** — 35 units in anthropology and 25 units in related social science fields. The 60 units must form a coherent program of study and be approved by the student’s academic adviser and the Undergraduate Committee as part of the application for this major. Students whose program includes linguistic studies may petition the University Committee to have up to 10 units count toward the degree if such courses are at second-year level or are in a second language.

**Honors Program in Anthropology** — Candidates whose application to the honors program has been approved by the Undergraduate Committee must complete all of the requirements for their major and submit an honors thesis no later than four weeks prior to the end of the quarter in which graduation is anticipated. The thesis is read by the candidate’s adviser and a second reader appointed by the Undergraduate Committee. Honors candidates enroll in Anthropology 95, Honors Program Directed Individual Study, for as many as 15 units, but may not count more than 5 of those units toward the 60-unit degree requirement.

All required units for undergraduate programs must be passed with an LGI of 'C' or better, and not more than 8 (5 units in anthropology and 3 units in related subjects) of the required 60 units may be taken for a Satisfactory/No Credit grade. Undergraduate majors who have completed the prerequisites are encouraged to enroll in 100- or 200-level seminars. They may also take part in field work on local archaeological sites, obtain training in museum methods by means of research with Stanford collections, and apply for funds to support summer field research in archaeology and social anthropology. In addition, they are encouraged to take part in department activities and to attend the department’s biweekly colloquia (Mondays) and other presentations. Specific dates and topics are posted in the department.

**GRADUATE PROGRAMS**

University requirements for the degrees of Master of Arts and Doctor of Philosophy are described in the “Graduate Degrees” section of this bulletin.

**MASTER OF ARTS**

The Department of Anthropology offers the A.M. degree to four groups of students: (1) Stanford undergraduates who enroll in the coterminal program; (2) Stanford graduate students taking advanced degrees in other departments or schools at Stanford; (3) Ph.D. students in Anthropology who fulfill the A.M. requirements in the course of their work toward the Ph.D. degree; and (4) students who apply from outside of Stanford for entry into the terminal A.M. program.

Stanford students interested in the coterminal program and graduate students in other departments or schools at Stanford should review the "Graduate Degrees" section of this bulletin and consult with the student program coordinator in
ANTHROPOLOGY 285

The A.M. program usually requires more than one year of study. However, full-time students entering the program with appropriate background can complete the A.M. program in one calendar year. To provide a meaningful A.M. program within a one-year period, advance planning of course work with an adviser is required.

A field or library research paper read and approved by at least two departmental faculty members must be presented. Ph.D. students in the department may submit the first-year paper in fulfillment of this requirement. Other A.M. students must submit a project proposal for the master's paper for approval. Coterminal students must obtain approval either by the end of the second quarter of the fifth year of study, or if earlier, by the end of the quarter preceding the quarter in which the degree is completed. All other A.M. students must do so not later than the end of the second quarter of graduate study.

**DOCTOR OF PHILOSOPHY**

Prospective graduate students should request application materials from Graduate Admissions, the Registrar's Office. Applicants must file a report of their scores on the Graduate Record Examination and submit a writing sample in English that demonstrates the ability to produce original analytical work at the graduate level. Successful applicants for the Ph.D. program may enter only in Autumn Quarter. The deadline for applications is January 1.

The Ph.D. program includes a number of required courses and examinations. It also allows the student to develop a flexible program reflecting special interests, under the supervision of a faculty committee chosen by the student. Students encouraged to plan for completion of all work for the Ph.D. in five years.

The Ph.D. requirements for students matriculating beginning 1992 are as follows (those matriculating earlier should consult the department's Guide through the Ph.D. Program for their cohort):

1. **Pass within the first year, at an acceptable graduate level:**
   a) Three of the graduate-level courses in Anthropology designated by the faculty as evaluation courses, including History of Anthropological Thought (either 290 or 291; 290 and 291A in the case of doctoral concentration in Human Biocultural Evolution).
   b) Archeological Data Analysis (184) or Anthropological Research Methods (289).
   c) At least 40 units of completed course work overall.

2. In the first year, enroll and participate in a year-long teaching apprenticeship practicum (Anthropology 298A, B, C).

3. Submit an acceptable, substantial research paper in the Spring Quarter of the first year.

4. During the second year, pass at a satisfactory level:
   a) At least three more of the graduate-level evaluation courses in the department; in the case of concentration in Human Biocultural Evolution, 291A must be completed before the end of the second year.
   b) The Proposal Writing Seminar (Anthropology 294).
   c) At least 27 units of completed course work overall.
5. Serve as a teaching assistant during the second year for three courses (or two courses if not on University financial aid). An approved internship may be substituted for the third teaching assistantship requirement.

6. By the end of Winter Quarter in the second year, recruit the special examination committee, and by the end of Spring Quarter in the second year, schedule examinations (see item 9, below).

7. For those whose native language is English, pass by the end of Spring Quarter of the second year a reading examination in a language other than English in which there is a substantial body of general theoretical literature relevant to anthropology. For those whose native language is not English, demonstrate satisfactory command of English, as evidenced by successful completion of the first two years of graduate study.

8. Upon completion of the above requirements, and upon recommendation of the Anthropology faculty, petition for candidacy at the end of Autumn Quarter of the third year (or earlier).

9. Pass a special examination (written and oral), before or during Winter Quarter (but in no case later than the fourth week of Spring Quarter) of the third year, covering the candidate's major topic of specialization and one major ethnological or paleoanthropological area of the world. The oral part of this examination is normally taken as the University oral.

10. Serve as a teaching assistant for one course in the third year if on financial aid (waived for those who complete all requirements above no later than Winter Quarter of the third year).

11. Prepare a dissertation proposal to be approved by the student's dissertation committee, and obtain needed research clearances before the end of Spring Quarter of the third year and before undertaking doctoral research.

12. Present an approved dissertation based on independent research.

HUMAN BIOCULTURAL EVOLUTION

The department is initiating a doctoral degree program in Human Biocultural Evolution, emphasizing the biological and cultural aspects of human evolution and their interaction during the last few hundred thousand years. Undergraduate and master's candidates can pursue study in this area under the guidelines described in the previous sections. During the first two years in residence, doctoral students are expected to take courses on the description and interpretation of stone artifacts, the analysis of animal bones from archaeological sites, quantitative methods for archaeologists and paleontologists, absolute and relative methods for dating ancient archaeological and fossil sites, hunter-gatherer ethnography, human osteology, evolutionary genetics, language and prehistory, and evolutionary and anthropological theory. The department expects to add courses on the behavioral ecology of the Great Apes and the comparative anatomy of the primates.

Ph.D. MINOR

Prospective Ph.D. minors in Anthropology should request an application from the Department of Anthropology student program coordinator. The requirements for a minor in Anthropology consist of the following:

1. Complete 30 units of courses in the Department of Anthropology at Stanford with an LGI of 'B' or better. Course work for a minor can not also be used to meet requirements for a master's degree.

2. Enlist a faculty member within the Department of Anthropology at Stanford who will provide written consent to serve as the adviser for the minor (see the student program coordinator for a listing of faculty and office hours).

3. In conjunction with the adviser, determine a coherent course of study related to the Ph.D. program, including three courses in theory/methods and one course in a geographical area (for a list of current theory/methods courses, see the student program coordinator).

4. File the necessary paperwork with the student program coordinator. Department of Anthropology requirements listed above are more extensive than the University requirements.

FINANCIAL SUPPORT

The department endeavors to provide needed financial support (through fellowships, teaching and research assistantships, and tuition grants) to all students admitted to the Ph.D. program who maintain a satisfactory course of study. Applicants for the Ph.D. program must file a request for financial aid when applying to the program if they wish to be considered for support. First-year students in the Ph.D. program who have not entered with outside funding are required to apply for such funding during their first quarter. No financial support is available to students enrolled for the A.M. degree.

TEACHING CREDENTIALS

For information concerning the requirements for teaching credentials, consult the "School of Education" section of this bulletin or address the inquiry to the Credential Administrator, School of Education.
COURSES
UNDERGRADUATE
GENERAL

Open to all students, these courses are introductory in the sense that prior knowledge is not assumed. The numbers are only labels; they say nothing about the level of the course. Students who want a general introduction to human behavior and culture are advised to take Anthropology 1; those who are interested in introductory courses focused on specific areas of anthropological inquiry should choose from among the courses numbered 2 through 18. A student who wants a comprehensive introduction to all four subfields of anthropology should take 1, 3, 5 and 6.

1. Social and Cultural Anthropology — (Upper-division students register for 101.) Cross-cultural anthropological perspectives on human behavior, including cultural transmission, social organization, sex and gender, culture change, technology, war, ritual, and related topics. Lectures, films, and readings help present case studies illustrating basic principles of the cultural process. DR:2(*) or DR:9(4* or 5*)

5 units, Win (Staff)
Spr (Gibbs)

3. Human Prehistory — The aims, methods, and data of prehistoric archaeology. Human society's development from early hunters through late prehistoric civilizations. Examines archaeological sites and remains characteristic of the stages of cultural development for selected geographical areas, emphasizing methods of data collection and analysis appropriate to each. DR:9(5*)

5 units, Aut (Rick)

4. Language and Culture — Introductory lecture on language in its cultural setting. Comparative approach, using examples from many languages, concentrating on analysis of monographic studies of (generally non-Western) speech communities. Topics: the theory of signs, the ethnography of speaking, registers, speech acts and pragmatics, conversation and discourse analysis, ethnosciences, ethnopoetics, world view and grammatical categories, encodability and language adaptivity, writing and literacy, and nonverbal communication. DR:9(4 or 5)

4-5 units (Fox) not given 1995-96

5. Biology and Evolution of Language — Language as an evolutionary adaptation of humans. Comparison of communicative behavior in humans and animals, and the inference of evolutionary stages. Structure, linguistic functions, and evolution of the vocal tract, ear, and brain, with associated disorders (stuttering, dyslexia, autism, schizophrenia) and therapies. Controversies over language "centers" in the brain and the innateness of language acquisition. Vision, color terminology, and biological explanation in linguistic theory.

4-5 units (Fox) not given 1995-96

6. Human Origins — (Same as Human Biology 6.) The human fossil record from the first nonhuman primates in the late Cretaceous or early Paleocene, 80-65 million years ago, to the anatomically modern people in the late Pleistocene, between 100,000 and 50,000 B.C. Emphasis is on the broad evolutionary trends and on the natural selective forces behind them. DR:5(7)

5 units, Win (Klein)

7. Investigating Culture: Introduction to Anthropology — Elements of everyday life are used as clues for investigating the implicit premises and explicit forms of culture, revealing its meaningful and constructed nature. Drawing on the common experience of entering the university, compares and contrasts disorientation and reorientation with that experienced by anthropologists entering another culture and provides a means for considering the ways humans orient themselves, in space and time, with the body and structures of everyday life, by means of language, and in terms of the symbols and frameworks of myth and religion. Lectures, discussions, and mini-fieldwork projects develop an anthropological approach to the study of culture. DR:9(5)

5 units (Delaney) not given 1995-96

8,9,10. Origins, Encounters, Identities — The sequence fulfills the Cultures, Ideas, and Values requirement. How culture, language, and civilization have arisen, how peoples have understood and preserved insights from their past, how they have interacted in the context of imperial and colonial expansion, and how they have understood and constructed nature, humankind, and their place within the cosmos as groups and individuals. Meets two hours per week in lectures and three hours per week in small group discussion. Ten units are applicable to the major in Anthropology. Enrollment limited, with priority to those applying the sequence to the Area 1 requirement.

8. Origins: Prehistory, Myth, and the Notion of the Primitive — Approaches to inferring human origins and interpreting people's explanations of their own and others' origins. Physical, linguistic, and comparative cultural evidence about the evolution and dispersion of humans in relation to the origins of Old and New World civilizations. Myths and the narratives of origin, including evolutionary theory, in relation to the way peoples think about themselves and others. The intellectual accomplishments of supposedly "primitive" and "advanced" cultures, asking whether their cognitive models of time, space, and the cosmos justify such differentiation. DR:1 (three-quarter sequence)

5 units, Aut (Delaney)
9. Encounters: The Anthropology of Contact and Conflict — The conquest of the Americas in the context of the expansion of Europe, beginning with the Iberian engagement with New Spain. How the Euro-American encounter resulting from the expansion of Europe shaped the identities of indigenous people while forging uniquely American identities of American-born Europeans (Creoles) and persons of mixed descent (Spanish, African, Amerindian). How the meanings of encounters shifted from the Renaissance during the Enlightenment and under 19th-century liberalism, and in the legacy and experience of California’s populations. DR:1 (three-quarter sequence)
3 units, Win (G. Collier)

10. Identities: The Self, Belonging, and Destiny — European and U.S. ideas about the identities of individuals and the social groups to which they belong. Themes: the discovery and salvation of the self through love (romantic love and love of God), the making of the self through work, the meaning of “citizenship” and national identity, the role of property in shaping identity, the concept of the self as property, and the idea of the authentic self as a stable, internal essence. The different ways women and men from various racial, ethnic, and class groups experience and negotiate their identities. DR:1 (three-quarter sequence)
5 units, Spr (Yanagisako, J. Collier)

11C. Gender in Cross-Cultural Perspective — Overview of anthropological theories of gender constructions. Recent questions posed to anthropologists about representation, power, and interpretive authority of ethnographers, drawing on a range of resources — ethnography, film, fiction, and life stories. How gender is a lens through which other forms of social organization can be illuminated and how given theoretical tools act as framing devices for the kind of cross-cultural interpretation one makes. DR:2(*) or 9†(5)†
5 units (Ebron) not given 1995-96

14. Cultures in Crisis — Worldwide demise of tribal groups and peasant communities facing massive cultural change wrought by political and economic expansion from “centers.” Processes leading to the current situation. Global and national factors of local problems. Seminar with maximum student participation. Enrollment limited to 15. DR:2(*)
5 units

17. Astronomy and Culture — Cross-cultural historical 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.
5 units (Fox) not given 1995-96

18. Writing and Literacy — Introduction to the origins, evolution, and diffusion of writing, its relationship to speech, and its roles in culture and civilization. Archaeological decipherment, major writing systems of the world, scribal practice, and current issues and problems in literacy.
4-5 units (Fox, McDermott)
not given 1995-96

60. Environmental Problems and Development — How do global environmental problems affect developing countries? What is the relationship between environmental degradation, poverty, and population? Why the perspective of developing countries of the South differs from the industrial nations of the North, and what can be done to reconcile environmental concerns with the amelioration of poverty.
3-5 units, Spr (Gupta)

71. Linguistic Field Methods — Practical training in the collection and analysis of linguistic data from native speakers. Research goals, ethics, working in the community, technical equipment, and analytical strategies. Emphasis on the use of computers in collection and analysis, and the preparation of materials useful to the subject community. Prerequisite: introductory course in linguistics.
5 units, Spr (Fox)

73A,B,C. First-Year Quiche Maya — For beginners. Introduction to the language of the Maya of Yucatan, Mexico. Emphasis on Quiche, with some attention to colonial and pre-Columbian writings.
3 units, Aut, Win, Spr (Fox) by arrangement

74A,B,C. Intermediate Yucatec Maya
3 units (Fox) by arrangement

75A,B,C. First-Year Classical Nahuatl — For beginners. Introduction to the language of the Aztecs of colonial Mexico.
3 units (Fox) by arrangement

76. Intermediate Classical Nahuatl
3 units (Fox) by arrangement

77A,B,C. First-Year Quechua — For beginners. Introduction to the language of the Inca and their descendants in the Andes of Peru, Bolivia, and Ecuador. Emphasis on modern spoken Quechua.
3 units (Fox) by arrangement

78. Intermediate Quechua
3 units (Fox) by arrangement

90. Theory in Anthropology — Anthropological interpretations of other societies contain assumptions about ourselves and about “Western” societies. Seminar highlights that interplay and considers how underlying assumptions and implicit categories have influenced the presentation of data in a set of major anthropological monographs. Emphasis is on Karl Marx, Emile Durkheim, Max Weber, and
anthropological analyses of nonwestern societies. Writing focus course. Enrollment limited to 20.
5 units, Win (Mankekar) Spr (Rosaldo)

91/191. Archeological Field Methods — Student archeological field research in the local area. The practical working methodology of the archeologist through excavation and site survey, with training in registration, preservation, and analysis of archeological data.
5 units (Rick) not given 1995-96

93. Prefield Research Seminar — Prepares students for anthropological field research in other societies and the U.S. Instruction in data collection techniques including participant observation, interviewing, surveys, sampling procedures, life histories, ethnohistory, and use of documentary materials. Strategies of successful entry into the community, research ethics, interpersonal dynamics, and the reflexive aspects of fieldwork. Prerequisite: introductory course in anthropology or consent of instructor.
5 units, Spr (Staff)

94. Postfield Research Seminar — Helps undergraduates analyze and write about material gathered during summer fieldwork, emphasizing writing and revising as key steps in analysis and composition. Students critique classmates’ work and revise their own writing in light of others’ comments. Reading/discussion on ethical issues in fieldwork and ethnographic writing, setting research write-up concerns within broader contexts. Objective: produce an excellent ethnographic report based on original field research.
5 units, Aut (Gibbs)

95. Honors Program — Directed independent study and honors thesis work for students admitted to program.
any quarter (Staff) by arrangement

96. Directed Individual Study — For undergraduate students with special needs, and showing capacity to do independent work. Prerequisite: 1 or consent of instructor.
any quarter (Staff) by arrangement

98B. The Zapatista Rebellion in Chiapas, Mexico — Open to sophomores only. Seminar on the economic, political, and cultural forces bringing about the Zapatista rebellion in Chiapas, tracing the rebellion from its origins to its present situation. Novels, ethnographic studies, written and oral history, and ongoing journalistic and internet communiqués complement the instructor’s study of the agrarian politics and change in Chiapas, 1960-present.
3-5 units, Aut (G. Collier)

99/199. Honors/Masters Writing Workshop — (Graduate students register for 199.) For students in the process of writing honor’s or master’s papers. Techniques of interpreting data, organizing bibliographic materials, writing, editing, and revising. Also, preparation of papers for conferences and publications in anthropology.
2-6 units, Aut, Win, Spr (Karalis)

UNDERGRADUATE AND GRADUATE AREA STUDIES

102. Native American Cultures of North America — Introduction to diverse cultures of indigenous peoples in N. America before the European conquest. Lectures, readings, and films on the precontact situation, postcontact changes (including government policies), influences of Indian culture on American society and culture, and the contemporary situation of native peoples. An antidote to TV and movie Western stereotypes. DR:2(*) or DR:3(*)
5 units (Barnett, Rick) not given 1995-96

102A. The Battle of the Little Bighorn in Anthropological Perspective — Lecture/discussion focusing on the Battle of the Little Bighorn as a vantage point for an examination of racial and ethnic relations on the Western frontier. Events leading up to the battle, the course of the battle, and its mythologization in American folk culture. The Northern Plains environment of Sioux, Cheyenne, and Crow cultures, and of military culture and the political context of the Indian Wars. Optional summer field trip to the Northern Plains (extra expense, limited capacity). Enrollment limited to 25.
5 units (Fox)

103/203. Mesoamerican Communities, Ethnicities, and Nations — (Same as Latin American Studies 127.) Survey of Mayas, Aztecs, and their prehistoric neighbors, and how they fared under Spanish colonial rule and in contemporary Guatemala and Mexico. Emphasis on movements of resistance and rebellion including the Zapatista rebellion of 1994. DR:2(*)
3-5 units, Aut (G. Collier)

103A. Native Peoples and Cultures of the Southwest — The development of the rich, varied cultures of the American southwest from earliest prehistory to postmodern times. Emphasis on the interaction of cultures, and their responses to changes in social and natural environments. Recommended: background in Native American cultures or literature and/or archaeology. DR:2(*) or 3(*)
5 units (Barnett, Rick) not given 1995-96

107. Maya Mythology and the Popol Vuh — Introduction to the mythology of the ancient and modern Maya, emphasizing the Quiché Maya colonial mythological text (the Popol Vuh) in light of associated colonial documents, modern ethnography, and ancient Maya art. Discussion of theories of
myth, including classic works of Frazer, Freud, Jung, Malinowski, Lévi-Strauss.

5 units (Fox) not given 1995-96

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 and independence. Topics: subsistence patterns, art, shifts in patterns of marriage and family life, the emergence of new classes, the impact of Islam and Christianity, and issues of development. DR:2(*) or DR:9(5*)

5 units, Aut (Gibbs)

108B. Africa: Gender and Representation — Survey of recent gender theory as it applies to Africa. The ways anthropologists, feminist theorists, and African intellectuals present issues of gender. Gender as a category of analysis through which other forms of social inequality are illuminated.

5 units (Ebron) not given 1995-96

114. Introduction to Chinese Society — Introduces pre- and post-revolutionary Chinese society through selected topics including marriage, ancestor worship, foot-binding, regional variation, collectivization, birth control, and rural development. Guest lectures. DR:2(*) or 9(5*)

5 units, Spr (Wolf)

117. Society in Traditional China — The social structure of late traditional China. Implications for anthropological and sociological theory and for the understanding of China prior to the 1949 revolution. Topics: social stratification, the social organization of production and exchange, marriage and the family, lineage and community organization, fertility and mortality, and the sociological aspects of religion and ritual. DR:2(*) or 9(5*)

5 units, Spr (Wolf)

118A. 20th-Century China — Open to graduate students and upper-level undergraduates. The variations in Chinese culture that have arisen through industrialization, imperialism, alternative forms of nation building in China and Taiwan, the socialist experiment, and integration with world capitalism since the 1940s. Continuities and fundamental changes in Chinese culture as seen through the social organization of production and exchange; the state and its ideologies; social stratification; marriage, kinship, and gender; population growth and migration; and popular systems of belief. DR:2(*) or 9(5*)

5 units, Win (Gates) not given 1995-96


5 units, Win (Gupta, Mancall)

121. Japanese Society and Culture — Cultural theories of Japanese social organization, selfhood, and national identity as productions of a historical relationship between Japan and the West, especially the U.S. The relation of individual and Japanese collectivity through the Japanese and American academic and popular discourses which shape it. Topics: Japanese economic organization and working culture; gender and women’s issues; crime, policing, and social control; “trade wars” and cultural representation, and the influence of Ruth Benedict on post-war U.S. anthropology of Japan. DR: 2(*)

5 units, Win (Borovoy)

123. Japanese Economic Organization — Social and cultural factors in Japanese economic organization and business management, motivational basis for commitment to work, relation of kinship to economic system, “industrial gradation” and its correlates. DR:2(*)

5 units

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

126. The Middle East Through Ethnography — For advanced undergraduates and graduate students. Exploration of the Middle East and anthropological theory through a close reading of a number of ethnographies. Emphasizes issues associated with the region (honor and shame, public and private, sexual segregation, religion, and orientalism). DR:2(*)

5 units (Delaney) not given 1995-96

SOCIAL AND CULTURAL ANTHROPOLOGY

128. Ethnographic Film — The ethnographic film as a documentary form examined through viewing and analysis of classical and current films. Comparison of film and video tapes with written monographs as a tool for understanding and representing culture. Film as a vehicle for anthropological research. Issues of authenticity and legitimacy in representing cultures. Recommended: 1. DR:9(5)

5 units (Gibbs) not given 1995-96

130. Film Images of African-American Culture — The nature of the images of African-Americans and African-American culture as portrayed on film. The sources of those images (including the sources of African-American culture itself); their variations...
and how they have changed over time. Historical trends are related to changes in overall American race relations and American popular culture, including the filmic media. Links to African-Americans' self-conceptions and their status and power in American society. DR: 9

5 units, Win (Gibbs)

132. Gender in South Asian Communities at Home and Abroad — The relationship between men and women in S. Asian communities. Material from scholarship on gender relations in India, Pakistan, Bangladesh, Sri Lanka, Nepal, and overseas S. Asian communities (e.g., those in N. America, Africa, and the U.K.). Focus is on the relationship between the practices and ideologies of gender, and other social institutions (e.g., religion, family, the state, mass media, and ideologies of communalism and nationalism). Prerequisite: 120 or consent of the instructor.

5 units (Mankekar)

133A,B,C. Ethics of Development in a Global Environment (EDGE) — (Same as Engineering 297A,B,C, Political Science 140A,B,C.) Wednesday evening seminars on world affairs, mostly on issues affecting poor nations. Autumn Quarter treats war and peace: the background of current wars and peace negotiations, the UN peace keeping efforts, war and religion, arms trade. Winter Quarter treats international resources and commerce: the debt crisis, environmental protection, resource depletion, Japan in the world economy, aid and monetary institutions. Spring Quarter treats "poverty and prejudice": development models, comparative national health, AIDS, control of wealth, India-China-Africa America today. Speakers from Stanford and other institutions are experts who deal directly with world policy makers through research and advisory activities.

1-4 units, Aut, Win, Spr (Lusignan, Packenham, Gupta) lecture W 7:30-9:30 p.m. workshops by arrangement

136. Culture and Learning — (Same as Education 287X.) Learning in various institutional settings in America and around the globe. Learning in families, in schools, on the job, and on the streets. Emphasis on the information technologies people use to organize their learning, e.g., the body, language, literacy, money, and the computer as they are embedded in different culture contexts and as they interface with the production technologies that dominate the political order.

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

140. Aging: From Biology to Social Policy — What can we expect when we join the ranks of the elderly? What are the biological processes that contribute to aging and are they the same across all populations and cultures? What are the cultural, social, and economic consequences of a large proportion of the elderly? What implications do they have for social policy? Readings, lectures, and films. Students are assisted in research and working with the elderly. DR: 9(5)

5 units, Spr (Barnett)

144A. From Theory to Praxis — Seminar puts into practice feminist theories of subjectivity, location, power, political action. Students work in coordinated research and action projects focused on a cluster of interrelated policy issues. Enrollment limited to 20. Prerequisite: Feminist Studies 102 or consent of instructor.

5 units (Yanagisako) not given 1995-96

145A. Person, Gender, and Family in Welfare Policy — Explicit, implicit notions of the individual person, gender, and family embodied in U.S. welfare policy. Historical roots of welfare, its institutionalization, actual practices, and effects on recipients. Who has responsibility for children? Do theorists and policy makers have different assumptions about person, gender, and family when thinking about the poor? What assumptions are implied about marriage, the individual, in(te)dependence? Underlying assumptions of personhood, gender, and family among those who shape policy.

5 units, Win (Delaney)

147A. Comparative Feminisms — Preference given to juniors and seniors majoring in Feminist Studies and Anthropology. Interdisciplinary seminar for upper-level undergraduates. Women's struggles for empowerment, situating them in the specific cultural and historical contexts in which they have emerged in different parts of the world. Focus: broadening an understanding of women's struggles in the world, and develop analytical models that enable study of these struggles in their complexities and specificities by calling into question dominant assumptions about feminism.

5 units, Spr (Mankekar)

149A. Peasant Society: Economy and Environment — (Same as Human Biology 182.) Until WW II, peasants were a majority of the population. Now they are a minority everywhere except in S. and E. Asia and sub-Saharan Africa. Despite this transformation, peasant and semi-proletarian populations in rural Asia, Latin America, and Africa number some two billion people. Core seminar explores interdisciplinary peasant studies literature and a political economy approach to agrarian change. Student research projects are on a question situated in a specific social context, and relating to food, forests, technology, or water. Prerequisite: course on developing world.

4 units (Crow) not given 1995-96

151. Cultural Citizenship — Exploration of inequality and cultural differences in the U.S. Can people be different and belong too? Interdisciplinary study of selected examples.

5 units (Rosaldo) not given 1995-96
151A. Comparative Cultural Studies — For upper-division undergraduates. The meanings of culture, from anthropological notions to contemporary social theories of mass/public culture. The relationship between popular culture and populist connections (the use of popular culture to build community ties and national and global constituencies) through social difference. How class, gender, ethnic distinctions are created through production and consumption of various cultural practices. DR:9(5)
5 units (Ebron) not given 1995-96

152. Symbolic Anthropology — For undergraduates. Symbolic anthropology is an approach to the study of human society developed along with the concept of culture as a system of symbols and meanings, a system presumed to be embedded in and expressed by institutions, values, attitudes, structures of everyday life, and social action. The intellectual roots, exemplary texts, and opportunities to do symbolic analysis. DR:8t(3)
5 units (Delaney) not given 1995-96

154. Creation/Procreation: A Comparative Study — (Same as Feminist Studies 147.) An alternative to the study of religion and reproduction as distinct categories and separate domains. The gendered aspects of cosmological or religious systems and the cosmological significance of gender in terms of their symbolic interrelationships. Anthropological and other literatures examine these relationships in several cultures, including our own. Emphasis on the ways these beliefs are embedded in practices and structures of social life and on Western categories and meanings, and their implications for theorizing. DR:8t(3)
5 units (Delaney) not given 1995-96

158. The Sociology of Scientific Knowledge — (Same as History 133B, History and Philosophy of Science 155.) Classical problems in the sociology of knowledge as represented in the writings of Marx, Durkheim, and Mannheim. Recent work in the social construction of scientific knowledge. Emphasis on recent studies in the historical sociology of experimental science and lab practice. Using case studies and drawing on anthropological approaches in the works of Pierre Bourdieu, Mary Douglas, and others, a theory of practice and a critique of historically situated practical reason is explored as the foundation of the sociology of scientific knowledge.
4 units (Staff) not given 1995-96

159. Urban Culture — Socio-cultural perspectives of urban culture. How social theories, literature, and film create categories of meaning of cities in cross-cultural contexts. Symbolic anthropology, social history, and cultural studies form theoretical frameworks of analysis.
5 units (Ebron) not given 1995-96

159A. The Multicultural City in Europe — European cities have become a kaleidoscope of peoples and cultures. What does multiculturalism mean in the European setting? How have different governments dealt with the issues, and with what results? Theoretical issues of migration, citizenship, and international labor as they affect people's lives. How does culture affect how different groups utilize space and time, health, and educational resources? How do different notions of gender, family, work, religion, and food and clothing operate as symbols of identity? What are the politics of language? In what way does the city foster or mitigate difference?
5 units (Delaney) not given 1995-96

160. Gender and Science — (Same as History and Philosophy of Science 160.) Seminar examines different perspectives on the study of gender and science, including biological, medical, and physical science. Topics: the historical and contemporary construction of gender and sex, feminist critiques of scientific theories and methods, the work (and lack of work) of women in science, and debates on gendered and feminist epistemologies. DR:8t(3) or 9t(5)
5 units. Aut (Fujimura)

161A. Conservation and Community Development in Latin America — (Same as Human Biology 139, Latin American Studies 196.) The problems and potentials for linking management of protected areas (parks, reserves, wildlife sanctuaries, etc.) with local community development in Latin America. Case studies include national and private parks in Costa Rica, and biosphere reserves in Central and S. America. Emphasis on the impact of Western conservation efforts on indigenous peoples and the ways such efforts might be carried out with social, cultural, and economic benefits at the local level.
3-5 units (Durham, Irvine) not given 1995-96

162A. Topics in Socio-Cultural Studies of Biotechnology — (Same as History and Philosophy of Science 162.) Current literature in socio-cultural studies of biotechnology. Issues of concern at the intersection of biology and technology (e.g., human genome project, bioinformatics, biodiversity, virtual reality, artificial life, cyborgs and representations, and products in biology, biotechnology, and medicine). Sociocultural questioning about the organization of scientific work, the universalization and formalization of knowledge, the transformation of societies via novel products, multicultural ways of knowing, definitions of life, and ethical and legal concerns.
5 units (Fujimura)

164. Ecological Anthropology — (Same as Human Biology 134.) The relationship between human populations and their environments. Theories of how environment influences human behavior and culture, and how human populations shape the environment. Classical approaches within the field: cultural ecology, systems theory, optimization theory,
evolutionary ecology, and population dynamics. Current research on indigenous systems of resource management, common property resources, and political ecology. DR:2(*) or DR:9(5*)
  3-5 units (Durham, Staff) not given 1995-96

168. Medical Anthropology—For students with interests in health care. Introduction to curing systems in our own and in non-Western cultures; problems of adapting modern medicine to diverse cultures; explication of the social and cultural correlates of physical and mental health and disease (social epidemiology). DR:2(*) or DR:9(5*)
  5 units, Aut (Barnett)

  3-5 units (Durham, Staff) not given 1995-96

LINGUISTIC ANTHROPOLOGY

170A. Language and Youth Culture—Sociocultural and linguistic studies through which urban youth have been defined and debated. Gang histories and structures, ghetto and project life, socialization of children and youth, and aesthetic expression (graffiti, vernaculars, music, drama, and pictorial art.) Case study with investigations of language and culture patterns within institutions (e.g., families, schools, youth groups, (including Boys’ and Girls’ Clubs, neighborhood basketball leagues, etc.), and “service” agencies. Emphasis on U.S. youth, with comparative perspectives from other nations, especially with respect to language socialization.
  5 units, Aut (Heath)

172. Indigenous Languages of North and South America—Survey of Native American languages, their history, classification, structure, and possible Old World relationships. The relationship between Native American languages and the development of anthropological and linguistic theory. Native American writing systems. Problems of language, culture, and world view.
  5 units (Fox) not given 1995-96

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, Spr (Fox)

ARCHAEOLOGY AND BIOLOGICAL ANTHROPOLOGY

  5 units, Aut (Franciscus)

180C. Advanced Human Osteology—Analysis of human bone remains from archaeological and paleontological sites. In-depth analysis of fragmentary skeletal remains from an archaeological site prior to their reburial. Analysis includes morphometric measurements and observations of various skeletal elements, and assessment of age, sex, and pathological conditions of individual specimens. Cultural influences on skeletal variability, and the assessment of prehistoric population dynamics.
  5 units, Win (Franciscus)

181/281. Evolutionary Anthropology—(Same as Human Biology 181.) Upper-division/graduate seminar focusing on the concept of evolution as used in anthropology. Theory in biological anthropology as applied to hominid evolution and human population genetics. Evolutionary approaches to culture and social organization, including social evolution, sociobiology, and evolutionary culture theory. Enrollment limited to 20.
  5 units, Aut (Durham)

181A. Human Evolutionary Genetics—For upper-division graduate students. The evolution of modern humans as inferred from available genetic data. Quantitative methods used to analyze mitochondrial DNA allele frequencies. Inference of human migrations and expansion. Genetic support for models of the evolution of modern humans. Comparison of genetic data with archaeological and linguistic data. Emphasis is on critical reading of the literature. Prerequisite: Human Biology core or equivalent. Recommended: introductory course in statistics.
  4-5 units, not given 1995-96

182A. Archaeology and Education at Zuni Pueblo—Intensive experience in archaeological education in Zuni, N.M. Participants learn Southwest archaeology and simultaneously work as teachers and tutors for Zuni High School students in a Stanford-sponsored archaeology course. Stanford students lead archaeological research projects and plan field trips and other class activities while living in the pueblo. Insights to prehistory, history, and current conditions of life on Indian reservations.
Contact Department of Anthropology early in academic year. Enrollment limited to 6. DR:3(*)
6-9 units (Rick) not given 1995-96

182B. Cultural Anthropology of the Southwest — Intensive field experience at Zuni pueblo in northern New Mexico. Stanford students work as teachers and tutors for Zuni High School students who also take the course. Guidance provided to develop and carry out research and service activities in the pueblo and plan field trips and service activities. Contact Department of Anthropology. Enrollment limited to 6. Corequisite: 96. DR:3
6-9 units, not given 1995-96

184. Archaeological Data Analysis — The univariate, multivariate, and graphical methods used for analyzing archaeological and paleobiological data. Archaeological and paleontological examples illustrate various methods. Recommended: knowledge of algebra.
5 units (Klein) not given 1995-96

185/285. Stone Tools in Prehistory — Archaeologists rely on an understanding of stone tools to trace much of what we know of prehistoric societies. How to make, illustrate, and analyze stone tools, revealing the method and theory intrinsic to these artifacts. Recommended: previous archaeology course work.
5 units, Spr (Rick)

186A. Dating Methods for Archaeology — Advanced undergraduate/graduate seminar on the primary geochronological methods used to date archaeological and human fossil sites and to calibrate major transitions in human evolution. Fundamental principles of radiometric, paleomagnetic, and thermoluminescence techniques; extensive use of real archaeological samples. Field trips to U.S. Geological Survey and Lawrence Livermore Laboratory. Prerequisite: knowledge of algebra. Recommended: basic chemistry.
5 units (Staff) not given 1995-96

187/287. Hunter-Gatherers in Archaeological Perspective — 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 1995-96

188A/288A. Animal Bones for the Archaeologist (Faunal Analysis) — Advanced undergraduate/graduate seminar. The vertebrate skeleton and methods for reconstructing past environments and ecology from assemblages of fossil bones. Emphasis on how bones from ancient archaeological sites are used to reconstruct their human environments and ecology. Enrollment limited.
5 units, Spr (Klein)

189. Incas and their Ancestors: Peruvian Archaeology — (Same as Latin American Studies 125.) The development of high civilizations in Andean S. America from hunter-gatherer origins to the powerful, expansive Inca empire. Contrasting ecologies of coast, sierra, and jungle areas of early Peruvian societies of 12,000-2,000 B.C. Domestication of indigenous plants, which provided the economic foundation for monumental cities and beautiful ceramics and textiles. Cultural evolution, and why and how major transitions occurred.
5 units, Win (Rick)

193. Darwin, Evolution, and Galapagos — (Same as Human Biology 161.) Advanced seminar on the flora and fauna of Galapagos Islands and what they reveal about the pattern and process in organic evolution. Darwin's observations in the Galapagos, and their role in the formulation of his theory of evolution. Implications of recent research in the Galapagos for understanding evolutionary dynamics. Lectures/discussion/optional field trip to Galapagos Islands (at extra expense, limited capacity). Limited to 25 sophomores and juniors. Prerequisites: Human Biology. Limited to 6-9 units, not given 1995-96

194. The Origins of Modern Humans — Analysis of the data and theories bearing on the origins of anatomically modern humans between 100,000 and 50,000 years ago. Emphasis on the two major competing theories: that modern humans originated more or less simultaneously from non-modern humans in many regions of Africa and Eurasia; or that modern humans originated exclusively in Africa and spread from there, largely replacing non-modern humans elsewhere.
5 units, Spr (Franciscus)

195. Museum Methods — Individually directed work on anthropology collections. Introduction to the computerized storage and retrieval system, cataloging, exhibit techniques. Can be taken for one or two quarters by arrangement with instructor.
1-4 units (Rick) by arrangement

5 units (Durham)

alternate years, given 1996-97

GRADUATE AND ADVANCED UNDERGRADUATE

203. Culture and Power: Mesoamerica and Beyond — Indigenous peoples, their articulation
in contemporary states and in transitional processes in relation to issues of ethnic consciousness as shaped by exercises of and responses to power. Limited enrollment. Prerequisites: Spanish reading literacy, consent of instructor.
5 units (G. Collier) not given 1995-96

5 units

232. Science, Technology, and Society—(Same as History and Philosophy of Science 232; Science, Technology, and Society 232.) Seminar on science as social activity; recent approaches to the social production of scientific knowledge and technologies as constructed through cultural practices and the organization of scientific work. Related issues in the studies of knowledge, culture, politics, work, and organizations.
5 units (Fujimura)

5 units (Gibbs)

235. Mass Media and Subjectivities—Graduate seminar on critical approaches to mass media and popular culture. Object is to collaborate in developing methodologies and critiques and to interrogate prevailing theoretical perspectives. Emphasis is on feminist perspectives, national and transnational circulation and reception of popular texts, questions of narrativity, identity and agency, and cross cultural conceptions of subjectivity. Evening sessions required.
5 units (Manekar)

237. Applied Anthropology—Anthropologists apply their knowledge and skills to a variety of problems: developing and evaluating medical care delivery systems and educational programs at home and abroad; assisting in the transfer of technological innovations and predicting and measuring their impact; serving as planners, administrators, and advisers for development programs. The substance of such programs, the utility of anthropological theory and research approaches in solving contemporary problems, and the ethics of professional practice.
5 units, Spr (Barnett)

242. Reading Theory Through Ethnography—Graduate seminar focusing on contemporary ethnography and related socio-cultural theories generated by texts. Topics: agency, resistance, identity formation, discourse analysis, etc.
5 units (Ebron)

243. Culture as Commodity—Graduate seminar focusing on theories of commodification, interests in tourism, national cultures as marketable objects, how identities are constituted through production and consumption. Formation of global style and taste.
5 units (Ebron) not given 1995-96

244. Naturalizing Power: Kinship/Gender/Race/Sexuality—Graduate seminar examines discursive and material practices through which social relations of inequality are naturalized. Ideologies of family, kinship, gender, race, and sexuality are compared to consider parallel processes of naturalization and mutual affirmation. The role of anthropological theory in these naturalizations. Enrollment limited to 20. Prerequisite: graduate student or advanced undergraduate major in anthropology, or consent of instructor.
5 units (Yanagisako) not given 1995-96

245. Advanced Feminist Theory—Interdisciplinary graduate seminar examines cultural difference and recent feminist theory within dialogues of contemporary social theory. Enrollment limited to 20. Prerequisite: graduate student or advanced undergraduate major in anthropology, or consent of instructor.
5 units (Ebron) not given 1995-96

246. Feminist Theories of Science and Technology—(Same as History and Philosophy of Science 233.) Feminist theories and studies of science, technology, and medicine, especially as they intersect with cultural studies of science and technology. Focuses on feminist epistemologies, and questions whether, and how, they challenge and shift the lens of current practices in science and technology. How gender is constructed by and constructs the technosciences.
5 units, Aut (Fujimura)

247. Feminist Methodologies—Interdisciplinary graduate seminar for students with thorough working knowledge of feminist theories. Focus is on feminist epistemologies and methodologies, drawing on questions from feminists working at the intersection of feminist anthropology and cultural studies, and in political theory, film theory, history, and literary theory. Feminist negotiations of poststructuralism and postmodernism and interrogations of concepts such as difference, experience, fieldwork, location, and voice. Students think through readings by doing specific research, pedagogical, and community projects.
5 units, Win (Manekar)

248. Gender and Social Theory—Seminar analyzes the ways in which gender figures in the work of a variety of "classical" and contemporary social theorists.
5 units (Delaney) not given 1995-96
249. Seminar on Studying Up — Graduate seminar on issues in cultural theory and methodology through research on people who have greater material and cultural resources than those usually studied by anthropologists. How ideas about ideology, hegemony, identity, power and practice are altered when we study those we consider to be agents of power rather than the subaltern. Topics: transnational capitalist families, colonial administrators, male gender identity, white racial subjectivity, and scientists. Enrollment limited to 20.
5 units (Yanagisako) not given 1995-96

250. Nationalism and Gender — The co-implication of discourses of nationalism and gender, focusing on nationalist movements and ideologies in newly-independent countries and “Third World” contexts. Themes: discourses and practices of colonialism and postcoloniality; the policing of sexuality; the intersection of nationalism with institutions such as the state, mass media, and the family; masculinity, femininity, and militarization; and questions of representation, historiography, location, and strategy.
5 units, Spr (Mankekar)

251. Issues in Cultural Studies — Focuses on the politics of identity and community. Broader topics: questions of nationalism, displaced nationalism, and ethnicity. Interdisciplinary readings in cultural studies provide a theoretical context.
5 units, Aut (Rosaldo)

251B. Cultural Citizenship — Exploration of inequality and cultural differences in the U.S. Can people be different and belong, too? Interdisciplinary study of selected examples.
5 units (Rosaldo) not given 1995-96

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, Spr (Delaney)

253. Religion — Covers theoretical and ethnographic material, sensitizing students to the complexity of the issues involved in the study of religion. In what ways is it useful, or not useful, to talk of religion as a human universal? What is the nature of religion, how is it practiced and by whom, what counts as religious phenomena and what accounts for the persistence of religion and the power of religious movements? What is the relationship between religion and state and what are some issues blurring that distinction? What is the relation between religion, power, and gender? Prerequisite: consent of instructor.
5 units (Delaney) not given 1995-96

256. Imaginary Homelands: Constituting Diasporic Communities — Graduate seminar focusing on meanings of identity and community in post-colonial and diasporic contexts. African, Asian, and Latino diasporas in the U.S., and African and Asian communities in Britain. Topics: nationalism in the postcolonial era; gender, class, and sexuality within diasporas; and relations between postcolonial intellectuals and domestic “minorities” in the U.S. Enrollment limited to 15.
5 units (Ebron) not given 1995-96

257. Law and Culture — Seminar focusing on recent writings on the role of law and legal processes in defining and policing differences among people. Readings on law’s role in differentiating citizens from non-citizens, and in fostering identities based on apparently natural characteristics, e.g., age, sex, sexuality, race, and ethnicity.
5 units, Spr (J. Collier)

258. Ideology and Cultural Nationalism — Ideology understood in the broad sense to encompass “folk” and “hegemonic” ideology. Problems and processes of creating and maintaining cultural identity at the national level in relation to postcolonial nations and to older, established nation-states. Interplay of “ethnicity” of minority groups with national integration. Emphasis on cultural/symbolic processes rather than institutional/structural processes.
5 units

259A. Political Economic and Poststructuralist Theories of the State — Advanced graduate seminar on classic and contemporary marxist, structuralist, and poststructuralist approaches to the state. Readings initiate a dialogue between institutional analysis and those emphasizing processes of representation and the cultural construction of the state. Prerequisite: 262 or consent of the instructor.
5 units, Win (Gupta)

262. Topics in Political Economy — Introduction to selected themes in political economy, emphasizing Marxist approaches. Topics: the development and articulation of capitalism, imperialism, colonialism, dependency, and world systems; 20th-century capitalism, post-Fordism, and postmodernism; the political economy of race, gender, and ethnicity; class relations and productive inequalities in the Third World; the discourse of development; and the cultural mediation of political economic transformation. Ethnographic material that employs these theories to examine specific socio-historical contexts.
5 units (Gupta) not given 1995-96

263. Political Ecology — Graduate seminar focused on the causes and consequences of environmental degradation in diverse social and ecological settings. Emphasis on the role of current trends in ecological anthropology, social and cultural forces in ecological change, including forces that promote...
differential access to resources within and between local populations. Case studies: tropical deforestation, rangeland degradation, soil erosion, drought, and famine.

5 units (Durham) not given 1995-96

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 (multilineal evolution, neo-functionalism, adaptive radiation), and evaluate current theory and research trends. Case studies include agricultural involution in Java, ritual regulation in New Guinea, demographic change in the Swiss Alps, peasant ecology of Central America, and politics of conservation and development in Amazonia. Prerequisite: 164 or graduate standing.

5 units (Durham) not given 1995-96

265. Advanced Psychological Anthropology — Analysis of selected psychocultural processes and theory. Attention to group and individual adaptations to rapid cultural change and urbanization. Prerequisite: consent of instructor.

5 units (Staff) not given 1995-96

266. Cultural Transmission: Education in Cross-Cultural Perspectives — (Same as Education 315.) The transmission and communication of explicit and implicit cultural assumptions in a variety of formal and informal educational contexts. The patterning of education in a cross-cultural perspective, the sequence of culturally constructed experiences in life careers, cultural analysis, and sensitization. Attention to education in the U.S. and other complex societies, and in non-literate cultures.

3-5 units, Spr (G. and L. Spindler)

273. Seminar in Advanced Medical Anthropology — Students work on a previously chosen research problem of their choice in medical anthropology and as it progresses, present their work for supportive discussion and assistance. Prerequisite: 168 or consent of instructor.

5 units, Spr (Barnett)

277. Linguistic Anthropology — 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, Win (Fox)


5 units (Fox) not given 1995-96

280. Ethnographic Approaches to Cultural Diversity in Schooling — (Same as Education 280.) How to learn about culture and to analyze education-relevant situations such as the culturally diverse classroom. The cultural process is approached by acquiring techniques of observation, interview, and interpretation of behavior in context, and soliciting and recording the "native" explanations of their own behavior; developing an internally consistent conceptual structure that orientation observation and elicitation productively; and being sensitized to one's own culture and how it influences perception and interpretation of behavior. Techniques of ethnographic research applicable to the study of schooling are demonstrated and applied in modest field research projects. Writing of one research proposal for research.

4 units, Win (G. and L. Spindler)

289. Anthropological Research Methods — Required for students in Ph.D. program in Anthropology. Practicum in anthropological field research methods, including: interviewing; observation; mapping; linguistic elicitation; use of film, video, and tape recording. Material on ethics of field research, prefield, field and postfield; relationship of methods to research problems and data analysis; and procedures for maintaining physical and mental health in the field. Prerequisite for students not in Anthropology Ph.D. program: consent of instructor.

5 units, Spr (Gutpa)


5 units, Aut (Wolf)

291. History of Anthropology: The 20th Century — Comparative analysis of the development of social and cultural anthropology in France, Britain, and the U.S., focusing on the interplay between the development of anthropological theory, and the changing political and economic circumstances in which it developed.

5 units, Win (J. Collier)

291A. Theory in Biocultural Evolution: 20th Century — Required of HBE Ph.D.s instead of 291. The development of method and theory in archaeology and biological anthropology in the 20th century. Relationships to other subfields of anthropology, and to cognate disciplines. Emphasis is on
integrating perspectives on the cultural and biological evolution of the genus Homo.

(Staff)

292. Dissertation Seminar — For graduate students in the process of writing dissertations and preparing for professional employment.
   *Aut, Win, Spr (Delaney) by arrangement*

293. Internship
   *any quarter (Staff) by arrangement*

294. Proposal Writing Seminar — Required of Ph.D. students in Anthropology in their second year. Treats conceptualization of dissertation research problems, the theory behind them, and the methods for exploring them. Participants draft a research prospectus of the sort suitable for dissertation proposals and research grant applications. Limited enrollment. Prerequisite: 289 or consent of instructor.
   *5 units, Spr (G. Collier)*

295. First-Year Paper
   *2-3 units, Win, Spr (Fox) by arrangement*

296. Research Assistantship — Supervised work with an individual faculty member on the student research project. May be taken for more than one quarter.
   *5 units, any quarter (Staff) by arrangement*

297. Directed Individual Study — Opportunities for advanced students to explore special areas of interest.
   *any quarter (Staff) by arrangement*

298. Teaching Assistantship — Supervised experience as assistant in one undergraduate course.
   *5 units, any quarter (Staff) by arrangement*

298A, B, C. Teaching Apprenticeship Practicum — Required of Ph.D. students in Anthropology in their first year of study. Orientation and training in the skills and practices of effective undergraduate teaching. Limited enrollment, consent of instructor.
   *2 units, Aut, Win, Spr (Staff)*

299. A.M. Project — Research in connection with the master’s paper.
   *any quarter (Staff) by arrangement*

**AFFILIATED DEPARTMENTAL OFFERINGS**

**AFRICAN AND AFRO-AMERICAN STUDIES**

105. Introduction to African and Afro-American Studies
   *5 units, Win (Staff)*

**CHICANO/A FELLOWS**

110. Introduction to Chicano Life and Culture — (Same as Spanish 180.)
   *5 units, Aut (Yarbro-Bejarano)*

**DANCE**

177. Dance and Culture in Latin America — DR:2(*) or 7(2*)
   *3-4 units, Spr (Cashion)*

**EDUCATION**

306C. Cultural Approaches to Education and Development
   *3-5 units (McDermott) given 1996-97*

**FEMINIST STUDIES**

101. Introduction to Feminist Studies
   *5 units (Freedman)*

**LINGUISTICS**

160/260. Introduction to Language Change
   *4 units, Win (Kiparsky)*

146. Language and Gender
   *4 units, Spr (Eckert)*

167. Ethnography of Communication
   *4 units, Win (Heath)*

**PSYCHOLOGY**

108. Cultural Psychology
   *3-4 units (Markus) not given 1995-96*

**SCIENCE, TECHNOLOGY, AND SOCIETY**

270. Poverty, Technology, and Rural Industrialization — (Same as Human Biology 137.)
   *5 units, Spr (Crow)*

**SLAVIC LANGUAGES**

194. Demonology in Russian and other Slavic Cultures
   *4 units, Aut (Arkhipov) TTh 11*

**OVERSEAS STUDIES**

These courses are approved for the Anthropology major and taught overseas at the campus indicated. Students should discuss with their major advisers which courses would best meet individual needs. Descriptions are in the “Overseas Studies” section of this bulletin or at the Overseas Studies office, 126 Sweet Hall.

**FLORENCE**

71. Investigating Culture: Introduction to Cultural Anthropology through Italy
   *5 units, Aut (Yanagisako)*

111. Gender and Feminism in Italy
   *5 units, Win (Yanagisako)*

921. Research Seminar on Family Firms in Italy
   *5 units, Win (Yanagisako)*

1111. Lecture Series on Immigration and Race in Italy
   *2 units, Aut (Yanagisako)*
**APPLIED PHYSICS**

**Emeriti**: (Professors) Marvin Chodorow, C. Chapin Cutler, Theodore H. Geballe, W. Conyers Herring; (Professors [Research]) Bertram A. Auld, H. John Shaw; (Courtesy) William E. Spicer

**Chair**: Stephen E. Harris


**Assistant Professor**: Zhi-Xun Shen

**Professors (Research)**: Helmut Wiedemann, Herman Winick

**Associate Professor (Research)**: Martin M. Fejer

**Courtesy Professors**: James S. Harris, Lambertus Hesselink, Gordon S. Kino, Douglas D. Osheroff, Anthony E. Siegman

**Courtesy Associate Professors**: Bruce M. Clemens, Shoucheng Zhang

**Courtesy Professor (Research)**: Calvin F. Quate

**Consulting Professors**: Richard G. Brewer, Bernardo A. Huberman

**Consulting Associate Professor**: John D. Fox

The Department of Applied Physics offers qualified students with backgrounds in physics or engineering the opportunity to do graduate course work and research in the physics relevant to technical applications and natural phenomena. These areas include astrophysics, condensed matter physics, physics of biological macromolecules, quantum electronics, space science, and superconductivity. Student research is supervised by the faculty members listed above and also by various members of other departments such as Electrical Engineering, Materials Science and Engineering, and Physics, who are engaged in related research fields. Research activities are carried out in the Center for Materials Research, the Center for Space Science and Astrophysics, the Department of Applied Physics, and in the Ginzton Laboratory, Hansen Experimental Physics Laboratory, Solid State Electronics Laboratory, and Stanford Synchrotron Radiation Laboratory.

The number of graduate students admitted to Applied Physics is limited. Applications should be received by January 1, 1996. Graduate students normally enter the department only in Autumn Quarter.

**GRADUATE PROGRAMS**

Admission requirements for graduate work in Applied Physics include a bachelor's degree in Physics or an equivalent engineering degree. Students entering the program from an engineering curriculum should expect to spend at least an additional quarter of study acquiring the background to meet the requirements for advanced degrees in Applied Physics.

**MASTER OF SCIENCE**

The University's basic requirements for the master's degree are discussed in the "Graduate Degrees" section of this bulletin. The minimum requirements for the degree are 36 units, of which at least 30 units must be graduate-level courses in applied physics, engineering, mathematics, and physics. The required program consists of the following:

1. Courses in physics and mathematics to overcome deficiencies, if any, in undergraduate preparation.
2. Basic graduate courses:
   a) Advanced Mechanics — one quarter, 3 units; Physics 210.
   b) Electrodynamics — two quarters, 6 units; Physics 220, 221, Electrical Engineering 241, 242.
   c) Quantum Mechanics — two quarters, 6 units; Physics 230, 231.
3. Additional advanced courses in science and/or engineering, not including Directed Study (Applied Physics 290) or 1-unit seminar courses, to complete the requirement of 36 units.
4. A final overall average letter grade indicator (LGI) of 'B' is required for courses used to fulfill degree requirements.

There are no department or University examinations, and a thesis is not required. If a student is admitted to the M.S. program only but later wishes to change to the Ph.D. program, the student must apply to the department's Admissions Committee.

**DOCTOR OF PHILOSOPHY**

The University's basic requirements for the Ph.D. (residency, dissertation, examination, and so on) are discussed in the "Graduate Degrees" section of this bulletin. The program leading to a Ph.D. in Applied Physics consists of course work, research, a Ph.D. candidacy qualifying examination, a research progress report, a University oral examination, and a dissertation as follows:

1. **Course Work**
   a) Courses in physics and mathematics to overcome deficiencies, if any, in undergraduate preparation.
   b) Basic graduate courses:
      1) Advanced Mechanics — one quarter; Physics 210
      2) Statistical Physics — one quarter; Physics 212
3) Electrodynamics — two quarters; Physics 220, 221, Electrical Engineering 241, 242
4) Quantum Mechanics — two quarters; Physics 230, 231
5) Laboratory — one quarter; Applied Physics 207, 208, 304, 305; Physics 201, 202, 203, 301; Materials Science and Engineering 161, 162, 163
c) 18 units of additional advanced courses in science and/or engineering, not including Directed Study (Applied Physics 290), Dissertation Research (Applied Physics 390), and 1-unit seminar courses.
d) A final average overall LGI of ‘B’ is required for courses used to fulfill degree requirements.
e) Students are normally expected to complete the specified course requirements by the end of their third year of graduate study.

2. Research: may be conducted under the supervision of a member of the Applied Physics faculty or appropriate faculty from other departments.
3. Ph.D. Candidacy Qualifying Examination: must be passed before the third year of graduate registration. The examination consists of a seminar on a suitable subject delivered by the student before the faculty academic adviser (or an approved substitute), the research adviser, and one other member of the faculty selected by the department. Passing the examination, together with satisfactory academic and research work, qualifies the student to apply for Ph.D. candidacy.
4. Research Progress Report: before the end of the Winter Quarter of the fourth year, the student arranges to give an oral research progress report of approximately 30 minutes, of which a minimum of 10 minutes should be devoted to questions from the Ph.D. reading committee.
5. University Ph.D. Oral Examination: consists of a public seminar in defense of the dissertation, followed by private questioning of the candidate by the University examining committee.
6. Dissertation: must be approved and signed by the Ph.D. reading committee.

* Requirements for item 1b may be totally or partly satisfied with equivalent courses taken elsewhere, pending the approval of the Graduate Study Committee.

ASSISTANTSHIPS
Research assistantships are available for Ph.D. candidates. Information on applying for financial aid is included in the admission packet received from Graduate Admissions, the Registrar’s Office.

COURSES

100. Introduction to Observational and Laboratory Astronomy — (Enroll in Physics 100.) 4 units, Spr (Walker)
160. Introduction to Stellar and Galactic Astrophysics — (Enroll in Physics 160.) 3 units, Aut (Romani)
161. Introduction to Extragalactic Astrophysics and Cosmology — (Enroll in Physics 161.) 3 units, Win (Petrosian)
169A,B,C. Independent Study in Astrophysics and Honors Thesis — (Enroll in Astronomy 169A,B,C.) 1-9 units 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 (Byer)
192. Introductory Biophysics — For undergraduate and graduate students who wish to learn about the physical basis underlying selected topics in contemporary molecular biology. Relation of structure to function of proteins: elementary statistical mechanics of allosteric molecules. Macromolecular conformations: secondary and tertiary structure of proteins. Kinetics of small molecule binding and transport: CO-myoglobin and ion channels. Supramolecular kinetics: motor proteins. Transition from molecular scale to macroscopic scale: nerve impulse propagation. 3 units, Win (Doniach)
207,208. Laboratory Electronics — Combined lecture/lab emphasizing analog and digital electronics for lab research. RC and diode circuits. Transistors. Feedback and operational amplifiers. Active filters and circuits. Pulsed circuits, voltage regulators and power circuits. Precision circuits, low-noise measurement and noise-reduction techniques. Combinatorial and synchronous digital circuits. Analog/digital conversion. Microprocessors and real time programming. Current lab interface protocols. Emphasizes techniques commonly used for lab measurements. Development of students’ lab projects during the last three weeks of 208. Limited enrollment. Prerequisites: some undergraduate-level device and circuit exposure. 207. 3 units, Win (Fox) 208. 3 units, Spr (Fox)
216. X-Ray and VUV Physics — Introduction to current x-ray and VUV physics research and classical concepts in photon science. Photon-electron interactions; x-ray absorption and Compton scattering. X-ray spectroscopy; EXAFS, SEXAFS, edge structure, magnetic circular dichroism and linear dichroism. Photoemission spectroscopy and many-electron effects: angle-resolved and integrated pho-

3 units (Shen)
alternate years, given 1996-97

231. Lasers I and II — (Enroll in Electrical Engineering 231, 232.)
231. 3 units, Aut (Siegman)
232. 3 units, Spr (Siegman)

248. Fundamentals of Noise Processes — (Enroll in Electrical Engineering 248.)
3 units, Aut (Yamamoto)

261. The Fourier Transform and Its Applications — (Enroll in Electrical Engineering 261.)
3 units, Aut (Nishimura)
Win (Gray)
Spr (Kazovsky)

290. Directed Studies in Applied Physics — Special studies under the direction of a faculty member for which academic credit may properly be allowed. May include lab work or directed reading.

any quarter (Staff) by arrangement

291. Practical Training — Opportunity for practical training in industrial labs. Arranged by student with the research adviser’s approval. A brief summary of activities required, approved by the research adviser.
1 unit, Aut (Staff) by arrangement

301. Astrophysics Laboratory — (Enroll in Physics 301.)
3 units, Sum (Walker)

304. Lasers Laboratory — Laser theory and practice. Lectures on the theoretical and descriptive background for lab experiments, detectors and noise, lasers (helium neon, beams and resonators, argon ion, cw dye, titanium sapphire, semiconductor diode, and the Nd:YAG). Measurements of laser threshold, gain, saturation, and output power levels. Laser transverse and axial modes, linewidth, and tuning, Q-switching and modelocking. Limited enrollment. Prerequisites: Electrical Engineering 231 and 232, or consent of instructor.
3 units, Win (Byer)

305. Nonlinear Optics Laboratory — Emphasis on laser interaction with matter. The laser devices provide the radiation required to explore the linear and nonlinear properties of matter. Experiments on modulation, harmonic generation, parametric oscillators, modelocking, stimulated Raman and Brillouin scattering, Coherent Anti-Stokes scattering, other four wave mixing interactions such as wavefront conjugation and optical bistability. Optical pumping and spectroscopy of atomic and molecular species. Limited enrollment. Prerequisites: 304, Electrical Engineering 231 and 232, or consent of instructor.
3 units, Spr (Byer)

312. Basic Plasma Physics — For the non-specialist who needs a working knowledge of plasma physics for space science, astrophysics, fusion, or laser applications. Material includes orbit theory, the Boltzmann equation, fluid equations, MHD waves and instabilities, EM waves, the Vlasov theory of ES waves and instabilities including Landau damping and quasilinear theory, the Fokker-Planck equation, and relaxation processes. More advanced topics are resistive instabilities and particle acceleration. Prerequisites: Physics 210 and 220, or consent of instructor.
3 units (Sturrock)
alternate years, given 1996-97

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, cellular automata; simulation of quantum systems.
3 units (Doniach)
alternate years, given 1996-97

320. Quantum Optics and Selected Topics in Atomic Physics — (Enroll in Physics 320.)
3 units (Chu) alternate years, given 1996-97

321. Laser Spectroscopy — (Enroll in Physics 321.)
3 units, Spr (Kasevich)
alternate years, not given 1996-97

324. Introduction to Accelerator Physics — Introduction to basic accelerator physics in linear and circular accelerators. Topics: acceleration, phase stability, transfer matrices, beam envelopes, emittance, and the effects of synchrotron radiation. Topics of current research, including nonlinearities and instabilities.
3 units, Aut (Siemann)
alternate years, not given 1996-97

3 units, Win (Beasley)
346. Introduction to Nonlinear Optics — (Enroll in Electrical Engineering 346.)
  3 units, Spr (S. Harris)

360. Stellar Physics — (Enroll in Physics 360.)
  3 units, Spr (Petrosian)
  alternate years, not given 1996-97

362. High Energy Astrophysics — (Enroll in Physics 362.)
  3 units (Petrosian)
  alternate years, given 1996-97

363. Solar and Solar-Terrestrial Physics — Structure, mechanisms, and properties of the sun's interior and atmosphere; solar wind and its variability; solar activity; coronal mass ejections; UV, x-ray, and high-energy particle emission. Earth's magnetosphere. Interaction of the solar wind with the earth's magnetosphere and its terrestrial effects. Sun's electromagnetic radiation effect on the terrestrial environment. Prerequisite: Physics 221 or equivalent.
  3 units, Win (Sturrock)
  alternate years, not given 1996-97

364. Advanced Gravitation — (Enroll in Physics 364.)
  3 units, Aut (Wagoner)

365. Extragalactic Astrophysics and Cosmology — (Enroll in Physics 365.)
  3 units, Spr (Linde)

366. Introduction to Fourier Optics — (Enroll in Electrical Engineering 366.)
  3 units, Win (Goodman)

370. Theory of Many-Particle Systems — (Enroll in Physics 370.)
  3 units, Spr (Fetter)
  alternate years, not given 1996-97

  3 units, Aut (Shen)

  3 units, Win (Harrison) MWF 10

  3 units, Spr (Kapitulnik)

  3 units, Spr (Harrison)

376. Superfluidity and Superconductivity — (Enroll in Physics 376.)
  3 units, Win (Zhang)
  alternate years, given 1996-97

377. Literature of Condensed Matter Physics — Review of key discoveries in condensed matter physics in the past 15 years, with emphasis on experiment. Topics: sliding charge density waves in layer compounds, the first pressure-induced Mott transition and organic superconductor, the discovery of superfluid 3He, quasicrystals, the Sharvin effect, the Quantum Hall Effect, and reentrant superconductivity. Journal Club format with presentations by students on assigned topics.
  3 units, Spr (Laughlin)

  3 units, Aut (Harrison)
  alternate years, not given 1996-97

  3 units (Harris)
  alternate years, given 1996-97
387. Quantum Mechanics and Measurements —

3 units (Yamamoto) given 1996-97


3 units (Yamamoto) alternate years, not given 1996-97

390. Dissertation Research
any quarter (Staff) by arrangement

453. Special Topics in Accelerator Physics —
Research level discussions of current topics in accelerator physics. Content varies each quarter and year, depending on the interests of staff and students. Course may be repeated. Offered occasionally.

453A. Beam Dynamics in Storage Rings — Various beam dynamics topics in storage-ring accelerators including single-particle optics, synchrotron radiation effects, nonlinear dynamics and their manifestations in storage rings, collective effects and instabilities, and how electrons become polarized in storage rings. Prerequisite: knowledge of basic accelerator physics.

3 units, Win (Chao)

453B. Physics of Free Electron Lasers — Introduction to the physics of coherent radiation from electron beams, emphasizing the free electron laser and cyclotron resonance masers, gyrotrons, and plasma-based devices. Topics: naive linear theory, generalized linear theory, non-linear modeling, amplifiers, oscillators, waveguide and free-space systems, optical guiding (or "wave-profile modulation"), and numerical methods.

3 units, Spr (Whittum)

460. Astrophysics Seminar — (Enroll in Physics 460.)
1 unit, Aut, Win, Spr (Petrosian)

463. Special Topics in Astrophysics — (Enroll in Physics 463.)
3 units, Spr (Wagoner) by arrangement

470. Condensed Matter Seminar — Discussion of current research and literature in condensed matter physics offered by faculty, students, and outside specialists.

1 unit, Aut (Beasley) 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 occasionally.

473A. Non-Equilibrium Phenomena in Condensed Matter — Survey of recent progress in understanding the physics of selected systems far from equilibrium. Topics: spinodal decomposition, sandpile models of the vortex critical state in superconductors, front instabilities, propagation of defects in random media, vortex pinning and depinning.

3 units, Aut (Doniach)

473B. Condensed Matter Physics — Students undertake background study prior to each weekly seminar offered through 470 as an introduction to topics of contemporary interest in condensed matter physics, critique each seminar for success in oral communication, and present a one-hour seminar on a contemporary topic for critique by the class. Corequisite: 470.

2 units, Aut (Beasley) by arrangement


2 units, Win (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
Emeriti: (Professors) Keith Boyle, Lorenz Eitner, John LaPlante, Frank Lobdell, Dwight C. Miller, Nathan Oliveira, Michael Sullivan

Chair: Richard Vinograd

Associate Chair for Planning and External Affairs: Wanda M. Corn

Principal Adviser to Undergraduate Studio Majors: Kristina Branch

Principal Adviser to Undergraduate Art History Majors: Jody Maxmin

Director of Graduate Studies in Studio Art: David Hannah

Director of Graduate Studies in Art History: Alexander Nemerov

Professors: Wanda M. Corn (American Art), Elliot Eisner (Art Education), David Hannah (Painting), Matthew S. Kahn (Design, on leave Spring), Suzanne Lewis (Medieval Art, on leave Spring), Richard Randell (Sculpture), Paul V. Turner (Architectural History, on leave 1995-96)

Associate Professors: Kristina Branch (Painting/Drawing, on leave Winter), Michael Marrinan (18th-19th century European Art, on leave Winter, Spring), Jody Maxmin (Ancient Art), Melinda Takeuchi (Japanese Art), Richard Vinograd (Chinese Art)

Assistant Professors: Enrique Chagoya (Painting/Drawing), Paolo Berdini (Renaissance Art), Alexander Nemerov (American Art)

Associate Professor (Teaching): Charles Bigelow (Art and Computer Science)

Affiliated Professor: John H. Merryman (Art and Law)

Senior Lecturers: Joel Leivick (Photography), Laura Volkerding (Photography)

Lecturers: Bernard Barryte (16th-century Italian, 19th-century British Art), Hilaric Faberman (19th- and 20th-century European and American Art), Sarah Fraser (Asian Art), Betsy Fryberger (Prints and Drawings), Richard Joncas (Architecture), Katherine Morris (Native American Art), Maria Ochoa (Chicana/o Art), Christopher Pearson (Architecture), Thomas K. Seligman (African Art), Diana Strauzdes (American Art), Patience Young (American Art)

Visiting Professor: Bryan Wolf (American Art)

Visiting Assistant Professor: Jennifer Shaw (Modern Art)

Acting Assistant Professor: Christina Kiaer (Modern Art)

The department offers courses of study in: (1) the history of art; and (2) the practice of art (studio), with major concentrations in painting and drawing, sculpture, design, and photography. The undergraduate program of the department is designed to introduce students to the humanistic study of the visual arts. The courses are intended to increase understanding of the meaning and purpose of the arts, their historical development, their role in society, and their relationship to other humanistic disciplines such as literature, music, and philosophy. The work in classroom and studio is designed to intensify visual perception of the formal and expressive means of art and to encourage insight into a variety of technical processes. The collection of the Stanford Museum and the exhibitions program of the Stanford Gallery supplement the regular academic program of the department.

PROGRAMS OF STUDY

Undergraduates may major in History of Art or the Practice of Art (Studio). A freshman or sophomore intending to major in one of these areas must consult with an adviser appointed by the department to plan his or her course of study.

Graduate programs are offered in History of Art and Studio (including Product Design).

HISTORY OF ART

BACHELOR OF ARTS

The major program in the History of Art must include the following:

1. Two courses from the following: Art 1, 2, 3.
2. Forty units in art history courses, of which at least 32 must be at or above the 100 level, including one seminar and one other seminar or colloquium. To ensure that majors have a broad foundation in art history, they are required to take 40 units in at least four of the six following areas: Asian, ancient, medieval, renaissance, baroque, and modern. This distribution still permits the student to take several courses in an area of particular interest.
3. Total units: 50. All required course work, including collateral requirements, must be taken for a grade; they may not be taken Satisfactory/No Credit. University units earned by placement tests or advanced placement work in secondary school are not counted within the 50 units.
4. Collateral Requirements:
   a) Each undergraduate major in the history of art shall take at least one university year of a foreign language or present proof of reading ability in a foreign language. Students who intend to apply to graduate school in art history should become proficient in German and either French or Italian because these are required by most major schools in Art History. Students who intend to apply to graduate school in Asian art should take the appropriate Asian language.
   b) Each undergraduate major shall also take two upper-division courses in other depart-
ments that relate to his or her work in art history. Students should discuss the choice of these courses with their advisers as early as possible. The adviser must approve the collateral courses before the student registers for them.

c) Each undergraduate major shall attend an Art library orientation session. Majors are to consult with the Art library staff for scheduling information.

5. Undergraduate majors planning to take courses at an overseas campus must have each course approved by their adviser prior to leaving for the overseas campus.

6. Art majors are required to meet with both their adviser and the undergraduate curriculum adviser during the first two weeks of each quarter to have course work approved and to make certain they are meeting degree requirements. Failure to do so will result in the withholding of registration for that quarter.

7. Recommended courses (but which do not count towards the major): Art 40, 50, or 53 and 70.

HONORS PROGRAM

Art History majors wishing to undertake an individually supervised study in addition to the regular requirements of the major may apply for admission to the honors program. Candidates must have a 3.5 letter grade indicator (LGI) both in the major and overall.

Once a faculty member in Art History agrees to serve as thesis adviser, the candidate submits to the entire Art History faculty a thesis proposal of approximately five pages and a completed paper demonstrating the candidate’s writing ability and intellectual capacity. This submission must be made no later than the third week of the Spring Quarter of the junior year. A majority of the faculty must approve the admission of the candidate to the honors program. The student must find two faculty members willing to serve, along with the adviser, as readers of the thesis; at least one of these additional readers must be a member of the Art History faculty. The thesis adviser must be in residence at Stanford during the student’s senior year. While working on the honors thesis, the student may register for up to 8 units of Art 240 (Individual Work: Art History); these are in addition to the units required for the major.

The completed thesis must be submitted to the three readers no later than the second week of the student’s final quarter of course work. The thesis adviser assigns a grade to the work. The approval of all three readers is required for the thesis to qualify for honors.

MASTER OF ARTS

The Department of Art offers A.M. and Ph.D. degrees. The A.M. is granted as a step toward fulfilling requirements for the Ph.D. The department does not admit students who wish to work only toward the A.M. degree.

The University’s basic requirements for the master’s degree are set forth in the “Graduate Degrees” section of this bulletin.

Completing the University’s requirements for an A.B. degree in the History of Art, or equivalent training, is required of students entering a program of study for the A.M. The required curriculum for entering students is determined by a committee consisting of three members of the art history faculty. The process includes the evaluation of transcripts and records and a meeting (scheduled during the week prior to the opening of Autumn Quarter) with students to discuss course deficiencies.

Requirements for the Degree — The requirements for the A.M. degree in the History of Art are:

1. Residence: completing a minimum of three full-tuition quarters or the equivalent in partial-tuition quarters of graduate registration.

2. Units: completing a total of at least 36 units of graduate work in the history of art in courses at the 200 level, including a seminar in art historiography/visual theory.

3. Languages: reading knowledge of two foreign languages, preferably German and French or Italian. Students in Chinese and Japanese art are ordinarily expected to demonstrate reading competence in modern and classical Chinese or Japanese depending on the student’s area of focus. Final determination is made in consultation with the student’s primary adviser.

4. Papers: submission for consideration by the faculty of two term papers from among those written during the year.

5. Area Coverage: demonstration to the faculty, by course work and/or examination, that the student has adequate knowledge of the major areas of the history of art.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the Ph.D. degree are set forth in the “Graduate Degrees” section of this bulletin. The following are departmental requirements:

Residence — To be eligible for the doctoral degree, the student must complete three years of full-time graduate work in the history of art, at least two years of which must be in residence at Stanford.

Unit Requirements — The student must complete at least 99 units of course work with a minimum of 63 units in art history.

Collateral Studies — The student is required to take at least three courses in supporting fields of study (such as anthropology, classics, history, literature, or philosophy), determined in consultation with the department advisers.
Graduate Student Teaching — As a required part of their training, all graduate students in art history, regardless of their source of funding, must participate in the department's teaching program. At least two one-quarter assignments in Art 1, 2, or 3 are required. Students must register for the Seminar in Teaching Praxis (Art 295). Students receiving financial aid are required to serve as a teaching assistant for a third quarter. Further opportunities for teaching may be available.

Admission to Candidacy — A graduate student's progress is formally reviewed during Spring Quarter of the second year. The applicant for candidacy must complete the requirements governing the A.M. program in the History of Art (see above), and at least an additional 18-24 units by the end of Winter Quarter of the second year. The graduate student does not become a formal candidate for the Ph.D. degree until he or she has fully satisfied these requirements and has been accepted as a candidate by the department.

Dissertation Proposal — By the end of the third year, dissertation subjects should be chosen and the proposal written in consultation with the candidate's adviser. The student forms a Reading Committee consisting of the principal adviser and two other readers. The proposal is submitted to the art history faculty for comments. The student then meets with the Reading Committee to discuss the proposal and faculty comments no later than 30 days after the submission of the proposal, at which time necessary revisions are determined. The proposal is submitted to the adviser for final approval.

Area Core Requirements — Every graduate student must participate in at least one 4-unit graded directed reading course or colloquium to acquire and demonstrate a command of current issues in a field. The course results in one of the following: (a) an examination, (b) a series of short critical essays, (c) an annotated bibliography or, (d) a narrative review of the literature. The student and the student's adviser, or other suitable faculty member(s), will agree on a format. If the number of students in a given field permits, this course may be offered as a colloquium.

Dissertation — A member of the faculty acts as the student's dissertation adviser and as chair of the Reading Committee. The final draft of the dissertation must be in the adviser's hands at least four weeks before the University deadline in the quarter during which the candidate expects to receive the degree. The dissertation must be completed within five years from the date of the student's admission to the candidacy for the Ph.D. degree. A candidate taking more than five years must apply for an extension of candidacy.

Oral Examination — The student forms an Oral Defense Committee (see University guidelines). The oral examination consists mainly of a defense of the dissertation but may range, at the committee's discretion, over a wider field. The student is required to discuss research methods and findings at some length and to answer all questions and criticisms put by members of the examining committee. Changes, resulting from the committee's criticism of the manuscript and subsequent examination of the student's research during the orals, must be incorporated by the student into the final draft of the dissertation for submission to the department as the final requirement for the granting of the Ph.D. degree in History of Art.

Ph.D. Minor

For a minor in History of Art, a candidate is required to complete 24 units of graduate-level art history courses (200 level or above), in consultation with a 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. It is recommended that the basic courses be taken in the freshmen and sophomore years, before declaring a major.

The art history requirement for all studio majors consists of Art 1, to be taken as the basic course before declaring the major, followed by four additional courses. At least one of the courses must be in the modern art series (Art 120A through 121B), and one in the history of non-Western art.

Each undergraduate major is required to attend an Art library orientation session. Majors are to consult with the Art library staff for scheduling information.

REQUIREMENTS FOR PAINTING/DRAWING

Art 40, 50 or 53, 60.
Art 140, 141, 142 (Any of the drawing classes may be taken concurrently with Art 145, Painting I).
18 units of painting courses.
Art 1 plus four other art history courses, including one in the modern art series (Art 120A through 121B) and one in the history of non-Western art.
8 units of electives with the adviser's approval.
Total units required: 65.
REQUIREMENTS FOR SCULPTURE
Art 40, 50 or 53, 60, 70.
Art 140, 141, 142 (two quarters required).
18 units of sculpture courses.
Art 1 plus four other art history courses, including one in the modern art series (Art 120A through 121B) and one in the history of non-Western art.
7 units of electives with the adviser's approval.
Total units required: 65.

REQUIREMENTS FOR DESIGN
Art 40, 50 or 53, 60, 70.
Art 1 plus four other art history courses, including one in the modern art series (Art 120A through 121B) and one in the history of non-Western art.
Mechanical Engineering 101 plus one other Mechanical Engineering course at or above the 101 level.
Art 64, 160, 161, 166, 167 (intermediate design).
Art 261, 268 (advanced design).
Art 140, 145, or 150 (one quarter required).
Total units required: 65.

REQUIREMENTS FOR PHOTOGRAPHY
Art 40, 50 or 53, 60, 70.
Art 140, 141, or 142 (one quarter required).
Art 148.
15 units of photography courses.
Art 1 plus four other art history courses, including one in the modern art series (Art 120A through 121B) and one in the history of non-Western art.
10 units of electives with the adviser's approval.
Total units required: 65.

A major in studio may take Satisfactory/No Credit units in courses outside the 65 units required for the major area of interest.

Students are required to meet with both their adviser and the department's undergraduate curriculum adviser during the first two weeks of each quarter to have course work approved and to make certain they are meeting degree requirements. Failure to do so will result in the withholding of registration for that quarter.

Overseas Campus Credit for Studio Art Courses — A minimum of 52 of the 65 units required for the studio art major must be taken at the Stanford campus. This allows a student to take art courses at an overseas campus, but still requires that the bulk of the work be done under the guidance of an adviser and an approved curriculum. In all cases, a student should meet with his or her adviser before planning an overseas campus program.

Transfer Credit Evaluation — Upon declaring a studio art major, a student transferring from another school must have his or her work evaluated by a Department of Art adviser. A maximum of 13 transfer units are applied toward the 65 total units required for the studio art major. This allows a student to receive some credit for course work completed elsewhere, but still requires that the bulk of the work be done under the guidance of an adviser and an approved curriculum. A student wishing to have more than 13 units applied toward the major must submit a petition to the adviser and then have his or her work reviewed by a studio committee.

MASTER OF FINE ARTS
Programs for the M.F.A. degree are offered in painting, sculpture, new genres, photography, and product or graphic design.

Graduate Program in Painting, Sculpture, New Genres, and Photography — The program provides a rigorous and demanding course of study designed to challenge and encourage advanced students. Participants are chosen for the program on the basis of work that indicates artistic individuality, achievement, and promise. Candidates should embody the intellectual curiosity and broad interests appropriate to, and best served by, work and study within a university context.

Admission — Admission to the M.F.A. degree program requires:
1. Applicants must have an A.B. or B.S. from an accredited school. It is expected that the applicant have a strong background in studio art, either an undergraduate degree or at least three years of independent studio practice.
2. Portfolio specifications: 20 slides of your work. Some of these can be drawings if relevant to the overall project. Send in a Kodak Universal carousel; no actual work is accepted. All slides must be labeled with the applicant's name and an accompanying slide list must be included indicating the size, date, and medium of each work. If the applicant wants the portfolio returned, a stamped, self-addressed container must be included.
3. Applications and portfolios for the studio program must be submitted by January 1. Students accepted to the program are admitted for the beginning of the following Autumn Quarter. No applicants for mid-year entrance are considered.

Requirements for the Degree — The requirements for M.F.A. degree in painting, sculpture, new genres, and photography are:
1. Completing a minimum of two years (six full quarters) of graduate work in residence or its equivalent at Stanford.
2. Completing 48 units of study. Students must discuss their programs of study with the department's Administrator for Programs to ensure that the most favorable registration arrangement is made.
3. Six quarters of the Master’s Project, which includes two weekly seminars (the Object Seminar and the Concept Seminar) and Studio Practice, which is an individual tutorial with a selected member of the faculty. In addition, three courses of academic electives are required to be taken in the first year. These courses can be chosen from a large variety of disciplines in consultation with the faculty adviser.

4. The student is expected to pass three faculty reviews: (1) at the end of the first quarter (anyone judged to be making inadequate progress is placed on probation and will require an additional review at the end of the second quarter), (2) at the end of the third quarter, (3) at the time of the M.F.A. exhibition. The purpose of these reviews is to evaluate development and to assess the progress of the student.

5. During the final quarter, students must write a thesis paper addressing the development of their work over the two-year period at Stanford. Participation in the M.F.A. exhibition at the end of the year is required.

6. All students, regardless of their source of funding, are required to assist with the department’s teaching program for the equivalent of eight hours per week over the period of six quarters; the particulars of this assignment are at the department’s convenience.

The studio faculty reserves the right to make use of graduate paintings, sculpture, and photographs in exhibitions serving the interests of the graduate program.

Graduate students must remain in residence at Stanford for the duration of the program.

The Graduate Program in Design — Working jointly, the Departments of Art and Mechanical Engineering offer graduate degrees in product and visual design. A large new physical environment, the Design Yard, provides professional caliber studio space and well-equipped shops. Flexible programs may include graduate courses in fields ranging from graphic design to engineering design, typography to biotechnology, marketing to microcomputers. The program centers on a master’s project and may also include work in advanced art and design. The program is structured to balance independent concentration with rich utilization of the University and the community, and personal interaction with the students and faculty of the graduate Design program. Cross-disciplinary interaction is encouraged by a four-person graduate design faculty.

An A.M. degree in Design is offered to qualified students who prefer to participate in the graduate program for only one year.

Admission — Admission to the M.F.A. degree program requires:

1. Applicants must have an A.B. or B.S. from an accredited school. It is expected that the applicant have a strong background in studio art, either an undergraduate degree or at least three years of independent studio practice.

2. Portfolio specifications: twelve slides or photographs of creative work. All slides must be labeled with the applicant’s name; if a carousel is sent, an accompanying slide list must be included indicating the size, date, and medium of each work; otherwise, slides should be labeled with the same information and sent in the standard cardboard box received from processing. If applicants want portfolios returned, a stamped, self-addressed container must be included.

Requirements for the Degree — The requirements for the M.F.A. degree in Design are:

1. Completing a minimum of two years (six full quarters) of graduate work in residence or its equivalent at Stanford.

2. Completing in the first year 54 units of course work chosen in consultation with an adviser. At least 18 of the 54 units must be in Art 360A,B,C and Mechanical Engineering 211A,B,C.

3. Participating in a weekly seminar in which their work is criticized and discussed in detail.

4. As a part of their training for the M.F.A. degree, all students, regardless of their source of funding, are required to assist with the department’s teaching program for the equivalent of eight hours per week over the period of six quarters; the percentage of work assigned in a given quarter is at the department’s convenience.

Graduate students must remain in residence at Stanford for the duration of the program.

ART EDUCATION

Complete information concerning the A.M. in Teaching, Doctor of Education and Ph.D. in Education, and Teaching Credential (Single Subject-Secondary) degrees and programs may be secured from the Office of the Dean of the School of Education.

COURSES

HISTORY OF ART

BASIC

1. Introduction to the Visual Arts — Introduction to the critical problems of understanding, analyzing, and writing about the visual arts. Approach is multicultural and topical rather than historical. Discussion sections. DR:7(2)

2. Ideas and Forms in Asian Art — The religious and philosophical ideas and social attitudes of India.
China, and Japan and how they are expressed in the architecture, painting, woodblock prints and sculpture, and in such forms as garden design and urban planning. Discussion sections. DR:2(*) or 7(2*)
5 units, Win (Vinograd)

3. Introduction to the History of Architecture — Selective survey of architecture from antiquity to the 20th century. Mostly Western with some non-Western topics. For each period, specific buildings and general principles relevant to the study of architecture are examined. Discussion sections. DR:7(2)
5 units, Win (Joncas)

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 (Maximin) not given 1995-96

12. Theme and Style in Japanese Art — Selected topics, presented chronologically, illuminating central artistic movements, monuments, and issues in their cultural context from prehistoric times to the 19th century.
4 units, Aut (Takeuchi)

13. Introduction to Chinese Art — Major themes and forms in Chinese art from the Neolithic period to the present. Architecture, ritual bronzes, sculpture, painting, calligraphy, and ceramics in their historical and cultural contexts.
4 units (Vinograd) not given 1995-96

93. Sophomore Seminar: Landscapes, Geographies, Ideologies — For sophomores only. Approaches to landscape sites, images, and contexts, emphasizing European/American and E. Asian traditions. Through analysis and discussion of artistic monuments and writing about landscape, explores ways of understanding cultural and social functions of landscape sites and representations.
3 units, Aut (Vinograd)

INTERMEDIATE

100A/200A. Archaic Greek Art — The development of Greek art from Neolithic beginnings to the decades preceding the age of Pericles. DR:7(2)
4 units, Aut (Maximin)

100B/200B. Classical and Hellenistic Greek Art — The formation, in 5th-century Athens, of the classical ideal and its development and diffusion in the centuries that followed. DR:7(2)
4 units, Win (Maximin)

100C/200C. Roman Art — Introduction to the rich and varied art and architecture of Rome from the Etruscans to the Late Empire.
4 units, Spr (Maximin)

102/202. Greek Painting — Introduction to the study and appreciation of Greek vases and their painters, especially the masters of Athenian black- and red-figure who flourished in the culturally rich and volatile era of the tyrant Peisistratos and his sons.
4 units (Maximin) not given 1995-96

103/203. Late Roman and Byzantine Empire — Art and architecture from Constantinople (4th century) to the Turkish conquest of Constantinople (1452). Artistic traditions (mosaics, icons, manuscript illumination) and building types centered on patterns of ideology and patronage in Rome, Ravenna, Istanbul, Mt. Sinai, the Balkans, and Sicily. DR:7(2)
4 units, Aut (Lewis)

104/204. Early Middle Ages — Art and architecture in Western Europe from c. 700 to 1095, centered on the Celtic, Anglo-Saxon, Carolingian, Ottonian, and Spanish Mozarabic phases of hybrid cultural formation and the creation of such works as the Book of Kells, the Sutton Hoo treasure, and the plan of St. Gall. In a period of social upheaval and political fragmentation, new modes of visual discourse emerge, and remnants of the late classical tradition survive within larger ideological patterns of assimilation and change.
4 units (Lewis) not given 1995-96

105/205. Age of the Crusades — Romanesque art and architecture in Western Europe from c. 1095 to 1200 developed to meet the expansionist demands of such movements and events as the Crusades, the Pilgrimage Roads, the Norman Conquest, and 12th-century humanism in the schools. How spatial environments are built and systems of visual discourse are designed within the ideological contexts generated by monastic and feudal institutions in centers such as Cluny, Citeaux, Moissac, Mont Saint-Michel, Vezelay, Winchester, Canterbury, Durham, Santiago de Compostela, and Monreale.
4 units (Lewis) not given 1995-96

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 patronage and practice in Chartres, Paris, Bourges, Strasbourg, Canterbury, London, Oxford, and Cambridge. DR:7(2)
4 units (Lewis) not given 1995-96

108/208. Age of Realism: 15th-Century French and Netherlandish Painting — Reconfiguration of the visual world and the viewer in the art of the Limbourg brothers—Van der Weyden, Van der Goes, Fouquet, and Bosch. Focuses on the shift from court patronage to entrepreneurial art markets and the new position of the artist in society, within the unstable ideological contexts of late medieval optimism, disillusionment, and premodern spiritual crisis on the Eve of the Reformation. DR:7(2)
4 units (Lewis) not given 1995-96
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

110B/210B. Quattrocento Painting: Masaccio to Leonardo — Survey of early Renaissance painting in light of the artistic practices and cultural attitudes that characterizes the visual culture of Florence throughout the 15th century. The circumstances of patronage, secular and religious, are the framework through which important artistic episodes of Renaissance imagery, from the revival of antiquity to Christian neo-Platonism, find historical explanation. Masaccio’s frescoes at the Brancacci Chapel to Leonardo’s Last Supper. Works by Masolino, Pisanello, Beato Angelico, Gentile da Fabriano, Filippo Lippi, Paolo Uccello, Andrea del Castagno, Mantegna, Piero della Francesca, and Botticelli. DR:7(2)
4 units, Aut (Berdini)

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

110D/210D. Center and Periphery in the Venetian Renaissance — The visual culture of Venice is a culture of exchange between center and periphery. After the acquisition of land dominions, the Terraferma, 1500-1550, Venice, the center, promoted forms of interaction (social, political, and cultural) among the regions of the periphery. By renewing, absorbing, and valorizing the characteristics of the local schools of painting, Venice realized its own aesthetics, e.g., the pictorial genre of the pastoral. Focus is on the works of Bellini, Giorgione, Savoldo, Lotto, Titian, Veronese, Bassano, Schivone and Tintoretto. DR:7(2)
4 units, Spr (Berdini)

120A/220A. 18th-Century Art in Europe, ca 1660-1780 — The major developments in painting across Europe from the High Baroque illusionism of Bernini (Rome) and the founding of the French Academy (Paris) to the international revival of antiquity during the 1760s, with parallel developments in Venice, Naples, Madrid, Bavaria, and London. Lectures situate shifts in themes and styles amidst the emergence of new viewing publics. Artists: the Tiepolos, Giordano, Batoni, and Mengs; Ricci, Pellegrini, and Thornhill; Watteau and Boucher; Chardin and Longhi; Reynolds and West; Hogarth and Greuze; Vien, Fragonard, and the first works by David. Additional hour discussion each week for graduate students. DR:7(2)
4 units (Marrinan) not given 1995-96

120B/220B. Painting in the Age of Revolution — Survey of painting in Europe within the context of the French Revolution and its aftermath. Lectures align ruptures in the traditions of representation with respect to shifting social formations and political events. Artists: David and his students; Gros and the painters of Napoleon; Gericault; Blake, Fuseli, and Goya; Turner and Constable; Friedrich, Runge, and the Nazarenes; Ingres and Delacroix. Additional hour discussion each week for graduate students. DR:7(2)
4 units (Marrinan) not given 1995-96

120C/220C. The Age of Naturalism, ca. 1830-1874 — The origins, development, and triumph of naturalist painting in Europe. Lectures underscore the creative tensions between the traditional ambitions of painting and the challenge of new "modern" subjects and the emerging practice of working in the open air. Artists: Corot, Rousseau, and the painters of Barbizon; Courbet, Millet, and Daumier; the Pre-Raphaelites; Manet and his circle; the early works of Monet, Renoir, Degas and friends. Additional hour discussion each week for graduate students. DR:7(2)
4 units, Aut (Marrinan)

120E/220E. Post-Naturalist Painting — How conceptual models from language, literature, new technologies, and scientific theory affect picture-making following the collapse of the radical naturalism that characterized European painting of the 1860s and early ’70s. Bracketed in France by the first Impressionist exhibition (1874) and the first public acclamation of major canvasses by Matisse and Picasso (1905), explores related developments in England, Germany, and Austria. Artists: the Impressionists and Cezanne; Moreau, Redon, and Rops; Van Gogh and the Fauves; Gauguin, Les XX, and Munch; Seurat and Signac; Puvis de Chavannes, Burne-Jones, Whistler and Klimt; Hortz, van de Velde and Guimard; Beardsley, Vallotton, and Toulouse-Lautrec. Additional hour discussion each week for graduate students. Recommended: some prior experience with 19th-century art.
4 units (Marrinan) not given 1995-96

120F/220F. Painting and Modernity: Art in Paris ca. 1874-1907 — Art in Paris from the first Impressionist exhibition in 1874 through the turn of the century. Impressionists, Post-Impressionists, Symbolists, and others are evaluated as a series of responses to the questions and problems of "modernity." Issues: the development of new models of perception and technologies of vision, the modernization of the city, the discovery of the unconscious.
the diversification of the art market, the flowering of feminism, the rise of nationalism and colonialism. Artists: Impressionists and Cezanne; Gauguin, Van Gogh and the Nabis; Seurat and the Neo-Impressionists; Valadon, Vallotton, Whistler, Moreau, Redon, Puvis de Chavannes, Henri Rousseau, Paula Modersohn-Becker, Matisse, Picasso, and others.

4 units, Win (Shaw)

121C/221C. Art in Europe 1900-1940: Realisms, Modernism, and Avant-Gardes — Early 20th-century Modernism including modernist "masters" (Cezanne, Matisse, Picasso, Malevich, and Mondrian) and practices outside this standard (the role of women artists, the development of new forms of realism, including Socialist Realism, the emergence of new photographs, and the radical avant-gardes between the wars: Dada, Russian Constructivism and Surrealism). Topics: the politics of the avant-garde, the uses of abstraction and realism, and the relation of modernist art to mass visual culture, the commodity, and everyday life.

4 units, Aut (Kiaer)

123C/223C. 20th-Century Sculpture — European and American sculpture from Auguste Rodin to the present. Topics: changing technologies of making sculpture from cutting marble and molding clay to construction, assemblage and the ready-made; the mass production of commodity objects and its effect on the perception of what constitutes a sculptural "object;" the fate of the public sculptural monument to great men; the changing role of sculpture as public monument; the transformation or total disappearance of sculpture in conceptual and earth art; sculptural uses of the body, particularly in feminist art; the body in performance art as a form of sculpture.

4 units, Spr (Kiaer)


4 units (Vinograd) not given 1995-96

126A/226A. Introduction to the Study of Chinese Painting — Issues and approaches to the study of Chinese painting and related pictorial arts. Introduction to major genres, styles, and techniques; problems of subject matter and significance; the social and institutional contexts of painting; painting theory and critical standards; and painters’ lives and cultural roles. Critical readings and discussions of representative studies.

4 units (Vinograd) not given 1995-96

126B/226B. Early Chinese Pictorial Art — Major developments in the pictorial art of early Imperial China, Han through Sung dynasties. Emphasis on recent archaeological discoveries, the appearance of a theoretical and critical literature for painting, and the diversity of functions and conceptions of painting in the Sung period.

4 units (Vinograd) not given 1995-96

126C/226C. Artists and Systems in Later Chinese Painting — Survey of major Chinese artists from A.D. 1300-1900, in the context of changing systems of patronage, art theory, and image production. Focuses on the literati, individualists, court artists, and urban painters of later Imperial China.

4 units (Vinograd) not given 1995-96

126D/226D. Landscapes, Geographies, and Ideologies: Intercultural Perspectives — Comparative issues in the understanding of landscape arts, focusing on E. Asian and European/American traditions. Paintings, gardens, site-specific art, and literature utilize approaches drawn from art history, cultural geography, and literary studies. Topics: conceptions of landscape and nature; social and economic contexts of landscape production; ideological and textual constructions of landscape.

4 units (Vinograd) not given 1995-96

126E/226E. Across Cultures: Encounters of Eastern and Western Art — Crosscultural interactions and appropriations between the art of E. Asia, Europe, and America from the 16th century to the present. Artistic interchange in the context of culturally based attitudes toward visual representation, imagery, and the idea of the foreign.

4 units (Vinograd) not given 1995-96

128A/228A. Imagining Paradise in the Arts of East Asian Buddhism — Buddhist art (200 B.C.-1200 A.D.) focuses on the importance of indigenous Chinese social values in the formulation of E. Asian cults of worship. Images of paradise and spiritual perfection unite Chinese notions of the afterlife and preservation of the family’s ancestors with Indian icons of asceticism. The Indian foundations of Buddhist art. Parallels between Tang-Sung China and the Nara-Heian periods in Japan (tension between narrative and iconic programs, luxury and lavishness in devotional objects, and gardens as sites of meditation and eschatological release). The roles of the temple: storehouse, educational and social center, tool in political programs, and a motivating force in the development of art and calligraphy. Paper drawing on lectures, discussions, and independent research.

4 units, Spr (Fraser)

129/229. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868 — Castles, residences, temples, painting, prints, ceramics, and gardens of Momoyama and Edo Japan. The social, economic, and ideological forces that brought about the genesis, evolution, and demise of specific forms.

DR:2(*) or 7(2*)

4 units (Takeuchi) not given 1995-96

129A/229A. Painting in Late Medieval and Early Modern Japan, 1500-1868 — The appearance, de-
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, Spr (Takeuchi)

130/230. Art in America and Britain, 1670-1825: Culture and Politics — Interdisciplinary study of major themes and genres of British and early American art. Focuses on art in relation to the French and Indian Wars, the American Revolution, and the invention of American national identity, and the art of indigenous peoples, particularly the Iroquois. Close readings of works of art. Artists: Copley, West, Trumbull, Allston, Hogarth, Wright of Derby. DR:7(2)

4 units (Nemerov) not given 1995-96

130A/230A. Art in America, 1825-1910: Culture and Politics — Interdisciplinary study of American art from the Romantic landscape, history, and genre painters to the nostalgic artists working circa 1900. Close readings of works of art. Artists: Cole and the Hudson River School, Mount and Bingham, Leutze, Homer and Eakins, Remington. DR:7(2)

4 units (Nemerov) not given 1995-96

130B/230B. American Art between the Wars — Preference given to upper-class students with art history courses and some familiarity with the history of modernism. Early 20th-century American modernism, emphasizing nationalism, transatlantic exchange, and cultural politics. Topics and artists: the Armory Show, Gertrude Stein, Marcel Duchamp, Alfred Stieglitz, Charles Demuth, Georgia O’Keeffe, Paul Strand, the Regionalists, Walker Evans, the Harlem Renaissance, Paul Cadmus, and the Mexican muralists. Enrollment limited.

5 units (W. Corn) not given 1995-96

130C/230C. Culture in Crisis: American Art in the 1930s — The American artists’ response to the Great Depression, to the New Deal, and to European fashion. Emphasis is on the rise of the short-lived Regionalist movement, Depression era photography, New York modernism, government patronage of the arts, and the heated debates on culture and politics.

4 units (W. Corn) not given 1995-96


4 units, Spr (Nemerov)

130F/230F. Romantic Landscape Painting in America, 1825-1875 — The art of Thomas Cole and the Hudson River School. Emphasis is on American literature and British aesthetic theory, and on questions of patronage, industrialization, and tourism.

4 units (Nemerov) not given 1995-96

134/234. A History of Photography — Survey of the medium, from its prehistory in the Renaissance to the present. Discussions on the work of photographers who used available techniques to serve individual expression and the social and scientific uses of photography through its history. Required readings are thematically directed.

4 units, Win (Leivick)

134A/234A. Photography in America — Topic-driven sequel to 134. Current critical debates around pictorialism, documentary photography, surrealist photography, and word and image texts. Visits to Bay Area collections; work with photographs from the Stanford Museum collection.

4 units, Spr (W. Corn)

134B/234B. Ethnicity and Dissent — Dissent in American literature and art, from feminist consciousness in the poetry of Anne Bradstreet to the critique of contemporary colonial mentalities by James Luna. How categories like race, gender, and ethnicity inform aesthetic production; how artists resist and accommodate themselves to the majoritarian culture; and how the notion of “hegemony” affects artistic thinking. Writers (tentatively): Bradstreet, Wheatley, Douglass, Harriet Wilson, Chestnutt, Paredes, Cisneros, Anaya, Silko, Morrison. Visual artists: Copley, Bingham, Mount, Homer, Tanner, Lawrence, Colescott, Piper, Munoz, Avalos, Mesa Bains, Rupert Garcia, Puryear, Luna.

4 units, Win (Wolf)

135/235. Beyond Tradition: Innovation in Native American Art 1850-Present — The native arts of the Great Plains and the Pacific N.W. Coast. The development of Native American art in the 20th century. The changing role of the Native artist within and outside of his/her community; the repeated interventions of the U.S. and Canadian governments; and the influence of museums, traders, and the art market on Native artistic production. Effect of “identity politics” on contemporary works by Native artists in light of recent federal legislation. The writings of Native American historians, critics, and artists.

4 units, Aut (Morris)


4 units, Aut (Ochoa)

4 units (Turner) not given 1995-96

175A/B/275A.B. Modern Architecture I, II — Two-quarter tracing of the developments, largely in Europe and starting in the 18th-century, which led to the present state of architecture and urban design. Emphasis is on the architects' and planners' responses to new materials, technology, and cultural conditions. DR:7(2)

175A. 4 units, Spr (Joncas, Pearson)
175B/275B. not given 1995-96

176/276. American Architecture and Urbanism — The development of architecture and city planning in the U.S. since colonial times, concentrating on those characteristics and problems which are distinctively American. DR:7(2)

4 units (Turner) not given 1995-96

190X. Readings in Art History — For students with a knowledge of German (one year or equivalent) who want to acquire German reading proficiency in art.

3-4 units (Staff)

ADVANCED UNDERGRADUATE AND GRADUATE

201. Graduate Seminar: Political Iconography — Study of 6th-century painters and the extent to which their work can be seen to reflect the history and political shenanigans of their age. Prerequisite: 100A or 102.

4 units (Maxmin) not given 1995-96

202A. Undergraduate Colloquium: Greek Art — (Same as Classics 120A.)

4 units (Maxmin) not given 1995-96

202B. Graduate Seminar: Greek Vase Painting

4 units (Maxmin) not given 1995-96

202C. Undergraduate Colloquium: Ancient Art

4 units (Maxmin) not given 1995-96

202D. Undergraduate Colloquium: Greek Art

4 units (Maxmin) not given 1995-96

206. Graduate Seminar: Medieval Art and Visual Theory — Readings, discussion, and critical analyses of medieval works of art and architecture within the cognitive and perceptual frameworks of narratology, reception theory, and visual semiotics.

4 units (Lewis) not given 1995-96

206A. Seminar: Manuscript Illumination — Readings, discussion, and critical analyses centered on the production and consumption of the illustrated book in the Middle Ages within the framework of textually generated concepts of visual perception and experience. Topics: genres of texts, literacy and reader response, semiotics, pictorial exegesis, ownership and patronage, codicology, paleography, and the role of the artist vs. the designer of the book.

4 units (Lewis) not given 1995-96

206B. Seminar: Medieval Narrative — Visual and intertextual strategies and structures in some major medieval narriative cycles in mural and manuscript illustration, within the context of current critical theory.

4 units (Lewis) not given 1995-96

214A. Seminar: Modified Expectations — Caravaggio and the Beholder — Contrary to academic theory that image should present the beholder with an experience of higher moral value, Caravaggio's paintings, religious or profane, offer no edifying exempla. They modified the beholder's expectations, and were perceived as a betrayal of artistic ethics. "Caravaggio had destroyed painting" (Poussin). In the process of defying the ideals of painting, Caravaggio's work discloses dimensions of beholding, and of the beholder. Focusing on interpretive strategies from reception theory to psychoanalysis, explores the historical and theoretical circumstances of beholding Caravaggio's images.

4 units, Aut (Berdini)

214B. Seminar: Humanistic Discourse on Art — The linguistic and literary modes devised by the humanists of the 15th century to account for visual experience. How the humanist form of attention, constructed on a limited ensemble of classical disciplines (grammar, rhetoric, poetry, history, and moral philosophy) provided a bridge between the visual and the verbal, thereby establishing the first coherent discourse on art. The range and main themes of humanistic theory and art criticism (mimesis, perspective, composition, ekphrasis, and color structure, etc.) elucidating the emergence of two distinctive modes conditioning subsequent discourse on art: the narrative and the descriptive. Texts by Cennini, Alberti, Guarino, Ficino, Fazio and Leonardo; the contemporary reception of Pliny the Elder, Philostratus, Cicero, Quintilian, and Horace.

4 units, Win (Berdini)

221C. Seminar: Aspects of Realism in 19th-Century Painting

4 units (Marrinan) not given 1995-96

221D. Undergraduate Colloquium: Construction of the 19th-Century Masterpiece

4 units (Marrinan) not given 1995-96

221F. Undergraduate Seminar: Seurat

4 units (Marrinan) not given 1995-96

221H. Undergraduate Seminar: Paul Cezanne

4 units (Marrinan) not given 1995-96

222. Graduate Seminar: Crossroads of the Enlightenment — The Artistic Culture of Rome in the mid-18th Century — Rome, as a long-privileged site for training young artists, acquired new
importance following the discovery of ruins at Herculaneum and Pompeii (1730-1780). Roman artistic culture, as the arena where international artists and critics, dealers, and dilettantes met and were visited by wealthy young people making the Grand Tour, became the center of the contemporary art in Europe. Student research topics and presentations on any relevant aspect of artistic life in Rome at this time, including: patronage and patterns of collecting, monographs on artists or writers working in the city, art practices characteristic to Rome (e.g., copying antiquities), or constructions of the “mythic” Rome in visual renderings or written accounts. Prerequisite: working knowledge of at least one non-English language.

4 units (Marrinan) not given 1995-96

222A. Seminar: France 1880-1900—Modernity, the Unconscious, and the Nation in Representation — Open to graduate students and advanced undergraduates. The simultaneous emergence of an artistic and literary discourse of "Modernity," and a cultural preoccupation with “the Unconscious" (desire, fantasy, dream, hypnosis, hysteria, etc.) as signs or symptoms of modernity. The impact of this conjunction on representation, emphasizing the roles imagined for visual imagery in collective and national identity. The influence of theories of the unconscious on expectations of visual and literary works and the political uses of the relationship between visual imagery and unconscious fantasy. Readings on modernity, psychology, art, literature, and politics from the period and current studies in art history, literary theory, history, psychology, feminism, and cultural studies. Students pursue case studies of artists or events. Prerequisite: consent of instructor. Recommended: reading knowledge of French and of the period in art history, history, or literary studies.

4 units, Spr (Shaw)

223E. Avant-Gardes and Mass Culture between the Wars — Dada, Russian Constructivism, and Surrealism proposed new relations between art and life, the art object and the commodity, high art, and mass culture. How did the differing forms of mass culture and consumerism in Germany, the Soviet Union, and France inform the artistic and theoretical choices of these avant-gardes? What are the political stakes (Marxist and feminist) in the avant-garde notion of “art into life?” Readings: theories of the avant-garde, mass culture, everyday life, and the commodity.

4 units, Win (Kiaer)

223F. Feminist Theories, Feminist Art Practices, 1970s-1990s — Feminist art is often mobilized to demonstrate the biological "essentialism" of 1970s feminism (e.g., Judy Chicago) in contrast to the theorizing of gender in representation in 1980s feminism (e.g., Cindy Sherman). From the perspective of the mid-1990s, examines the alleged split between 1970s and 1980s feminism and how the terms of that split have been challenged by queer theory, identity politics and the recent return to the body in feminist art-making, which insist on interconnections between practices of representation and “bodies that matter.” Readings: Kate Millet, Teresa de Lauretis, Judith Butler, Patricia Williams, and the uses of psychoanalysis in feminist theory and the structuring issue of race. Artists: Chicago, Carolee Schnabel, Hannah Wilke, Adrian Piper, Mary Kelly, Lynda Benglis, Sherman, Rona Pondick, Janine Antoni, Kiki Smith, and Carrie Mae Weems.

4 units, Spr (Kiaer)

227/227A. Seminar: Painting and Theory in the Sung Dynasty — Problems in Five Dynasties and Sung period landscape, narrative, and figure painting studies. Emphasis on developments in art theory, criticism, ideologies, and social and institutional contexts for painting. Series may be taken as a one-quarter reading course (227) or as a two-quarter reading and seminar sequence.

4 units (Vinograd) not given 1995-96

227B. Seminar: Studies on 18th- and 19th-Century Chinese Painting — Investigation of newly important pictorial genres, antiquarian and popular taste, and the changing social role of urban painters in 18th- and 19th-century Yangzhou and Shanghai.

4 units (Vinograd) not given 1995-96

227C. Seminar: Studies of 17th-Century Chinese Pictorial Art — Issues in 17th-century painting and printed illustrations, emphasizing the systems and contexts of image production. Centers of painting, including markets, courts, and patrons; networks of support and signification for pictorial imagery; and the implication of pictorial arts in contestations of political and cultural authority.

4 units (Vinograd) not given 1995-96

227D,E. Issues in Chinese Painting of the Late Ming Period — Problems of revival and revision of the past, the status of artists, and art historical theory in the late Ming period.

4 units (Vinograd) not given 1995-96

227F. Colloquium: New Studies in Chinese Art — Critical readings of current studies of Chinese art, focusing on Ming and Qing period pictorial arts. Emphasis is on issues of political and cultural authority; systems of production, exchange, and possession; and gender-implicated imagery.

4 units (Vinograd) not given 1995-96

227G. Seminar: Chinese Court Painting — Institutions and Ideologies — Topics: study of Chinese court painting during the Sung, Ming, and Qing periods. Court institutions of support, training, and patronage of artists; taste and aesthetic standards; ideological and political functions of painting.

4 units (Vinograd) not given 1995-96

228. Graduate Seminar: Gender and Pictorial Narrative in China — Gendered roles and repre-
sentations, romantic and erotic themes, and strategies of pictorial illustration and narrative in Chinese paintings and prints of the late Ming and Qing periods.

4 units, Aut (Vinograd)

228B. Colloquium: Buddhist Art at Dunhuang: State of the Field — Themes from the study of Dunhuang, the largest Buddhist cave site in East Asia. Theories of vernacular culture and the notion of "popular" expression in Dunhuang medieval arts, articulating new directions for the study of pictorial and verbal storytelling. Artistic and historiographic overview, the use of the caves, sources of imagery and texts, visual narrative, the artist's practice in Buddhist workshops, and the economic infrastructure of the temple as it impacts construction of caveshines. Student presentations on specific objects and their intersection with vernacular theory or an issue related to students' research interests.

4 units, Spr (Fraser)

229D. Seminar: Problems in Japanese Painting — Graduate seminar on selected aspects of Japanese art as dictated by student wishes/interests. Possible topics: representations of the city, the interplay of Japanese and Chinese theories of painting, the artist in Japanese society, narrative and/or genre painting, Japanese calligraphy, concepts of artistic personality in Japan, art and politics, "eccentric" artists, topographical scenes, the scholar-painter tradition, and investigations of 16th-, 17th-, and 18th-century art. Training in use of Japanese dictionaries, bibliographies, and other research tools. Prerequisite: knowledge of Japanese or Chinese.

4 units (Takeuchi) not given 1995-96

229E. Colloquium: "Pictures of the Floating World" — Images from Japanese Popular Culture — Paintings, woodblock prints, and printed books delineating urban life during the 17th-19th centuries. Questions of technique, representation, social identity, and censorship. Prerequisites: 2, 12, 129 or 129A.

4 units (Takeuchi) not given 1995-96

229F. Seminar: 18th-Century Japanese Painting — Investigation of the rise of new styles and artistic revivals, the extraordinary number of "eccentric" painters, influences from China and the West, the proliferation of art-historical treatises, and the redefinition of the role of the artist in Japanese society. Prerequisites: 2, 12, 129 or 129A.

4 units, Spr (Takeuchi)

229G. Colloquium: Women and Gender in Japanese Art — For undergraduates and graduates. Women as patron, subject, and artist in Japanese society; conventions of homosexuality and hypersexuality; the pleasure quarters, theatricality, eroticism, censorship, the body, and the construction of play and fashion. Prerequisites: 2, 12, 129 or 129A, or consent of instructor.

4 units (Takeuchi) not given 1995-96

229H. Seminar: Japanese Art

4 units (Takeuchi) not given 1995-96

231A. Undergraduate Seminar: Photographs as Historical Documents

5 units (J. Corn, W. Corn) not given 1995-96


4 units (W. Corn) not given 1995-96

232A. Seminar: The Art of the Old West — Major painters and sculptors of the American West from 1880-1920, including Frederic Remington, Charles Russell, and Charles Schreyvogel. Cowboys and Indians in the context of evolutionary theory, ethnographic documentation, national symbolism, immigration and the urban world, the advent of movies, other turn-of-the-century nostalgias (e.g., New England and the Middle Ages), and questions about the recoverability of the past.

4 units (Nemerov) not given 1995-96

232B. Colloquium: Contemporary Cultural Criticism — The ideological content of recent movies, television shows and commercials, art exhibitions, sporting events, and other contemporary products of American culture.

4 units (Nemerov) not given 1995-96

232C,D. Graduate Colloquium: American Art — Theory and Practice — The historiography of American art and its development as a recognized subfield in art history. The invention of a national art history, the history of methods within the field, classics of American art scholarship, and current day revisionism. Two-quarter course satisfies the Ph.D. area exam in art history.

4 units, Win, Spr (W. Corn)

232E. Seminar: Interpretation and History — The Art of Benjamin West — Study of Benjamin West (1738-1820), the American artist who spent most of his career in England as court painter to George III. "New historical" emphasis on the West in terms of the various discourses (British colonial expansion) embodied in his art. Close readings of individual works by West and his contemporaries.

4 units (Nemerov) not given 1995-96

232F. Undergraduate Seminar: Interpretation and History — Hollywood Film, 1939-1955 — Focuses on film noir movies (Mildred Pierce and Double Indemnity) and on early technicolor films (King Vidor's Northwest Passage.) The problems of relating a visual text (movie or otherwise) to a cultural moment.

4 units (Nemerov) not given 1995-96
233. Colloquium on the History of Photography — Readings on the history and criticism of photography combined with a close study of works in Bay Area collections. Enrollment limited.
   4 units (W. Corn) not given 1995-96

   4 units, Win (Nemerov)

233E. Graduate Seminar: Modernity and 19th-Century American Visual Culture — Modernity helps understand how visual culture (painting, literature, and theory) operated and was put together historically. Focus is on topics central to the notion of modernity: the emergence of a public sphere, the commercialization of the art world, spectatorship and early mass culture, race and identity, and professionalized ways of seeing associated with the new managerial classes of the late 19th century. Painters and writers: Copley, Peale, Durand, Church, Woodville, Blythe, Eakins, Tanner; Franklin, Wheatley, Poc, Hawthorne, Barnum, Chestnutt; Barthes, Foucault, Jameson.
   4 units, Aut (Wolf)

235F. Undergraduate Seminar: Work and Play in Antebellum Painting and Literature — The removal of work from the home following the American Revolution changed the way culture was produced and absorbed. How older cultural forms were modified (gothic and sentimental fiction) and how new forms arose (minstrelsy, tourism, museums, early mass culture). Writers: Franklin, Brown, Foster, Barnum, Child, Poc. Painters: Copley, Peale, Cole, Durand, Church, Mount, Bingham, Woodville, Blythe, Quidor.
   4 units, Spr (Wolf)

235. Graduate Seminar: Visual Theory in Art History — Introduction to the major theoretical approaches in the contemporary praxis of art history through discussion and analysis of selected readings.
   4 units (Lewis) not given 1995-96

235A. Seminar on Art History: Ideas and Ideology — Readings/discussion of contemporary art history and art criticism, dealing with the problematics of post-structuralism, feminism and issues of gender, the new Marxism, reception theory, semiotics, and deconstruction.
   4 units (Lewis) not given 1995-96

235B. Graduate Seminar: Notions of "the Public" in Art Historical Discourse
   4 units (Marrinan) not given 1995-96

235C. Graduate Seminar: The Vision of Art History
   4 units, Aut (Marrinan)

235D. Graduate Seminar: Narrative Theory and Visual Forms
   4 units (Marrinan) not given 1995-96

236A. Undergraduate Colloquium: Chicana/o Mural Tradition — The historical, artistic, and representational significance of murals created by Chicanas/os in California from 1965-1990. Topics: wall art techniques and styles, including pre-Columbian, European, and Mexican; issues regarding public art, including form, production, funding, community involvement, and audience response; unpacking the concepts of “mestizaje” and “the vernacular” as circuits of artistic production; and the artist as social critic. Reading and writing intensive with student presentations. Fieldwork required. Limited enrollment.
   4 units, Spr (Ochoa)

237. Art History Bibliography and Library Methods — Primarily for art history graduate students; upper-class undergraduate majors who plan to continue in art history on the graduate level may enroll with the consent of the instructor. Introduction to reference works and library techniques essential to the study of architectural and art history. Sources of artistic, historical, and cultural information in their printed and automated forms.
   4 units, Win (Ross)

240. Individual Work: Art History
   any quarter (Staff) by arrangement

277. Seminar: Le Corbusier and Problems in Modern Architecture — Prerequisites: 175, consent of instructor.
   4 units (Turner) not given 1995-96

278. Seminar: The Design of the American College Campus — Prerequisites: 175 or 176, consent of instructor.
   4 units (Turner) not given 1995-96

279. Seminar: Frank Lloyd Wright and Problems in American Architecture — Prerequisite: 175 or 176, consent of instructor.
   4 units (Turner) not given 1995-96

280. Seminar: Utopia and Reality in Modern Urban Planning — Primarily for Urban Studies majors but others may be admitted. Examines utopian urbanist thinkers (Ebenzer Howard, Le Corbusier, Frank Lloyd Wright, etc.) who established the conceptual groundwork of contemporary urban planning practice. Student participation and research-oriented term paper required.
   4 units, Win, Spr (Stout, Turner)
only, Introduction to fields, issues, and practices in art history.
2 units, Aut (Nemerov)

295. Teaching and Professional Work Experience
4 units, Aut, Win, Spr (Staff) by arrangement

300. Research Project: Art History
any quarter (Staff) by arrangement

400. Dissertation: Art History
any quarter (Staff) by arrangement

RELATED TOPICS
Classical Athletics—(See Classics 14.)

PRACTICE OF ART
FOR NONMAJORS
These courses are designed for non-majors in studio art and have no prerequisites.

14. Drawing for Nonmajors
2 units, Aut, Win (Staff)

16. Sculpture for Nonmajors
2 units, Spr (Staff)

17. Photography for Nonmajors
2 units, Spr (Staff)

BASIC

40. Basic Drawing — Basic concepts of drawing.
3 units, Aut, Win, Spr (Staff)

50. Clay Modeling—The human head and figure.
Class projects are concerned with modeling from life using historical and modern sources.
3 units, Aut, Win, Spr (Randell)

53. Constructed Art — Simple assembly techniques, welding, and metal fabrication are used to construct non-representational sculpture using wood, metal, plastic.
3 units, Aut (Randell)

60. Basic Design — Introduction to visual language and media, and their applications to communication and environment. Two- and three-dimensional projects.
3 units, Aut (Kahn)

64. Color — Comprehensive study in the theories and practice of color. Emphasis is on working with color in a variety of media. Prerequisite: 60.
3 units, not given 1995-96

70. Photography I — Critical, theoretical, and practical aspects of creative photography are addressed through basic camera and lab techniques. Class lecture/discussion, viewing of slides, and field work. Viewing sessions in the Stanford Museum and Art Gallery scheduled according to current exhibitions. 35mm camera required.
4 units, Aut, Win, Spr (Leivick, Volkerding)

INTERMEDIATE
When available, students are encouraged to take intermediate and advanced design courses for 4-6 units.

4 units (Katz) not given 1995-96

140. Drawing I — Recommended as the beginning drawing class for studio art majors. Fundamentals of composition in black and white. Emphasis on the visual aspects of specific subjects which include still-life, model, landscape.
3 units, Aut, Win, Spr (Staff)

141. Drawing II — Intermediate/advanced drawing and composition. May be repeated for credit. Prerequisite: 40 or 140, or consent of instructor.
3 units, Aut, Win, Spr (Staff)

142. Drawing III — Advanced drawing. Emphasis on student initiative with respect to composition, color, and use of a variety of drawing materials. Work from imagination, still life, and model. May be repeated for credit. Prerequisite: 40 or 140, or consent of instructor.
3 or more units, Aut, Win, Spr (Staff)

145. Painting I — Introduction to painting procedure. Still-life, landscape, and figure studies in oil paint emphasizing painting directly from life. May be repeated for credit.
3 units, Aut, Win, Spr (Staff)

146. Painting II — Intermediate painting. Extended problems in pictorial organization and content, with stress on oil painting. May be repeated for credit. Prerequisites: 40 or 140, 145, or consent of instructor.
3 or more units, Aut, Win, Spr (Staff)

147. Painting III — Advanced painting with emphasis on the individual point of view. Prerequisites: three quarters of 145, 146, or equivalent, or consent of instructor.
3 or more units, Aut, Win, Spr (Staff)

148. Monotype — Introduction to print-making using monotype, a graphic art medium which was used by such artists as Blake, Degas, Gauguin, Pendergast, and others. May be repeated for credit. Prerequisite: 40 or 140.
3 units (Staff)

148A. Introduction to Printmaking
3 units (Staff)
149. Collage — Exploration of the aesthetic and generative principles of this 20th-century art form. Projects utilize a variety of media and materials. Examples of collage in music and literature supplement the emphasis on visual form. Prerequisites: 40 or 140, 145 or consent of instructor.
3 units, Spr (Hannah)

149A. Gouache — Intermediate/advanced painting on paper with this water-based medium. Observation and invention are explored. Prerequisites: 40 or 140, 145 or consent of instructor.
3 units (Hannah) not given 1995-96

153. Recent Sculpture Concepts and Projects — Study and practice of the art of recent decades emphasizing current postabstract procedures. Various materials and nonmaterials. Prerequisite: any one of 40, 50 or 53, 60 or 70.
3 units, Win, Spr (Randell)

160. Intermediate Design — Comprehensive design assignments in diverse media, emphasizing the relationship between professional design problems and their underlying elements and procedures. Prerequisite: 60.
3 or more units, Win (Kahn)

161. Visual Icons and Symbols — Introduction to the principles of type and symbol design, emphasizing conceptual thinking. Prerequisite: 60.
3 or more units

166. Pattern Design — Design projects in pattern as applied to cloth, paper, and other surface materials. Introduction to silkscreen printing process. Prerequisite: 160 or 161.
3 or more units

167. Metalsmithing — Projects in jewelry and small, fine objects. Emphasis on design and craftsmanship in metal construction and lost wax casting. Prerequisite: 160.
3 or more units (Kahn) not given 1995-96

168A. Introduction to Urban Design — (Enroll in Urban Studies 170.). 5 units, Win (Gast) plus two Sat. workshops

169. Professional Design Exploration — Six to eight mature projects stimulated by weekly field trips into significant areas of design activity or need. 3 or more units (Kahn) not given 1995-96

170. Photography II — Students individually pursue a topic of their own definition. Class sessions meet for individual and group critiques, lab demonstration, discussions, and slide lectures. 3 units, Win, Spr (Volkerding)

172. Alternative Processes — Priority is given to advanced students. Technical procedures and the uses of primitive and hand-made photographic emulsions. Enrollment limited to 10. Prerequisites: 70, 170, 270, or consent of instructor.
3 units, Aut (Letivick)

173. Photography Abroad — Students may register for 1 or more units for work done out of residence or in an overseas program. Lab work is done on return to Stanford campus. Prerequisite: consent of instructor.
1 or more units, Aut, Win, Spr (Letivick, Volkerding)

173A. Photography: Pinhole to Pixel — Students construct their own cameras from ordinary light-tight objects (shoe boxes, cookie tins, match boxes, waste baskets). Paper negatives from these cameras can be printed using conventional darkroom techniques or by scanning, modifying, and enhancing them on a computer using Photoshop. Themes of invention, discovery, creativity, craft, and technology are discussed during critiques.
3 units (Volkerding) not given 1995-96

ADVANCED UNDERGRADUATE AND GRADUATE

When available, students are encouraged to take intermediate and advanced design courses for 4-6 units.

241. Advanced Drawing and Painting Criticism I — Prerequisites: at least two quarters of painting or drawing and consent of instructor.
Aut, Win, Spr (Staff) by arrangement

242. Advanced Drawing and Painting Criticism II — Prerequisites: at least two quarters of painting or drawing and consent of instructor.
Aut, Win, Spr (Hannah) by arrangement

243. Advanced Drawing and Painting Criticism III — Prerequisites: at least two quarters of painting or drawing and consent of instructor
Aut, Win, Spr (Staff) by arrangement

244. Advanced Drawing and Painting Criticism IV — Prerequisites: at least two quarters of painting or drawing and consent of instructor.
Aut, Win, Spr (Branch) by arrangement

246. Individual Work: Drawing and Painting — Prerequisites: at least two quarters of painting or drawing and consent of instructor.
Aut, Win, Spr (Staff) by arrangement

248. Advanced Monotype — Continuation of monotype, dealing with advanced technical and aesthetic problems in the medium. Prerequisite: 148.
3 or more units (Staff)

250. Individual Work: Sculpture any quarter (Randell) by arrangement

260. Individual Work: Design any quarter (Kahn) by arrangement
261. **Visual Communication** — Design experiences in a wide range of media for communication utilizing a combination of typographic material and images. Class projects focus on producing a cohesive visual program of identity system. Prerequisites: any two design courses above 160.  
3 or more units

262. **Visual Essay** — Design experiences in visual communication through analytical approaches of visual problem solving. Class projects developed as book or similar sequential formats.  
3 or more units

268. **Design Synthesis** — Mature semi-elective problems in composite and multi-media design areas. Prerequisites: any two design courses above 160.  
4 or more units (Kahn not given 1995-96

269. **Advanced Creative Studies** — Evening seminar based on elective design projects in areas of individual specialization. Prerequisite: consent of instructor.  
3 or more units, Aut (Kahn)

270. **Photography III** — Student continues with own work, showing it in weekly seminar critiques.  
Aut, Win, Spr (Leivick, Volkerding) by arrangement

271. **The View Camera, Its Uses and Techniques** — Designed for serious students of photography who wish to gain greater control and refine skills in image-making. 4 x 5 view cameras are provided. Enrollment limited to 8.  
3 units, Aut (Volkerding)  
Win, Spr (Leivick)

272. **Individual Work: Photography** — Student continues with own work, showing it in weekly seminar critiques.  
any quarter (Leivick, Volkerding) by arrangement

273. **Photography and the Human Face** — Through slide lectures and practical work, attempts to determine when a picture of a person becomes a portrait, and in turn, when the portrait becomes a work of art. Various format cameras are available to students in addition to their personal camera. Prerequisite: 70.  
3 units (Volkerding) not given 1995-96

273B. **Photography and Landscape** — Changing attitudes toward nature and the environment are studied through slide lectures, museum study sessions, and field work in photography. Students work according to their own level of technical proficiency. Medium format and view cameras are available for use by advanced students. Prerequisite: 70.  
3 units (Volkerding) not given 1995-96

281. **Concepts of Text for Human-Computer Interfaces** — (Same as Computer Science 273.) Fundamentals of typographic design for computer-user interfaces. Topics: font aesthetics and technology; perception, reading, and legibility; form, pattern, and texture in the typographic image; text organization; integration of text and image; seminology and semiotics of writing systems.  
3 units, Spr (Bigelow)

310A,B,C. **Directed Reading: Studio**  
3 units, any quarter (Staff)

342. **Master's Project**  
any quarter (Staff) by arrangement

360A,B,C. **Master's Project (Seminar): Design**  
Aut, Win Spr (Kahn) by arrangement

**RELATED TOPICS**

**Visual Thinking** — (See Mechanical Engineering 101.)

**Human Values in Design** — (See Mechanical Engineering 115A.)

**OVERSEAS STUDIES**

The following courses are approved for the Art major and taught overseas at the campus indicated below. Students should discuss with their major 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.

120Z. **French Painting from 1780-1900** — (Same as Overseas Studies 120X.) Paris. DR:7(2)  
4 units, Win (Halevi)

173Y. **Industrial Revolution and Its Impact on Art, Architecture, and Theory** — (Same as Overseas Studies 117V.) Berlin. DR:7(2)  
4 units, Win (Neckenig)

174Y. **Architecture and the City, 1871-1990: Berlin as Nucleus of Modernity** — (Same as Overseas Studies 143U.) Berlin. DR:7(2)  
4 units, Aut, Spr (Neckenig)

4-5 units, Aut (Shapiro-Compte)

221Y. **Art and Society in Britain, 1870-1939** — (Same as History 243V.) Oxford. DR:7(2)  
5 units, Win (Tyack)

**ASIAN AMERICAN STUDIES**

**Affiliated Faculty:** Rudy Bustos (Religious Studies), Gordon Chang (History), Kenji Hakuta (Education), Bill Ong Hing (Law), Karen Huang (Student Health Services), David Palumbo-Liu (Comparative Literature, East Asian Studies, and Modern Thought and Literature), Sylvia Yanagisako (Anthropology,
Asian American Studies at Stanford is taught through offerings in a number of departments — Anthropology, Comparative Literature, History, and Law; other departments may offer courses that are relevant to Asian American Studies.

Currently, there are two introductory courses that may be taken either separately or in tandem and various advanced courses. While a degree program in Asian American Studies is not offered, students are strongly encouraged to contact affiliated faculty to share interests and explore the various possibilities for programs of research and study.

COURSES

Note — As of press time, course offerings in Asian American Studies are still being added. Please contact faculty or departments at the beginning of the academic year for full listings. See the department listings of this bulletin for course descriptions.

COMPARATIVE LITERATURE

141. Self and Other: Interpellating Minority Subjectivities
5 units, Win (Palumbo-Liu)

142. Ethnic Memory and Cultural Nationalism
5 units, Spr (Palumbo-Liu)

311. Hybridity and Diaspora
5 units, Aut (Palumbo-Liu)

HISTORY

159. Introduction to Asian-American History
4-5 units, Win (Chang)

5 units, Spr (Chang)

265S. Undergraduate Research Seminar: Asian-American History
5 units (Chang) not given 1995-96

PSYCHOLOGY

167F. Peer Counseling: Introduction to Asian-American Psychology
2 units, Aut (Huang)

RELIGIOUS STUDIES

255. Asian-American/Pacific Islander Religious Traditions
4 units, Win (Busto)

ASIAN LANGUAGES

Emeriti: (Professors) Albert E. Dien, David S. Nivison
Chair: Thomas W. Hare
Professors: Makoto Ueda (on leave Winter, Spring), John C. Y. Wang (on leave 1995-96)
Associate Professors: Thomas W. Hare (Asian Languages and Comparative Literature), William A. Lyell (on leave Autumn), Susan K. Matosoff (on leave 1995-96), Haun Saussy
Assistant Professors: Wan Liu, Yoshiko Matsumoto, Chao Fen Sun
Senior Lecturers: Kazuko M. Busbin, Yin Chuang, Kimie Nishimura Nebrig, Hiroshi Sakamoto, Dorothy Shou
Lecturers: Fumiko Arao, Young-Mee Cho, Richard Dasher, Momoyo Kubo Lowdermilk, Yuhwa Liao Rozelle, Youqin Wang, Yasuo Yagi, Xiao Yu

Chinese-Japanese Language and Area Studies Faculty:

Professors: Masahiko Aoki (Economics), Harumi Befu (Anthropology), Peter Duus (History), Harold L. Kahn (History), Lawrence Lau (Economics), John W. Lewis (Political Science), Jeffrey Mass (History), Daniel I. Okimoto (Political Science), Thomas P. Rohlen (School of Education), Makoto Ueda (Asian Languages), John C. Y. Wang (Asian Languages), Arthur P. Wolf (Anthropology), Lee H. Yearley (Religious Studies)

Associate Professors: Carl W. Bielefeldt (Religious Studies), Bernard Faure (Religious Studies), Thomas W. Hare (Asian Languages and Comparative Literature), William A. Lyell (Asian Languages), Susan K. Matosoff (Asian Languages), David Palumbo-Liu (Comparative Literature), Haun Saussy (Asian Languages), Melinda Takeuchi (Art), Richard Vinograd (Art)

Assistant Professors: Philip J. Ivanhoe (Philosophy and Religious Studies), James E. Ketelaar (History), Wan Liu (Asian Languages), Yoshiko Matsumoto (Asian Languages), Ellen Neskar (History), Yingyi Qian (Economics), Peter Sells (Linguistics), Chao Fen Sun (Asian Languages)

Senior Lecturers (Asian Languages): Kazuko M. Busbin, Yin Chuang, Kimie Nishimura Nebrig, Hiroshi Sakamoto, Dorothy Shou
Asian Languages 321

Lecturers: (Asian Languages) Fumiko Arao, Young-Mee Cho, Momoyo Kubo Lowdermilk, Yu-hwa Liao Rozelle, Youqin Wang, Yasuo Yagi, Xiao Yu; (Anthropology) Hill Gates

The Department of Asian Languages offers courses in the languages, linguistics, cultures, and literatures of China, Japan, and Korea. The department accepts candidates for the degrees of Bachelor of Arts, Master of Arts, and Doctor of Philosophy in Chinese or Japanese. It also offers a Ph.D minor in Chinese or Japanese language and literature.

For information concerning other opportunities for study in the Asian field, see listings under the following departments and programs: Anthropology, Art, Business, Comparative Literature, East Asian Studies, Economics, Humanities Special Programs, History, Law, Linguistics, Philosophy, Political Science, Religious Studies, and Sociology. Students interested in Asian languages not listed should contact the Special Language Program, Department of Linguistics.

Undergraduate Programs

Bachelor of Arts

The A.B. degree is granted both in Chinese and in Japanese. The following courses and their prerequisites must be completed with a letter grade indicator (LGI) of 'C' or better:

1. Concentrations in Chinese: Asian Languages 91 and 92, Chinese 207, Asian Languages 131, 132, 133, and four other content courses dealing with China primarily at the 100 level, as approved by the undergraduate adviser.

2. Concentrations in Japanese: Asian Languages 91 and 92, Japanese 103, and seven other content courses dealing primarily with Japan at the 100 level, as approved by the undergraduate adviser. At least two of these courses must be selected from the sequence 135, 136, 137, 138.

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 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

With department approval, students may be able to combine programs for the A.B. and A.M. degrees in Chinese or Japanese. For details, see the "Graduate Degrees" section of this bulletin.

East Asian Studies Theme House

East House, located at Governor's Corner on campus, is an undergraduate residence that houses 60 students and offers them a wide variety of opportunities to expand their knowledge, understanding, and appreciation of East Asia. Assignment is made through the regular undergraduate housing draw.

Summer Program

A nine-week summer program of intensive instruction is offered, on three different levels, in both Chinese and Japanese. The intensive courses provide the equivalent in instruction to regular academic-year courses. (See courses Chinese 5, 25, 105 and Japanese 5, 25, 105, and 114 as described below.) For detailed information about these and other aspects of the summer program, inquire at the Department of Asian Languages.

Graduate Programs

Admission

All students contemplating application for admission to graduate study must have a creditable undergraduate record. The applicant need not have majored in Chinese or Japanese as an undergraduate, but must have had the equivalent of at least three years of training in the language in which he or she intends to specialize, and must also demonstrate a command of English adequate for the pursuit of graduate study. Applicants should not wish merely to acquire or improve language skills, but to pursue study in one of the following fields: Chinese history (premodern), Chinese linguistics, Chinese literature, Chinese philosophy, Japanese cultural history, Japanese literature, and Japanese linguistics.
MASTER OF ARTS

The A.M. is granted in Chinese and in Japanese. The normal length of study for the degree is two years.

Applicants who wish to obtain only the A.M. and who do not intend to proceed to the Ph.D. 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 department approval first.

Candidates for the degree must be in residence at Stanford in California during the final quarter of registration.

A thesis or an annotated translation of a text of suitable literary or historical worth is required for the A.M. degree. Under special circumstances, a paper approved by the graduate adviser may be substituted.

The University’s basic requirements for the master’s degree, including a 36-unit minimum requirement, are given in the “Graduate Degrees” section of this bulletin. Department requirements are set forth below.

CHINESE

The candidate must:
1. Meet the department’s requirements for the A.B. in Chinese or their equivalent.
2. Complete the following course work: 103, 201, 221, 222, 223, 299; four courses in Chinese numbered between 230 and 292; and two upper-division or graduate-level courses in fields such as Chinese anthropology, art, history, philosophy, and politics as approved by the graduate adviser in consultation with the student’s individual adviser. Students may be exempted from 101, 102, 103, and 221, 222, 223 by passing examinations to demonstrate that they have attained equivalent language competence. Letter grades are mandatory for all required courses and their prerequisites.

JAPANESE

The candidate must:
1. Meet the department’s requirements for the A.B. in Japanese or their equivalent.
2. Complete the following course work: 201, 211-213, 246, 247, 248, 299; four courses in Japanese numbered between 256 and 298; one course in literary theory or methodolgy at the 100 level or higher; and two courses in such fields as Japanese anthropology, art, history, politics, and religion, as approved by the graduate adviser in consultation with the student’s individual adviser. Students may be exempted from 211, 212, 213, and 246 by passing examinations to demonstrate that they have attained equivalent language competence. Letter grades are mandatory for all required courses and their prerequisites.

DOCTOR OF PHILOSOPHY

The Ph.D. degree is granted in Chinese and Japanese. Candidates for the degree are expected to acquire a thorough familiarity with Chinese or Japanese literature, an adequate command of both languages, and a comprehensive knowledge of East Asian history, social institutions, and thought. The University’s basic requirements for the Ph.D. are given in the “Graduate Degrees” section of this bulletin. Department requirements are set forth below.

ADMISSION TO CANDIDACY

Students admitted with an A.B. only are evaluated by the graduate faculty during the Autumn Quarter of their second year at Stanford. The evaluation is based on written work and at least a portion of the A.M. thesis or translation. If the faculty has serious doubts about a student’s ability to work for the Ph.D., they will convey this to the student. During the subsequent Spring Quarter, the faculty formally decides whether a student should be admitted to candidacy for the Ph.D. or be terminated. In the case of a student who already has an A.M. in Chinese or Japanese when admitted to the department, the evaluation takes place in the Spring Quarter of the student’s first year. If a student goes to the Taipei or Yokohama centers during his or her first two years, the department will consider an extension for admission to candidacy. The timing of the evaluation of a student admitted with an A.M. in East Asian Studies is decided on an individual basis.

Admission to candidacy does not mean that the student has fulfilled all requirements for the degree except the dissertation, but that the department faculty consider the student qualified to pursue a program of study leading to the Ph.D. and that, subject to continued satisfactory progress, the student’s status in this department is secure.

REQUIREMENTS

A candidate must fulfill the following requirements:
1. Demonstrate a reading knowledge of French, German, or another European language approved by the graduate adviser.
2. Complete two seminars at the 300 level. These seminars must be in different subjects.
3. Pass an examination in the supporting Asian language. A candidate whose field is Chinese is examined on his or her ability to read modern Japanese works relevant to his or her field of study. This requirement may be met by taking Japanese 101, 102, and 103 or 104 for letter grades. A candidate whose field is Japanese is examined on ability to read classical Chinese works relevant to his or her field of study. This requirement may be met either by taking
Chinese 205, 206, and 207 for letter grades or by completing Japanese 250 and subsequently passing a test on the prescribed reading list in Kambun.

4. Pass a set of four comprehensive written examinations. One of these tests the candidate’s methodological competence in a discipline. The remaining three fields are chosen, with the approval of the graduate adviser in consultation with the student's individual adviser, from the following: Chinese literature, history, philosophy, linguistics, religion, art, and anthropology; Japanese literature, linguistics, history, religion, art, and anthropology.

5. Demonstrate pedagogical proficiency by serving as a teaching assistant for a minimum of one quarter, and taking Chinese, Japanese, or Korean 208 (Teaching Asian Languages).

University Oral Examination — General regulations governing the oral examination are found in the “Graduate Degrees” section of this bulletin. The candidate is examined on questions related to the dissertation, after acceptable parts of it have been completed in draft form.

Dissertation — The candidate must write a dissertation demonstrating ability to undertake original research based on primary materials in Chinese or Japanese.

Ph.D. MINOR
A student taking a minor in Asian Languages must complete at least 30 units of work within the department at the 200 and 300 level, chosen in consultation with a department adviser. The student must elect either Chinese or Japanese 201 unless the department is satisfied that work done elsewhere has provided similar training. The student must also pass a written examination in the Chinese or Japanese language.

SPECIAL PROGRAMS
Properly qualified students may plan special interdepartmental programs in the Asian field for the Ph.D. degree. See the “Graduate Special Programs” section of this bulletin.

STUDYING ABROAD
Students interested in a serious study of Japanese language, history, culture, and social organization are encouraged to apply to the Kyoto Center for Japanese Studies (KCJS), a September-to-April program managed by Stanford and including students from eight other American universities. In Spring Quarter, the Stanford Center for Technology and Innovation (SCTI), also in Kyoto, focuses on Japanese organizations and the political economy of research, development, and production of high technology and advanced industries, followed by a two-to-three month internship in an agency, firm, or laboratory in Japan. For information about either program, students should contact the Overseas Studies office in Sweet Hall. To fulfill the language requirement for the SCTI program at Kyoto, students must complete five quarters of Japanese for Professionals (7, 8, 9, 17, 18) or Japanese 1 and 2.

Students should take note of the programs of the Inter-University Program for Chinese Language Studies in Taipei and the Inter-University Center for Japanese Studies located in Yokohama (both of which are administered by Stanford University). See “The Institute for International Studies” section in this bulletin.

Attention is also called to the exchange program established with the Department of Chinese at Peking University in Beijing. Those interested in the program should consult the chair of the department early in the academic year.

COURSES
Since unavoidable changes occasionally have to be made in course offerings after the Stanford Bulletin has gone to print, students are advised to consult the department each quarter.

GENERAL
These courses are open to all undergraduate and graduate students, are taught in English, and do not require a knowledge of an Asian language.

46. Introduction to Chinese Thought — (Enroll in Philosophy 46, Religious Studies 55.) DR:2(*) or 8(3*)
4 units (Ivanhoe) not given 1995-96

49/149. Rewriting the Woman’s Place: Modern Japanese Women Writers in Translation — Fiction by 20th-century Japanese women writers exploring the position of the woman within the patriarchal home, from the sociohistorical institution of the pre-war stem family to the fragmented home of present-day urban experience. Texts by Ariyoshi Sawako, Enchi Fumiko, Uno Chiyo, etc.
4 units, Win (Suzuki) MW’2:30-4

3 units, Win (Dashier)

53. Gender and Modernity in Japanese Cinema — The works of major Japanese filmmakers (Ozu, Mizoguchi, Kurosawa, and Oshima). Native and foreign influences on the development of Japanese cinema, appropriation of Japanese cinema by Western critics, the function of gender and family in the cinematic construction of Japan’s modern history.
3-5 units, Aut (Yoda) W 3:15-6:05 and evening film showings
55. New Chinese Cinema — How do contemporary films (of the '80s and '90s) from China, Taiwan, and Hong Kong speak across and within political borders to map out new “Chinese” cinemas and re-imagine communities of “Chinese” citizens? Projects that renegotiate China’s past, aesthetic responses to historical “crisis” points (the Cultural Revolution, transition from Japanese colonial to KMT rule in Taiwan, impending 1997 return of Hong Kong to China), “translated” sexualities, relationship to literary discourses, film genres and their modes of narration (e.g., martial arts, “nostalgia”).
4 units, Win (Chow) by arrangement

91. Traditional East Asian Civilization: China — Introduction to Chinese culture in a historical context. DR:2(*) or 7(2*)
5 units, Aut (Saussy) MWF 10

92. Traditional East Asian Civilization: Japan — Perspectives on Japan’s traditional civilization by faculty from Art, Asian Languages, History, and Religious Studies. Students learn the intellectual methods of various disciplines in a common examination of traditional Japan, based on literary works, historical documents, religious texts, and art objects. Three lectures, one section. DR:2(*) or 7(2*)
5 units, Win (Staff)

95. The Japanese Language in Culture and Society — Introduction to the essentials of how the language functions in Japanese society and culture; salient characteristics contrasted with English. Topics: politeness rules, conversational strategies, language and gender, formulaic expressions and factors that make certain linguistic forms preferred in Japanese. Recommended: one quarter of Japanese 1 or equivalent. DR:2(*)
4 units (Matsumoto) not given 1995-96

113. Zhuang Zi — (Enroll in Philosophy 113, Religious Studies 113.)
5 units (Ivanhoe) not given 1995-1996

131. Chinese Poetry in Translation — The Chinese poetic tradition from the first millennium B.C. to the 14th century. Traditional verse forms representative of the classical tradition; highlights of the most distinguished poets. Topics on history, language and culture relevant to the literary works under study. DR:7(2*)
4 units, Aut (Liu) TTh 1:15-2:30

132. Chinese Fiction in Translation — Fiction from early times to the 19th century, emphasizing literary and thematic discussions of major representative works available in English translation. DR:2(*) or 7(2*)
4 units, Win (Kelley) TTh 11-12:15

133. Modern and Contemporary Chinese Literature in Translation — Readings in representative 20th-century works of fiction, drama, and poetry. DR:2(*) or 7(2*)
4 units, Spr (Lyell) MWF 9

134. Chinese Drama In Translation — The development of drama from early religious ritual forms through Yuan zaju, Ming kunqu, Peking opera, the modern “spoken drama,” and their recent combinations. Plays are analyzed as dramatic literature and in terms of performance.
4 units, Spr (DiBello) TTh 11-12:15

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 (Matisoff) not given 1995-96

4 units (Staff) not given 1995-96

137. Japanese Fiction in Translation — Introduction to major works of prose narrative from premodern Japan (7th through mid-19th centuries) read in English translation, and emphasizing the historical, intellectual, and cultural context in which they were written. Works vary each year; course may be repeated for credit with instructor’s consent. DR:7(2)
4 units, Win (Yodo) WF 1:15-2:30

138. Modern Japanese Literature in Translation — Introduction to Japanese poetry, drama, and fiction since 1868. Authors: Tanizaki, Kawabata, Mishima, etc. Knowledge of premodern Japanese literature not required. DR:2(*) or 7(2*)
4 units, Spr (Staff) MWF 1:15

141. Chinese Mythology — Introduction to Chinese mythology, focusing on some of the best-known mythic stories about the ancestry of the Chinese people and human interactions with gods and deities. Attention to literary works over 2,000 years that reinterpret earlier mythopoetic creations and reenact age-old fears and desires in different historical contexts.
4 units, Win (Liu) TTh 2:15-3:30

181. Chinese Writers — Work translated by women novelists and poets from the Meiji period to the present. Focuses on women’s response to their marginal role in Japanese society and the literary establishment. DR:7(2*)
4 units (Matisoff) not given 1995-96

182. Chinese Lyric Aesthetics — Traditional concepts of poetry, music, painting, and their interrelationships.
4 units (Liu) not given 1995-96

195. Modern Intellectuals in Japanese Literature — Modern Japanese novels dealing with problems of a modern intellectual. Works of Kawabata, Mishima, Soseki, Tanizaki, and others. Enrollment limited to 15. DR:2(*) or 7(2)
3 units, Aut (Ueda) M 2:15-4:05
CHINESE

Students registering for the first time in a first- or second-year course must take a placement test if they have had any training in Chinese before entering Stanford. Please sign up for a section in the department office before the quarter begins.

1,2,3. First-Year Modern Chinese — Conversation, grammar, reading, elementary composition. Daily sections may be set at the beginning of the quarter to suit schedule requirements.
   1.5 units, Aut (Shou) MTWThF 10, 11, or 1:15
   2.5 units, Win (Shou) MTWThF 10, 11, or 1:15
   3.5 units, Spr (Shou) MTWThF 10, 11, or 1:15

1B,2B,3B. First-Year Modern Chinese for Bilingual Students — For students with elementary comprehension and speaking skills. Provides a basic knowledge of modern Chinese literature and culture. Improves conversation and grammar.
   1B. 3 units, Aut (Rozelle, Yu) MWF 10, 11, 1:15, or 2:15
   2B. 3 units, Win (Rozelle, Yu) MWF 10, 11, 1:15, or 2:15
   3B. 3 units, Spr (Rozelle, Yu) MWF 10, 11, 1:15, or 2:15

5. Intensive First-Year Modern Chinese — Equivalent to 1, 2, and 3 combined. Five weeks at Stanford and four weeks at Peking University.
   8 units, Sum (Rozelle) MTWThF 8-12

6,7,8. Beginning Conversational Chinese — Three-quarter sequence to equip students with basic language skills in Mandarin to function abroad.
   2 units, Aut, Win Spr (Rozelle) TTh 2:15

10,11. Beginning Southern Min (Taiwanese) Conversation
   2 units, Aut, Win (J. R. Wang) TTh 12:10-1

21,22,23. Second-Year Modern Chinese — Further study in grammar, reading, conversation, composition. Prerequisite: 3 or equivalent.
   21. 5 units, Aut (Y. Wang) MTWThF 9 or 10
   22. 5 units, Win (Y. Wang) MTWThF 9 or 10
   23. 5 units, Spr (Y. Wang) MTWThF 9 or 10

21B,22B,23B. Second-Year Modern Chinese for Bilingual Students — For students with advanced comprehension and speaking skills, but lacking equivalent knowledge of grammar, reading, and writing Chinese characters. Equivalent to 21, 22, 23.
   21B. 3 units, Aut (Y. Wang) MWF 12 or 2:15
   22B. 3 units, Win (Y. Wang) MWF 12 or 2:15
   23B. 3 units, Spr (Y. Wang) MWF 12 or 2:15

25. Intensive Second-Year Modern Chinese — Equivalent to 21, 22, 23 combined. Prerequisite: 3 or equivalent. Five weeks at Stanford and four weeks at Peking University.
   8 units, Sum (Staff) MTWThF 8-12

27,28,29. Intermediate Chinese Conversation — Prerequisite: 3 or consent of instructor.
   27. 2 units, Aut (Shou) TTh 2:15
   28. 2 units, Win (Shou) TTh 2:15
   29. 2 units, Spr (Shou) TTh 2:15

51. Chinese Calligraphy — Practice in writing Chinese characters with a brush and learning different scripts. Limited enrollment. May be repeated for credit. Prerequisite: 3 or equivalent.
   1-2 units, Win, Spr (Chuang) TTh 2:15

ADVANCED

101,102,103. Third-Year Modern Chinese — Designed to help students solidify and further their communicative ability in Chinese through contact with various written and spoken styles of modern Chinese. Reading and discussion of authentic writings on cultural topics; newspaper reports, radio, and TV broadcasts and films; online Chinese software and e-mail network to facilitate study. Prerequisite: 23 or equivalent.
   3 units, Aut, Win, Spr (Yu) MTWThF 10

101B,102B,103B. Third-Year Modern Chinese for Bilingual Students — For students with advanced listening and speaking abilities, but lacking equivalent knowledge in reading and writing. Equivalent of 101, 102, 103. (See 101, 102, 103.)
   3 units, Aut, Win, Spr (Yu) MWF 12

105. Intensive Modern Chinese — Equivalent to 101, 102, 103 combined. Prerequisite: 23 or equivalent. Five weeks at Stanford and four weeks at Peking University.
   8 units, Sum (Staff) MTWThF 9-12

121,122,123. Advanced Chinese Conversation — Prerequisite: 23 or equivalent.
   121. 2 units, Aut (Chuang) W2:15-4:05
   122. 2 units, Win (Chuang) W2:15-4:05
   123. 2 units, Spr (Chuang) W2:15-4:05

131,132,133. Business and Legal Chinese — For those interested in China’s foreign trade. A familiarization with the technical language and current economic policies. Emphasis on close text reading, business letter writing, and conversation. Prerequisite: 23 or equivalent.
   131. 3 units, Aut (Q. P. Wang) 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: 223 or equivalent.
5 units, Win (Dien) W 2:15-4:05

205,206,207. Beginning Classical Chinese—For students who need to develop a reading knowledge of Classical Chinese and have completed at least two years of Modern Chinese, or its equivalent. Students who have no background in Classical Chinese and are taking 207 to satisfy Chinese major requirements must begin with 205. Introduces basic grammar and commonly used vocabulary of classical Chinese. Prerequisite: 23 or equivalent.
205. 5 units, Aut (Sun) TTh 2:15-4:05
206. 5 units, Win (Sun) TTh 2:15-4:05
207. 5 units, Spr (Staff) TTh 2:15-4:05

208. Teaching Asian Languages—Lectures on teaching methods, class visitations, and in-class teaching exercises to prepare students for a career in teaching. May be repeated for credit. Prerequisite: consent of mentor teacher.
2 units, Win (Staff) by arrangement

211,212,213. Advanced Modern Chinese—Appropriate for non-majors and individuals with language experience overseas. Year-long sequence designed to help students become functional speakers, readers, and writers of modern Chinese through articles and essays from newspapers, magazines, and scholarly journals. Frequent opportunities for oral presentations reflect the students' interests and form the basis of papers. Prerequisite: minimum three years of Chinese language training.
211. 5 units, Aut (Chuang) by arrangement
212. 5 units, Win (Chuang) by arrangement
213. 5 units, Spr (Chuang) by arrangement

221,222,223. Advanced Classical Chinese—Prerequisite: 207 or equivalent.
221. Philosophical Texts
5 units (Staff) not given 1995-96
222. Historical Narration
5 units, Win (Saussy) TTh 11-12:15
223. Literary Essays
5 units, Spr (Liu) TTh 2:15

230. Interpreting Confucian Texts—(Enroll in Philosophy 212, Religious Studies 212.)
5 units (Ivanhoe) not given 1995-96

231. Neo-Confucianism—(Enroll in Philosophy 114, Religious Studies 119A.)
4 units (Ivanhoe) not given 1995-96

232. Philosophical Texts of the Ming Dynasty—(Enroll in Philosophy 211, Religious Studies 211.)
5 units (Ivanhoe) not given 1995-96

241,242,243. Modern Chinese Literature—The short story, essay, and novel introduced through original and annotated texts.
241. The Short Story
5 units (Lyell) not given 1995-96

242. Essay
5 units, Spr (Chuang) MWF 10

243. The Novel
5 units, Win (Lyell) MWF 9

261. Sources of Chinese Poetry—Selections from the Book of Songs (c. 1000-500 B.C.) and the Songs of Ch' u (c. 400 B.C.), the two earliest anthologies of Chinese poetry.
4 units, Spr (Saussy) MWF 1:15

263. Lyric (shih) I—Selected readings in the early history of the lyric (shih), Han through Sui dynasties.
4 units (Liu) not given 1995-96

264. Lyric (shih) II—T'ang poetry, focusing on Li Po and Tu Fu and their places in the Chinese poetic tradition. Prerequisite: consent of instructor.
4 units (Liu) not given 1995-96

266. Chinese Tz'u Poetry (Song Lyrics)—From the earlier T'ang to the end of the Sung Dynasty, the selected readings of song lyrics (tz'u) highlight major poets from Northern and Southern Sung periods. Patterns of generic development are correlated to social changes in historical context.
4 units, Aut (Liu) W 3:15-5:05

271. Traditional Chinese Fiction—Selected readings in short stories and novels from early times to Ch'ing. Prerequisite: 113 or consent of instructor.
4 units, not given 1995-96

272. Apparitions of Women in Traditional Chinese Fiction—Selections from Liannii zhuan (a Han Dynasty exemplar book), Sui Yangdi yanshi, Nii caizi shu, and Hong lou meng.
4 units (Saussy) not given 1995-96

273. Chinese Drama—Selected readings in dramatic works of the Yuan, Ming, and Ch'ing periods emphasizing literary, not theatrical qualities. Prerequisite: 207 or consent of instructor.
4 units (J. Wang) not given 1995-96

291. The Structure of Modern Chinese—Introduction to the grammatikal structure of Chinese, focusing on syntax and semantics. Designed to help students, who have had one year or more of modern Chinese, develop a sophisticated knowledge of Chinese grammar. Prerequisite: 3 or equivalent, or consent of instructor.
4 units (Sun) not given 1995-96

292. The History of Chinese—Historical changes of the Chinese language in the last 2,000 years, emphasizing syntactic and semantic changes, and grammaticalization. Students use a computer corpus to do research on the history of Chinese. Prerequisites: 207, 291, or consent of instructor.
4 units, Spr (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

361. Seminar on T'zu Poetry of the Tang and Song 5 units, not given 1995-96

371. Seminar in Chinese Literary Criticism — Readings/discussion of Chinese critical texts vis-a-vis relevant literary theories in the West. May be repeated for credit. 5 units, Spr (Saussy) by arrangement

399. Dissertation Research — Exclusively for graduate students in Chinese working on doctoral dissertations. 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. 15 units per quarter (Staff)

JAPANESE

Students registering for the first time in a first- or second-year course must take a placement test if they have had any training in Japanese before entering Stanford. Sign up for section before quarter begins in instructor’s office.

1,2,3. First-Year Modern Japanese — Provides students with a solid foundation in grammar, conversation, reading, and basic composition (125 Kanji characters introduced). To fulfill the language requirement for the Stanford Center in Technology and Innovation (SCTI) at Kyoto, students must complete the equivalent of Japanese 1 and 2.

1. 5 units, Aut (Busbin, Staff) MTWThF 9, 10, 11, or 1:15
2. 5 units, Win (Busbin, Staff) MTWThF 9, 10, 11, or 1:15
3. 5 units, Spr (Busbin, 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. Does not satisfy the University language requirement. To fulfill the language requirement for the Stanford Center in Technology and Innovation (SCTI) at Kyoto, students must complete Japanese 1 and 2.

7/107. 3 units, Aut (Kubo) MWF 9, 11, 1:15
8/108. 3 units, Win (Kubo) MWF 9, 11, 1:15
9/109. 3 units, Spr (Kubo) MWF 9, 11, 1:15

17/117, 18/118, 19/119. Second-Year Japanese for Professionals — Continuation of 7, 8, 9 to build functional language skills. Prerequisite: 9/109 or equivalent.

17/117. 3 units, Aut (Yagi) MWF 9 or 10
18/118. 3 units, Win (Yagi) MWF 9 or 10
19/119. 3 units, Spr (Yagi) MWF 10

21,22,23. Second-Year Modern Japanese — Continuation of Japanese 3 (or 5); Students develop conversation and expression of ideas; master more advanced grammatical patterns, use 700 kanji; write simple compositions, and have an enhanced understanding of Japanese culture. At the completion of the sequence, students can read original source material. Prerequisite: 3 or equivalent.

21. 5 units, Aut (Nebrig, Staff) MTWThF 9, 11, or 1:15
22. 5 units, Win (Nebrig, Staff) MTWThF 9, 11, or 1:15
23. 5 units, Spr (Nebrig, Staff) MTWThF 9, 11, or 1:15

25. Intensive Second-Year Modern Japanese — Equivalent to 21, 22, and 23 combined. Prerequisite: 3 or equivalent. 12 units, Sum (Staff) MTWThF 8-12


27. 2 units, Aut (Kubo) TTh 2:15
28. 2 units, Win (Kubo) TTh 2:15
29. 2 units, Spr (Kubo) TTh 2:15

30/130. Reading Technical Japanese — Prerequisite: two years of Japanese or equivalent. 1-3 units, Sum (Dasher)

ADVANCED

101,102,103. Third-Year Modern Japanese — Third-year Japanese students move beyond acquisition of fundamental grammatical forms to reading and discussion of more complex material. Emphasis is on accurate understanding of Japanese sentence structure in newspaper and journal articles; readings from other genres (fiction, poetry, and essays). Polite language (keigo) skills and additional written and spoken patterns are mastered. Videos of everyday Japanese spoken at normal speed develop listening skills. Sequence course. Prerequisite: 23 or equivalent.

101. 5 units, Aut (Arao) MWF 11-12:20 or 12:45-2:05
102. 5 units, Win (Arao) MWF 11-12:20
103. 5 units, Spr (Arao) MWF 11-12:20

104. Japanese for Chinese Specialists — Focus is on the use of research materials in Japanese. Prerequisite: 102 or equivalent.

3-5 units, Spr (Yagi) by arrangement
105. Intensive Third-Year Modern Japanese — Equivalent to 101, 102, and 103 combined. Prerequisite: 23 or equivalent.
   12 units, Sum (Staff) MTWThF 9-12

111,112,113. Business Japanese — Conducted entirely in Japanese. Readings/discussions focus on business-related topics: cultural attitudes and approaches, work ethic, stock market, import-export trade. May be repeated for credit. Prerequisite: 23 or 25 or consent of instructor.
   111. 3 units, Aut (Yagi) TTh 11-12:20
   112. 3 units, Win (Yagi) TTh 11-12:20
   113. 3 units, Spr (Yagi) TTh 11-12:20

114. Japanese for Business — Eight-week summer course designed to improve Japanese language skills as used in business circles in Japan. Focuses on cultural attitudes and approaches, the stock market, international trade, business letters, usage of honorific forms and expressions, telephone etiquette, etc. Entirely in Japanese. Prerequisite: 23 or equivalent.
   3 units, Sum (Staff) TTh 4-6

121,122,123. Advanced Japanese Conversation — Enlarges vocabulary, focusing on improvement in fluency and listening comprehension. Fine tuning of grammatical points and practice explaining things in Japanese. Use of audiotapes, oral presentations, discussions. Prerequisite: 23, 29, or consent of instructor.
   121. 2 units, Aut (Kubo) TTh 1:15
   122. 2 units, Win (Kubo) TTh 1:15
   123. 2 units, Spr (Kubo) TTh 1:15

130. Reading Técánaal Japanese — Prerequisite: two years of Japanese or equivalent.
   3 units, Sum (Dasher)

177. The Structure of Japanese — Linguistic analysis of the major grammatical structures of Japanese, focusing on their salient characteristics and functions. Prerequisite: two years of Japanese. Recommended: previous course in linguistics.
   4 units, Spr (Matsumoto) MW 2:15-3:30

199. Individual Reading in Japanese — Asian Languages majors only. Prerequisite: 103 or consent of instructor.
   4 units, Aut, Win, Spr (Staff) by arrangement

GRADUATE

200. Directed Reading in Japanese — Prerequisite: 213 or consent of instructor.
   units by arrangement, Aut, Win, Spr (Staff) by arrangement

201. Proseminar — Bibliography and research methods in Japanese studies. Prerequisite: 103 or equivalent.
   5 units, Aut (Hare) T 2:15-4:05

208. Teaching Asian Languages — Lectures on teaching methods, class visitations, and in-class teaching exercises to prepare students for a career in teaching. May be repeated for credit. Prerequisite: consent of mentor teacher.
   2 units, Win (Staff)

211,212,213. Advanced Modern Japanese — Increase ability to understand the structure of Japanese, become familiar with writings in different genres and styles, utilize such knowledge in writing, and to discuss and express verbally questions and opinions on a variety of topics. Original writings, including fiction, essays, newspaper, and journal articles. Recommended taken in sequence. Prerequisite: 103 or consent of instructor.
   211. 5 units, Aut (Matsumoto) TTh 11-12:15
   212. 5 units, Win (Matsumoto) TTh 11-12:15
   213. 5 units, Spr (Staff) TTh 11-12:15

246. Introduction to Classical Japanese — The basic principles of the classical literary language, concentrating on grammar and vocabulary. Prerequisite: 103 or equivalent.
   5 units, Aut (Hare) MWF 10

247,248. Readings in Classical Japanese — Readings of texts in classical Japanese from Nara through Tokugawa periods. Literary analysis, rhetoric, and poetics (Japanese and Western). Offered alternate years and can be taken independently. Prerequisite: 246.
   247. 5 units, Spr (Staff) by arrangement
   248. 5 units (Hare) not given 1995-96

250. Introduction to Kambun — Readings from Japanese works written in Kambun, from Kaifuso to Yoshida Shoin’s diary. Offered when there is sufficient demand. Prerequisite: basic knowledge of classical Japanese.
   4 units (Ueda) not given 1995-96

   4 units (Staff) not given 1995-96

258. Japanese Buddhist Texts — Enroll in Religious Studies 258.)
   5 units (Bielefeldt) not given 1995-96

   4 units, Spr (Hare) Th 1:15-4:05

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 1995-96
277. The Structure of Japanese — Linguistic analysis of the major grammatical structures of Japanese, focusing on their salient characteristics and functions. Provides useful background for teaching the Japanese language. Prerequisite: two years of Japanese. Recommended: previous course in linguistics.

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

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 1995-96

281. Japanese Pragmatics — Japanese language from the point of view of pragmatics; focus is on socio-cultural and discourse factors reflected in choice of linguistic forms and their theoretical implications. Prerequisites: one year of Japanese, one course in linguistics or two years of Japanese, or consent of instructor.

4 units (Matsumoto) not given 1995-96


4 units (Matsumoto) not given 1995-96

294. Major Haiku Poets — Reading/discussion of selected haiku by Basho, Buson, Issa, and others. Prerequisite: 103 or equivalent.

4 units (Ueda) not given 1995-96

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 1995-96

300. Directed Reading in Korean — Prerequisite: 103 or consent of instructor.

units by arrangement, Aut, Win, Spr (Cho) by arrangement

208. Teaching Asian Languages
2 units, Win (Cho) by arrangement


4 units, Win (Cho) by arrangement
ASTRONOMY COURSE PROGRAM

Emeriti: (Professors) Ronald N. Bracewell, Von R. Eshleman, John R. Spreiter

Committee in Charge: (Director) Vahe Petrosian; Roger W. Romani, Peter A. Sturrock, Robert V. Wagoner, Arthur B. C. Walker, Jr.


Associate Professor: Peter F. Michelson (Physics)

Assistant Professors: Roger W. Romani (Physics), Jeffrey Willick (Physics)

Professor (Research): Philip H. Scherrer

Although Stanford University does not have a degree program in Astronomy or Astrophysics, teaching and research in various branches of these disciplines is an ongoing activity in the Departments of Applied Physics, Electrical Engineering, and Physics. For the convenience of students interested in the general areas of astronomy, astrophysics, and cosmology, a course program for undergraduate and graduate study is listed below.

The program is especially committed to providing introductory courses for the student who wishes to be informed about the fields of astronomy without the need for prerequisites beyond high school algebra and physics. Astronomy courses numbered below 100 are designed to serve this group of students.

Astronomy courses numbered 100-199 serve the student interested in an initial scientific study of astronomy.

The courses numbered 200 and above are for graduate students and advanced undergraduates, subject to prior approval by the course instructor.

UNDERGRADUATE PROGRAMS

The University does not offer a separate undergraduate major in astronomy. Students who intend to pursue graduate study in astronomy or space science are encouraged to major in physics, following the advanced sequence if possible, or in electrical engineering if the student has a strongly developed interest in radioscience. The course descriptions for these basic studies are listed under the appropriate department sections of this bulletin. Students desiring guidance in developing an astronomy-oriented course of study should contact the chair of the Astronomy Program Committee. The following courses are suitable for undergraduates and are recommended to students considering advanced study: 100, Introduction to Observational and Laboratory Astronomy; 106, Planetary Exploration; 160, Introduction to Stellar and Galactic Astrophysics; 161, Extragalactic Astrophysics and Cosmology. Students planning study in astronomy beyond the B.S. are urged to take 262, Introduction to Gravitation and Astrophysics, and consider an undergraduate thesis (Astronomy 169). The student observatory, located in the hills to the west of the campus and equipped with a 20-inch and other small reflecting telescopes, is used for instruction of the observation-oriented courses.

GRADUATE PROGRAMS

Graduate programs in astronomy and astrophysics and related topics are carried out in the Departments of Applied Physics, Electrical Engineering, and Physics. Students should consult the course listings, degree requirements, and research programs of these departments for more detailed information. For graduate research opportunities, see the “Center for Space Science and Astrophysics” section of this bulletin, or contact the Stanford-Ames Institute for Space Research.

Stanford is a member of a consortium building the Hobby Eberly telescope, a 10-meter-class telescope to be located at McDonald Observatory in Texas. Construction of the telescope is underway. There will be opportunities for graduate students doing research projects to use this telescope starting in late 1996.

The following courses are recommended for students planning to conduct research in astronomy and astrophysics: Applied Physics — 312 (Basic Plasma Physics), 363 (Solar Physics); Physics — 262 (Introduction to Gravitation and Astrophysics), 301 (Astrophysics Laboratory), 360 (Stellar Physics), 362 (High Energy Astrophysics), 364 (Gravitation), 365 (Extragalactic Astrophysics and Cosmology), 460 (Astrophysics Seminar).

Students interested in research programs in space physics involving spacecraft studies of the planets, their satellites, and their near-space environments should see the “Center for Space Science and Astrophysics” section of this bulletin.

COURSES

15. Topics in Modern Astronomy — 15A and B are for students not majoring in the sciences and are taught in different quarters by different instructors, but are related in topic. Students should not take both 15A and B.

15A. The Nature of the Universe — For undergraduates (with or without scientific background). Introduction to the structure, origin,
and evolution of the universe. The objects which make up the universe: galaxies, stars, planets, etc. Enigmas of modern astronomy: dark matter, quasars, x-ray sources, black holes, and pulsars. Topics: the formation of the sun and planets; the formation and evolution of stars and the dynamics and evolution of our galaxy; the organization and dynamics of luminous and non-luminous matter in the universe; the creation, evolution, and ultimate fate of the universe; and the search for life beyond our solar system. Presentations are non-mathematical.

DR:5(7)
3 units, Win (Linde) MW 2:15-3:30

15B. Cosmic Horizons — (Enroll in Physics 15B)
3 units, Spr (Willick) MW 1:15-2:30

169A, B, C. Independent Study in Astrophysics and Honors Thesis — Detailed study of a selected problem in astrophysics with one or more faculty members. While not all projects require three quarters, the sequence below suggests the format most projects are expected to follow. Projects may commence in any quarter.

169A. Selection of the Problem — Selection of the problem to be studied and development of the theoretical apparatus or initial interpretation of the selected problem. Preparation of a detailed description of the problem and its background and a comprehensive discussion of the work planned in the subsequent two quarters.
1-9 units, Aut (Staff) by arrangement

169B. Continuation of Project — Substantial completion of the required computations or data analysis for the research project selected.
1-9 units, Win (Staff) by arrangement

169C. Completion of the Project — Completion of research and writing of a detailed paper presenting methods used and results.
1-9 units, Spr (Staff) by arrangement

AFFILIATED DEPARTMENT OFFERINGS

APPLIED PHYSICS

312. Basic Plasma Physics
3 units (Sturrock)
alternate years, given 1996-97

363. Solar and Solar-Terrestrial Physics
3 units, Win (Sturrock)
alternate years, not given 1996-97

ELECTRICAL ENGINEERING

106. Planetary Exploration
3 units, Spr (Staff) MWF 9

GEOPHYSICS

195. Terrestrial Planets
2-3 units (Sleep)

PHYSICS

27. Evolution of the Cosmos
3 units, Aut (Petrosian) TTh 11-12:15
discussion by arrangement

50. Astronomy Laboratory and Observational Astronomy
3 units, Aut, Sum (Walker) lecture M 4:15
lab by arrangement

100. Introduction to Observational and Laboratory Astronomy
4 units, Spr (Walker) M 3:15-5
lab by arrangement

160. Introduction to Stellar and Galactic Astrophysics
3 units, Aut (Romani) MW 1:15-2:30

161. Introduction to Extragalactic Astrophysics and Cosmology
3 units, Win (Petrosian) MW 1:15-2:30

262. Introduction to Gravitation and Astrophysics
3 units, Spr (Michelson)

301. Astrophysics Laboratory
3 units, Sum (Walker)

360. Stellar Physics
3 units, Spr (Petrosian)
alternate years, not given 1996-97

362. High Energy Astrophysics
3 units (Petrosian)
alternate years, given 1996-97

364. Advanced Gravitation
3 units, Aut (Wagoner)

365. Extragalactic Astrophysics and Cosmology
3 units, Spr (Linde)

460. Astrophysics Seminar
1 unit, Aut, Win, Spr (Petrosian)

463. Special Topics in Astrophysics
3 units, Spr (Wagoner) by arrangement

ATHLETICS, PHYSICAL EDUCATION, AND RECREATION

Emeriti: (Professor) Wesley K. Ruff; (Associate Professor) Miriam B. Lidster; (Director of Intramurals) William P. Fehring; (Athletic Director) Joseph H. Ruetz; (Associate Director) Robert C. Young

Director: Ted Leland
Senior Associate Athletic Director: Cheryl Levick
Assistant Athletic Director, Development: Jon Denney

Director, Major Gifts: John R. Kates
As of its inception in 1920, dance at Stanford University has the capacity and potential for expansion through diverse forms of movement. Dance in the University has the capacity and potential for expansion through diverse forms of movement. Dance Specialization is offered through the School of Education either as a coterminous degree or as a post-bachelor's degree program. Undergraduate students interested in the coterminous master's degree should consult with Dance Degree Adviser, Janice Ross.

**Programs**

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 coterminous degree or as a post-bachelor’s degree program. Undergraduate students interested in the coterminous master’s degree should consult with Dance Degree Adviser, Janice Ross.

**Dance Division**

Dance in the University plays a vital role in self-definition in the college experience and provides the means to experience the body in new ways through diverse forms of movement. Dance becomes a conduit for impression and expression in society. It is a means of giving physical voice to the most private and powerful aspects of an individual's understanding of the person in relation to the world.

Dance in the University has the capacity and potential for expansion through diverse forms of movement. Dance becomes a conduit for impression and expression in society. It is a means of giving physical voice to the most private and powerful aspects of an individual's understanding of the person in relation to the world.

From the founding of the University, Stanford’s leaders have believed that physical activity is valuable for its own sake and complementary to the educational purpose of the University. The mission of the Department of Athletics, Physical Education, and Recreation is to offer the widest possible range of quality programs for athletic participation and physical fitness at all levels of skill and interest. Within the limitations of its resources, the department provides a broad range of instructional, recreational, and intramural competitive programs for all who wish to participate. The intrinsic value to the participant is the primary criterion by which the worth of the programs should be judged.

The goals of the instructional programs are to promote understanding of the value and role of physical activity as an important dimension of the human condition, to develop performance skills in dance and sport, to develop the habit of participation, and to provide leadership opportunities in aquatics, dance, sports, and other physical activities. To this end, the program encompasses a diversity of learning and participating opportunities from informal recreation through organized intramural competition, basic instructional classes, and theoretical study to, and including, intercollegiate athletic competition and dance performance.

**Assistant Director, Club Sports, Recreation, and Education Programs:** Shirley H. Schoof

**Athletic Affairs Coordinator:** Susan Burk

**Athletic Services Coordinator:** Scott Schuhmann

**Director, Physical Education:** Elizabeth P. Weeks

**Chair of Dance Division:** Susan Cashion

**Senior Lecturers:** Susan Cashion, Anne Gould, Tony Kramer, Elizabeth Weeks

**Lecturers:** Richard Powers, Janice Ross

**Sports Directors:** Tim Baldwin (Golf, women), Steve Bourdow (Sailing), Frank Brennan (Tennis, women), Kay Cowperthwaite (Lacrosse, women), Dante Dettamanti (Water Polo, men), Wallace Goodwin (Golf, men), Richard Gould (Tennis, men), Breck Greenwood (Gymnastics, women), Sadao Hamada (Gymnastics, men), Chris Horpel (Wrestling), Lisa Izzi (Gymnastics, women), Sheryl Johnson (Field Hockey), Skip Kenney (Swimming, men), Wieslaw Kujda (Crew, men), Vin Lananna (Track and Field), Colin Lindores (Soccer, men), Mark Marquess (Baseball), Jocelyn McCandless (Crew, women), Mike Montgomery (Basketball, men), Ruben Nieves (Volleyball, men), Sandy Pearce (Softball), Sherry Posthumus (Fencing, women), Richard Quick (Swimming, women), Ben Quitter (Water Polo, women), Ian Sawyers (Soccer, women), Richard Schavone (Diving), Don Shaw (Volleyball, women), Amy Tucker (Basketball, women), Zoran Tulum (Fencing, men), Vickey Weir (Synchronized Swimming), Tyrone Willingham (Football)

**Sport Assistant Coaches:** Aimee Baker (Crew, women), Dana Bible (Football), Dave Borbely (Football), John Brenner (Crew, men), Denise Corlett (Volleyball, women), David Esquer (Baseball), Lele Forood (Tennis, women), Andrew Gerard (Track and Field), Ross Gerry (Swimming, women), Bill Harris (Football), Kristy Howard (Softball), Jeff Jackson (Basketball, men), Ted Knapp (Swimming, women), John Koshy (Volleyball, men), Keith Larsen (Basketball, men), Pat Morris (Football), Doug Oliver (Basketball, men), Rob Patrick (Volleyball, women), Mark Reiff (Track and Field), Mike Still (Crew, men), Dean Stotz (Baseball), Dave Tipton (Football), Don Treadwell (Football), Robert Weir (Track and Field), John Whitlinger (Tennis, men)

**Teaching Specialists:** Kate Coughlin (Aerobics), Jim Miller (Golf)

From the founding of the University, Stanford's leaders have believed physical activity is valuable for its own sake and complementary to the educational purpose of the University. The mission of the Department of Athletics, Physical Education, and Recreation is to offer the widest possible range of quality programs for athletic participation and physical fitness at all levels of skill and interest. Within the limitations of its resources, the department provides a broad range of instructional, recreational, and intramural competitive programs for all who wish to participate. The intrinsic value to the participant is the primary criterion by which the worth of the programs should be judged.

The goals of the instructional programs are to promote understanding of the value and role of physical activity as an important dimension of the human condition, to develop performance skills in dance and sport, to develop the habit of participation, and to provide leadership opportunities in aquatics, dance, sports, and other physical activities. To this end, the program encompasses a diversity of learning and participating opportunities from informal recreation through organized intramural competition, basic instructional classes, and theoretical study to, and including, intercollegiate athletic competition and dance performance.
As society increasingly rediscovers the arts as a way of knowing, dance is a means through which students grow in their ability to comprehend their world. Lifelong participation is a valuable part of a life lived with amplitude and discipline. Exposure to dance and the arts constitutes a vital form of cultural literacy, one that is indispensable to freedom of inquiry and expression.

The A.M. degree in Education/Dance Specialization addresses fundamental issues of how to nurture effective educational leadership. One major emphasis of the program is to develop strategies for revitalizing and refocusing teaching skills in response to changing societal needs. Values and ethics in education are examined through course work that focuses on artistic considerations of human development, the patterning of dance education in a cross-cultural perspective, and teaching practices. To apply for admission to graduate study, successful completion of undergraduate courses in dance at Stanford, a bachelor's degree in dance from an accepted university or college, or proof of equivalent professional experience is required. For further information about the Dance Division, contact Janice Ross.

INTERCOLLEGIATE ATHLETICS

In keeping with American university tradition, Stanford offers a broad intercollegiate athletic program. The objectives are to provide the opportunity to compete at the highest possible level without jeopardizing the integrity of the individual or the institution; to adhere strictly to all University, association, and conference rules governing athletic participation; and to encourage effectively the achievement of academic goals by student athletes at the same rate as other University students. As a member of the National Collegiate Athletic Association (NCAA), Stanford fields both men's and women's varsity teams. Those for men are baseball, basketball, crew, cross country, fencing, football, golf, gymnastics, sailing, soccer, swimming and diving, tennis, track and field, volleyball, water polo, and wrestling. Those for women are basketball, crew, cross country, fencing, field hockey, golf, gymnastics, lacrosse, sailing, soccer, softball, swimming and diving, synchronized swimming, tennis, track and field, volleyball, and water polo.

Both men's and women's teams are affiliated with the Pacific Ten Conference, one of the premier athletic conferences in the nation. Additional or alternative intercollegiate athletic competition is available for all teams.

CLUB SPORTS

The Stanford Club Sports program is coeducational. It provides competition in sports not included in the intercollegiate varsity program and instruction in classes or activities not included in the Physical Education program. It also develops student leadership in organizing, administering, and funding activities. The club program is actively supervised by the Director of Club Sports, but the emphasis is on student interest and leadership to initiate, organize, and conduct the respective clubs. Those students in clubs that meet the criteria for inclusion in the formal curriculum may apply for units of credit through the Director of Physical Education, Elizabeth Weeks. Club sport teams competing against other college, university, and/or club teams and requiring eligibility certification for their team members must make such arrangements through the Director of Club Sports, Shirley Schoof.

INTRAMURAL SPORTS (IM)

Students interested in intramural competition may receive information from the IM Office in Burnham Pavilion through their campus residences. The program includes formal competition in league and tournament play for many different sports leading toward the All-University, Coed, and Women's Intramural championships. Competing organizations, teams, and individuals are urged to contact the IM office on the day before the start of classes to obtain meeting dates and times. Each quarter's printed materials and IM handbooks are available on or after the day before the start of classes. The intramural manager meetings are held the first Wednesday of the first week of classes each Autumn, Winter, and Spring Quarters.

RECREATION

The department provides facility use for faculty, staff, and students (and, for some activities, their immediate families) to participate in aquatics, conditioning, dance, and sports for general recreation. Specific recreation hours for all the facilities are publicized throughout the year both in the Campus Report and at the respective facilities.

The golf course and driving range are available for faculty, staff, and student use on a fee basis; information is available from the Golf Pro Shop. For further information about recreation opportunities, contact the Recreation Coordinator, Shirley Schoof.

FACILITIES

Athletic facilities are located throughout the campus. The dance studio (for classes and dance concerts), small activity rooms, a multipurpose gymnasium, a fencing center, an outdoor swimming pool, a weight room, and a large playing field are located at Roble Gym on the west side of campus as well as lighted tennis courts near Governor's Corner. The east side of campus includes the Arrillaga Family Sports Center, which
has a recreational Fitness Center and the Wrestling Room, intramural fields, outdoor volleyball courts, and tennis courts. Multipurpose rooms for aerobics, badminton, basketball, gymnastics, martial arts, and volleyball are included in the Ford Center for Sports and Recreation. The DeGuerre Complex houses swimming and diving pools as well as handball, racquetball, and squash courts.

The 18-hole championship golf course, a driving range, a sailing center, and a rowing facility are also available for the department's broad program.

CURRICULUM AND SERVICES

The diverse instructional program accommodates the 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 beginning student or the advanced performer to achieve success within the limits of individual motivation and potential. Skill level in, and knowledge about, a specific activity as well as available space during class list signing are the only limitations to enrollment. Physically handicapped students are encouraged to contact 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. Classes that are exempt from this University policy are identified as (PE:X); no limit is placed on PE:X units counting toward graduation.

Auditing/Zero Units — No auditing is allowed in activity classes. Students who wish to take a class but who cannot use, or do not want, unit credit must be full-tuition students. The class is recorded on the Official Study List, indicating 00 units. Zero-unit enrollment is allowed as space is available, after enrollment for credit, and by consent of instructor. The End Quarter Grade Report and student transcript record enrollment and grades.

Lockers — Lockers are available for rent to faculty/staff and students at the Arrillaga Fitness Center and Roble Gym. The fee for faculty/staff is $15 a quarter or $40 a year. The fee for students is $10 a quarter or $25 a year.

COURSES

DANCE ACTIVITY AND THEORY REGISTRATION

Registration for most dance classes takes place at the first class meeting. Further registration information is printed in the Time Schedule each quarter. Some class sizes are limited.

All courses/classes are coeducational. Only courses with PE:X notations are exempt from the 12-unit activity class limitation policy. Series classes (I, II, III) should be taken in order or with consent of instructor. Selected dance courses may fulfill the Distribution Requirements — see the Appendix.

INTRODUCTORY

Open to all students. No previous dance experience needed.

Class Fees — Fees are charged for enrollment in aerobics, fencing, golf, horsemanship, martial arts, sailing, tennis, weight training, windsurfing, and club sports classes. Class fees are payable only by check or money order. Cash is not acceptable. Checks or money orders should be made payable to Stanford University. Fees are payable at the first and are required by the second class meeting for a student to remain in class. Late enrollees must submit fees no later than the second time they attend the class.

Full refund is given to students who drop a class during the first two weeks of classes and request a refund at that time. No refund is given if a student either neglects to request a refund under the conditions listed previously or drops the class after the second week.

Equipment and Uniforms — No department uniform is required. Students provide their own rackets for badminton and tennis. Specific information on equipment and recommended class attire is available from the department or instructor.

Lockers — Lockers are available for rent to faculty/staff and students at the Arrillaga Fitness Center and Roble Gym. The fee for faculty/staff is $15 a quarter or $40 a year. The fee for students is $10 a quarter or $25 a year.

COURSES

DANCE ACTIVITY AND THEORY REGISTRATION

Registration for most dance classes takes place at the first class meeting. Further registration information is printed in the Time Schedule each quarter. Some class sizes are limited.

All courses/classes are coeducational. Only courses with PE:X notations are exempt from the 12-unit activity class limitation policy. Series classes (I, II, III) should be taken in order or with consent of instructor. Selected dance courses may fulfill the Distribution Requirements — see the Appendix.

INTRODUCTORY

Open to all students. No previous dance experience needed.

61. Modern Dance I — Technical and creative principles of modern dance designed to develop the body as an articulate instrument. (PE:X)
1 unit, Aut, Win, Spr (Cashion)

65. Musical Theater Workshop — Dance performance skills and choreography appropriate for musical theater. (PE:X)
2 units, Win (Cashion)
71. Ballet I — Emphasis on fundamentals of classical technique: alignment, basic barre exercises, and movement sequences in the center and across the floor.
   1 unit, Aut, Win, Spr (Staff)

75. Mexican Dance and Folklore — For the novice dancer. Three forms of Mexican dance: regional/folklorico, popular/social, and religious. Taught for technical and cultural understanding. (PE:X)
   2 units, Aut (Cashion)

77. Dances of Latin America — Selected dances of Latin America, specifically Argentina, Brazil, Chile, Cuba, Mexico, Peru, and Puerto Rico.
   1 unit, Win (Cashion)

78. Afro-Brazilian and Afro-Peruvian Dance — Brazilian dance forms of the Northeast: samba, maracatu, maculele, bloco afro, and Peruvian dance of the coastal region — Festejo and Zamacueca. (PE:X)
   1 unit, Win (Cashion)

81. Jazz Dance I — Introduction to basic technique with emphasis on current jazz style. Historical jazz steps are studied to enhance understanding of cultural content of hip-hop and street dances. (PE:X)
   1 unit, Aut, Win, Spr (Kramer)

87. Improvisation Plus Contact — Development of improvisation skills as a creative process for the craft of choreography; techniques of contact improvisation. (PE:X)
   2 units, Aut, Win (Kramer)

96. Social Dances of North America I — Introduction to partner dances found in American popular culture: blues, foxtrot, swing, tango, two-step, waltz. (PE:X)
   1 unit, Aut, Win, Spr (Powers)

INTERMEDIATE

160A. Dance History and Philosophy — Historical lecture/survey of Western theatrical dance examining changing notions of gender construction and the body in dance over the last 400 years. Ballet and modern dance looked at in the context of social and political events and artistic developments and ideologies. (PE:X) DR:7f(2)
   3-4 units, Win (Ross)

   3-4 units, Spr (Ross)

162. Modern Dance II — Intermediate technique. Introduction of improvisation and composition in directed studies. (PE:X)
   2 units, Aut, Win, Spr (Kramer)

   2 units, Win, Spr (Frank)

165. Dance Heritage: History and Styles — Workshop/seminar on the origins of movement forms that have influenced Western contemporary dance, e.g., Duncan, Graham, Horton, Limón, Aliley, Cunningham. Specific approaches and techniques utilize cross-cultural and historical perspectives; studio work is amplified by lectures, films, and readings. (PE:X)
   2 units, Aut (Ross, Staff)

166. Public Performance — For students participating in movement oriented performance. (PE:X)
   7 unit, Aut, Win, Spr (Kramer)

168. Performance Workshop — Explores and develops composition and performance skills. Required for participation in certain faculty and/or student-directed productions. (PE:X)
   2 units, Aut, Win, Spr (Kramer, Frank)

169. Faculty Choreography — Rehearsal and performance of faculty choreography. Selection by audition. (PE:X)
   1 unit, Aut, Win, Spr (Kramer)

172. Ballet II — Intermediate level. Continuation of 71, repeating the fundamentals with increased complexity and introducing additional movement vocabulary. Prerequisite: 71 or equivalent.
   1 unit, Aut, Win, Spr (Elliot)

177. Dance and Culture in Latin America — Selected dance forms 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 Argentina, Brazil, Chile, Cuba, Mexico, and Puerto Rico. (PE:X) DR:2f(4)
   3-4 units, Spr (Moses)

182. Jazz Dance II — Intermediate level emphasizing alignment, control, rhythmic coordination, and the learning of movement combinations. Prerequisite: 81 or equivalent. (PE:X)
   1 unit, Aut, Win, Spr (Elliot)

183. Jazz Dance III — Advanced level of technical proficiency. Focuses on advancing performance skills of projection and movement quality. Prerequisite: consent of instructor. (PE:X)
   1 unit, Aut, Win (Moses)

185. African-Caribbean Roots of American Jazz Dance — Traditional African and Caribbean dance forms and their influences on American concert jazz dance and American social dance forms. Some live drumming accompaniment. Reading materials and lectures support a dance historical approach. (PE:X)
   2 units, Spr (Moses)
196. Social Dances of North America II — Accelerated survey of partner dances found in American popular culture: foxtrot, quickstep, swing, tango, waltz. Prerequisite: some dance experience. (PE:X)
   1 unit, Aut, Win (Powers)

197. Argentine Tango and Swing — In-depth instruction of two dance forms that share common dynamics of partnering and improvisation. Advanced variations supplement foundation movements of each form. (PE:X)
   1 unit, Spr (Powers)

   2 units, Aut, Win, Spr (Powers)

ADVANCED AND/OR DEGREE PROGRAM

Designed for advanced undergraduates and graduates in the A.M. program.

100/200. Individual Study — Administrative internship or in-depth study of topics directly related to the discipline of dance. (PE:X)
   1-3 units, Aut, Win, Spr (Ross)
   by arrangement

267. Dance Teaching Internship — Methodologies of teaching dance and using music resources within a variety of classroom situations. Instruction and guided practice in the preparation of lesson plans, developing sequence and progression in class setting, and using accompaniment. (PE:X)
   1-3 units, Win (Frank)

268. Society, Education, and Dance — The role of dance as a transmitter of cultural perspectives. Cross-cultural analysis tracing the roots of dance from ritual to higher education and incorporating 20th-century philosophers’ perspectives on the social functions of dance. (PE:X) DR:7(2)
   4-5 units, Aut (Cashion, Ross)

269. Graduate Design Project — Three part, individually designed creative project required for completion of the master’s degree. (PE:X)
   5 units (Ross) by arrangement

270. Masters’ Seminar: Issues in Dance Education — Required of first-year A.M. students in Dance Education. Introduction to current courses and research on the art of dance in education. Weekly presentations by dance faculty and masters’ candidates. Questions and discussions of methodological issues. (PE:X)
   1 unit, Aut (Ross)

290. Directed Research — Individual project on work of any choreographer, period, genre, or dance-related topic. Thesis work need not be exclusively in Dance Division. (PE:X)
   1-4 units (Ross) by arrangement

PHYSICAL EDUCATION AND SPORTS THEORY

PE:X indicates that the course is exempt from the 12-unit policy.

190. Analysis of Human Movement — Overview of skeletal and muscular anatomy and a study of the mechanical principles of movement as related to efficient performance in aquatics, dance, and sports. (PE:X)
   3 units, Aut, Win (Weeks) TTh 9-10:50

LEadership Opportunities in Physical Education

PE:X indicates that the course is exempt from the 12-unit policy.

81. Manager: Athletic Team — For student managers of intercollegiate teams. Prerequisite: consent of respective varsity team head coach.
   1 unit, Aut, Win, Spr (Staff)
   by arrangement

142. Teacher Training: Student Assistant — Directed observation, individual and small group instruction, organization, supervision and assistance; evaluation of skill performances, and other activities as directed by master teacher. Prerequisite: consent of instructor.
   1 unit, Aut, Win, Spr (Staff)
   by arrangement

143. Teacher Training: Sport Internship — Beginning Level — For highly skilled students in a given sport seeking experience in teaching/coaching at beginning level of sport. Work under close guidance of experienced teacher/coach. Lesson plans, organization and evaluation of practice, teaching, skill demonstrations, paper relevant to sport. Prerequisite: consent of instructor. (PE:X)
   2 units, Aut, Win, Spr (Staff)
   by arrangement

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 — Aspects of professional lifeguarding: lifeguard characteristics and responsi...
bilities, recognition of hazards and emergencies, patron and facility surveillance, interaction with the public, rescue skills. Community first aid and CPR for the professional rescuer. Priority to those with summer jobs requiring certification; bring letter from employer to first class meeting. Prerequisite: pass swim test (swimmer/advanced swimmer level); see instructor for details. (PE:X)

2 units, Spr (Weeks)

107. Sailing: Beginning — Basic skills, theory, and techniques to enable beginners to sail with confidence. Fee.

1 unit, Aut, Spr (Staff)

108. Sailing: Intermediate — Refinement of skills. Introduction to racing. Fee. Prerequisite: consent of instructor.

1 unit, Aut, Spr (Staff)

109. Sailing: Advanced — Refinement of heavy weather sailing skills, with emphasis on racing. Fee. Prerequisite: 108 or consent of instructor.

1 unit, Spr (Staff)

110. Sailing: Keelboat — Application of small-boat sailing skills to intermediate-size keelboats. Focuses on safety and seamanship skills and spinnaker handling. Fee. Prerequisite: 108 or consent of instructor.

1 unit, Aut, Win, Spr (Staff)

130. Swimming I: Beginning — For non-swimmers or those who can swim about 10 yards but are not comfortable in deep water. Instruction in safety skills, the crawl, and a back stroke. Additional strokes introduced as ability warrants.

1 unit, Aut, Spr (Weeks)

131. Swimming II: Advanced Beginning — For those with limited swimming ability and safety skills. May not be fully comfortable in deep water. Instruction in safety skills, the crawl, and elementary backstroke or back crawl. Introduction to sidestroke and breaststroke. Improve skills and increase time and distance of swim. Prerequisite: ability to swim 25-50 yards on front and on back reasonably comfortably.

1 unit, Aut, Win, Spr (Weeks)

132. Swimming III: Intermediate — Continued work on crawl, elementary backstroke, breaststroke and sidestroke. Safety skill work as needed. Introduction to or review of breaststroke and sidestroke. Open turns. Introduction to butterfly, flipturn, and formal conditioning. Prerequisites: fair technique in crawl, elementary backstroke, breaststroke; some sidestroke and breaststroke; ability to swim approximately 100-200 yards continuously by mixing strokes.

1 unit, Aut, Win, Spr (Gerry, Weeks)

133. Swimming IV: Advanced — Review and refinement of all basic strokes and safety skills. Introduction to or review of butterfly and flipturn. Stroke skills and information on conditioning and designing individual workouts. Prerequisite: average to good strokes; ability to swim approximately 400-500 yards continuously.

1 unit, Aut, Win, Spr (Dettamanti, Kenney, Quick)

134. Swim Conditioning — For students wanting to improve cardio-respiratory endurance through directed swimming workouts. Prerequisite: advanced swimmer.

1 unit, Aut, Win, Spr (Dettamanti, Gerry, Knapp)


1 unit, Win (Quick) by arrangement

166. Water Polo: Beginning — Introduction to basic skills and game play. For those who have never played or have had limited experience.

1 unit, Spr (Dettamanti)


1 unit, Aut, Spr (Dettamanti)

171. Water Safety Instructor — Learning to teach swimming and community water safety. Not for teaching lifeguarding. Extensive textbook readings and written assignments. American Red Cross certification for successful course completion. Priority to those with summer jobs requiring certification with a letter indicating same required at first class meeting. Prerequisites: 17 years old, swimming skills at Red Cross Learn to Swim Level VI (advanced swimmer) (pass test) and pass a water safety skills test and written test; see instructor for details. (PE:X)

3 units, Spr (Weeks)


1 unit, Spr (Middleton)

FITNESS, INDIVIDUAL, AND TEAM SPORT ACTIVITIES

Most courses below are subject to the 12-unit limitation policy. PE:X indicates exemption from the 12-unit limitation policy. Activities are listed alphabetically by title.

3. Aerobics: Low Impact — Beginning/Intermediate — Continuous, total body movement at low intensity designed to enhance cardiovascular capacities. Focuses on body awareness and creation of a balance between controlled, powerful exercises that develop strength and large, fluid, ongoing movements that promote flexibility. Fundamentals of form and basic routines. Fee.

1 unit, Aut, Win, Spr (Coughlin)
4. Aerobics: Low Impact — Intermediate/Advanced — Continuous, total body movement at high intensity to enhance cardiovascular capacities. Focuses on body awareness and creation of a balance between controlled powerful exercises that develop strength and large, fluid, ongoing movements that promote flexibility. Fundamentals of form and challenging routines. Fee.

1 unit, Aut, Win, Spr (Coughlin)

20. Conditioning — Introduction to basic principles of conditioning. General knowledge of physiological aspects of conditioning, fitness parameters, and principles of training. Emphasis on proper stretching, monitoring of heart rate, correct techniques of running, and development of own fitness program. May include introduction to other forms of conditioning and aerobic activities. Individualized according to ability.

1 unit, Aut, Win, Spr (Lananna, Reiff)


1 unit, Aut, Win (Posthumus, Tulum)

39. Fencing: Intermediate/Advanced — Continuation of 38; introduction of electrical épée fencing. Fee. Prerequisite: 38 or consent of instructor.

1 unit, Aut, Win (Posthumus, Tulum)

42. Fencing Officiating — Supervised bouting with application of rules and officiating technique. Prerequisite: 39 or consent of instructor.

1 unit, Spr (Posthumus, Tulum)

45. Field Hockey: Advanced for Women — Understanding of techniques and skills under pressure. Team strategies, competitive games. Prerequisite: consent of instructor.

1 unit, Win (Johnson)

52. Golf: Beginning — Fundamentals of golf swing, introduction to putting, chipping, sand play. Golf etiquette, and knowledge of rules to enable a beginner to play a round of golf. Fee.

1 unit, Aut, Win, Spr (Hamada, Miller, Stotz)

54. Golf: Intermediate — Improvement through the use of drills and practice on all facets of golf game. Utilization of these skills in the game. Learn to lower your score and manage your game on the course. Fee. Prerequisite: 52 or the equivalent.

1 unit, Aut, Win, Spr (Miller, Stotz)

55. Golf: Advanced — Understanding of and refining the golf swing and increasing power, distance, and accuracy. Course management, mental preparation, visualization techniques. Fee. Prerequisites: 54 or experience playing and practicing and the ability to hit shots with relative accuracy and distance.

1 unit, Aut, Win, Spr (Miller)

59. Gymnastics: Beginning — Fundamental gymnastics movement for men and women, including various flexibility and strength exercises taught on the Olympic apparatus (e.g., floor, balance beam, bars, rings, etc.).

1 unit, Aut, Win, Win, Spr (Hamada)

60. Gymnastics: Intermediate/Advanced — For students who have completed the beginning gymnastics course or have a background in gymnastics. Emphasis on tumbling and somersaulting. Group work and individualized instruction for men and women. Limited apparatus work.

1 unit, Aut, Win, Spr (Izzi)

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)

74. Women’s Lacrosse: Beginning/Intermediate — Introduction to women’s lacrosse. Emphasis on learning and improving stick skills such as cradling, passing, catching and shooting, and an overall knowledge of the game and its rules.

1 unit, Aut (Cowperthwait)

101. Posture — Individual standing posture evaluation; exercises for proper body alignment emphasizing flexibility and balance of muscle strength development; techniques for correct body mechanics: push, pull, lift, carry, reach. Some nutrition, relaxation, and weight management; group and individualized exercise program.

1 unit, Aut, Win (Weeks)

121. Soccer: Beginning/Intermediate — Introduction to soccer. Includes skills of passing, shooting, control, dribbling and general offensive and defensive tactics and rules.

1 unit, Aut, Win, Spr (Lindores, Sawyers)

122. Soccer: Intermediate/Advanced — Review of the basic skills and rules. More in-depth work on offensive and defensive tactics. Includes work and scrimmage time.

1 unit, Aut, Win, Spr (Lindores, Sawyers)

123. Soccer: Advanced for Women — Technique under pressure, group and team tactics, introduction of modern system of play. Prerequisites: consent of instructor, tryouts in Spring for enrollment.

1 unit, Win, Spr (Sawyers)

129. Strength Training: Advanced — Designed around Olympic-style lifting (cleans, jerks, snatches
high pulls). Prerequisites: intermediate weight training or equivalent, consent of instructor.

1 unit, Win, Spr (Stephens)

148. Tennis: Beginning — Fundamental strokes (forehand, backhand, serve, and net play), rules, and scoring. Fee.

1 unit, Aut, Win, Spr (Staff)

149. Tennis: Low Intermediate — Intended as a bridge between beginning and intermediate classes. Review of fundamental strokes, and utilization of these skills in a game situation. Prerequisites: beginning-level class or knowledge of rules and scoring and average ability in fundamental strokes, but limited playing experience. Fee.

1 unit, Aut, Win, Spr (Staff)

150. Tennis: Intermediate — Fundamental stroke review and increased emphasis on singles and doubles tactics. Prerequisites: low intermediate class or average ability in fundamental strokes and regular playing experience. NTRP rating of 3.0 or equivalent. Fee.

1 unit, Aut, Win, Spr (Staff)

151. Tennis: Advanced — Review of fundamental strokes. Drills to emphasize footwork, serve and return, approach shots, volleys, lobs, and overheads. Strategy for competition in singles and doubles. Prerequisites: well above average strokes and game playing ability; NTRP rating above 4.0 or equivalent. Fee.

1 unit, Aut, Win, Spr (Staff)

152. Tennis: Tournament — Advanced drills and practice sessions for tournament-experienced players of near-varsity-level ability. Tryouts at Varsity Courts in Autumn Quarter for autumn enrollment and position on all-University ladder for winter and spring classes. Prerequisite: consent of instructor. Fee.

1 unit, Aut, Win, Spr (Staff)

154. Tennis: Computennis Scoring Techniques — Use of computer for analyzing tennis matches. Assist players and coaches by collecting data on player performance. Prerequisite: consent of instructor. Recommended: excellent knowledge of tennis, background in computers and statistics.

2 units, Aut, Win, Spr (Brennan, D. Gould) by arrangement


1 unit, Aut, Win, Spr (Corlett, Kosty)

161. Volleyball: Intermediate — Drills to improve skills and game playing strategy. As ability indicates, more emphasis on team play and strategy.

1 unit, Aut, Win, Spr (Corlett, Nieves)

162. Volleyball: Advanced — Refinement of all skills emphasizing offensive and defensive team play. Prerequisites: strong skills and general knowledge of team concepts.

1 unit, Aut, Win, Spr (Nieves)


1 unit, Aut, Win, Spr (Staff)

175. Weight Training: Intermediate — Review of basic exercises and techniques. Emphasis on individualized programs and learning use of all available machines and free weights. Further discussion on exercise physiology. Prerequisite: 174 or thorough knowledge of basic weight training principles. Fee.

1 unit, Aut, Win, Spr (Staff)

177. Weight Training for Women — Introduction to techniques and equipment for weight training. Emphasis on stretching, proper form and progressions, and injury prevention. Basics of physiology of strength training and planning of individual programs. All levels welcome, but designed for the beginner. Fee.

1 unit, Aut, Win, Spr (Staff)

183. Wrestling: Beginning/Intermediate — Introduces intercollegiate wrestling. Includes conditioning and cultivates the spirit of one-on-one competition. Basic skills and high-level sequences of upper- and lower-body technique. No experience necessary.

1 unit, Spr (Horpel)

MARTIAL ARTS

All classes below are subject to the 12-unit limitation policy.

85. Aikido — "The way of harmony with the principles or forces of nature." A non-aggressive Japanese martial art. Practice develops skills, conditioning, self-confidence, and a spirit of cooperation. Self-defense training in a supportive atmosphere, and at an energy level appropriate for each individual. Fee.

1 unit, Aut, Win, Spr (Doran)


1 unit, Aut, Win, Spr (Haramoto)

90. Kenpo Karate: Beginning — Fundamental stretching and conditioning. Introduction to basic moves, self-defense techniques, forms, light sparring. Emphasis on physical/mental control. Simple

1 unit, Aut, Win, Spr (Minneti)


1 unit, Aut, Win, Spr (Moses)

94. Shotokan Karate — A weaponless Japanese martial art with roots in Okinawa and China. Cultivates mental strength, physical suppleness, and self-defense skills. Techniques and behavior taught according to traditional methods. All instructors ranked by Shotokan Karate of America, under Tsutomu Ohshima. Periodic training sessions with other SKA collegiate groups. All levels. Fee.

1 unit, Aut, Win, Spr (Blair)

95. Tae Kwon Do — Training in the 2,000 year-old Korean martial art. Develops flexibility, speed, power, and mental and physical strength. Traditional forms, kicking, free-sparing, and self-defense techniques. All levels welcome. Fee.

1 unit, Aut, Win, Spr (Kim)

96. Tai Chi Chuan: Beginning — Trains one in mental tranquility and physical relaxation, improving strength, concentration, body awareness, and unification of action between mind and body. Basic stretching and warm-up exercises plus 24 postures in the Slow Tai Chi Chuan practice. History of Tai Chi and information on how the practice relates to other fields of study. Fee.

1 unit, Aut, Win, Spr (Chuck)

97. Tai Chi Chuan: Intermediate — The remaining postures of the Slow Tai Chi Chuan exercise and introduction to the two-person exercise (Push-Hands) and basic Wu-Shu postures used to develop more flexibility and leg strength. Fee.

1 unit, Aut, Win, Spr (Chuck)

98. Tai Chi Chuan: Advanced — Refine and study in greater detail the postures of the Slow Yang and Chen style of Tai Chi Chuan. Related Tai Chi practices such as Fast-Tai Chi, Tai Chi Sword, and Tai Chi Broadsword. Fee.

1 unit, Aut, Win, Spr (Chuck)

INTERCOLLEGiate ATHLETIC TEAMS

All classes below are subject to the 12-unit limitation policy.

Varsity men's and women's teams in PAC-10 are for the highly talented and motivated undergraduate student. Unless specified, team tryouts are open to men and women students.

14V. Baseball: Varsity (men's team)
1-2 units, Aut, Win, Spr (Marquess, Stotz)
MTWThF 1:30-4:30

17V. Basketball: Varsity (men's and women's teams)
1-2 units (Montgomery, Staff) men's team
Aut, MTWThF 3:30-6:30
Win, MTWThF 12:30-3:30
1-2 units (Tucker, Staff) women's team
Aut, MTWThF 1:3-45
Win, Spr, MTWThF 3:45-6:30

26V. Crew: Varsity (men's and women's teams)
1-2 units (Kujda) men's team
Aut, MTWTh 3:15-6 F 6-8
Win, MTWTh 3:15-6 F 6-8 S 7-10
1-2 units (McCandless) women's team
Aut, MTWThF 3:15-6
Win, MTWThF 3:15-6 S 7-10
Spr, MTWThF 6-8 S 7-10

29V. Cross Country: Varsity (men's and women's teams)
1-2 units, Aut (Lananna) MTWThF 3:30

35V. Diving: Varsity (men's and women's teams)
1-2 units (Schavone)
Aut, MWF 1-5, TTh 2-5
Win, MWF 11-12, 1-4; TTh 9-12, 2-4
Spr, MWF 1-5, TTh 9-5

41V. Fencing: Varsity (men's and women's teams)
1-2 units (Tulum, Posthumus)
Aut, Win, MTWThF 3-5:30

46V. Field Hockey: Varsity (women's team)
1-2 units (Johnson)
Aut, MTWThF 3-6
Spr, MTWTh 3-5

49V. Football: Varsity (men's team)
1-2 units (Willingham, Staff)
Aut, TTh 4-6 F 4-4:30
Win, MTWThF 3:30-5
Spr, MWF 3:30-5 S 9:30-12

57V. Golf: Varsity (men's and women's teams)
1-2 units (Goodwin) men's team
Aut, MTWThF 1-4
Win, Spr MTWThF 1-5
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 (Izzi) women’s team
Aut, SuMTThF 2:30-5:30
Win, SuMTThF 2-6
Spr, MWF 3-5

75V. Lacrosse: Varsity (women’s team)
1-2 units, Aut, Win, Spr (Cowperthwait)
Aut, MTWTh 3:15-5:30
Win, Spr, MTWThF 3:15-5:30

111V. Sailing: Varsity (coed and women’s teams)
1-2 units (Bourdow)
Aut, MWF 2:30-6
Win, WF 2:30-6
Spr, TTh 2:30-6

124V. Soccer: Varsity (men’s and women’s teams)
1-2 units (Lindores) men’s team
Aut, MTWThF 3:30-5:30
Win, MWF 3-5
Spr, MTWThF 3:30-5:30
1-2 units (Sawyers) women’s team
Aut, MTWThF 3:15-5:15

127V. Softball: Varsity (women’s team)
1-2 units (Pearce)
Aut, Win, MTWThF 2:30-5:30
Spr, MTWThF 3-6

136V. Synchronized Swimming Team (women’s team)
1-2 units, Aut, Win (Weir)
Su 8:30-12 T 6-8 p.m. Th 6-8 S 9:30-12

137V. Swimming: Varsity (men’s and women’s teams)
1-2 units, Aut, Win, Spr
(Kenney) men’s team
MTWThF 6-8, 2:15-4:30 S 7-10
(Quick) women’s team
MTWThF 6-8, 2:15-4:30 S 7-10

153V. Tennis: Varsity (men’s and women’s teams)
1-2 units, Aut, Win, Spr
(Gould) men’s team
MTWThF 2:30-5:30
(Brennan) women’s team
MTWThF 2:30-5:30

157V. Track and Field: Varsity (men’s and women’s teams)
1-2 units, Aut, Win, Spr (Lananna)
MTWThF 2-5

163V. Volleyball: Varsity (men’s and women’s teams)
1-2 units (Nieves) men’s team
Aut, MTWThF 4-7
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 and women’s teams)
1-2 units (Dettamanti) men’s team
Aut, MTWThF 2:30-5
Win, MTWTh 3:30-5:30
Spr, MTWTh 3-5:30
1-2 units (Quittner) women’s team
Aut, MWTh 5:30-8
Win, Spr MWThF 5:30-8, Su 10-12

184V. Wrestling: Varsity (men’s team)
1-2 units (Horpel)
Aut, MTWThF 3:15-5:30, S 10-12
Win, MTWThF 3:15-5:30, M 10-11 p.m.
W 12-12:30 S 10-12
Spr, MW 4-5:30 TTh 3-4

CLUB SPORTS

All classes below are subject to the 12-unit limitation policy.

The Stanford Club Sports Program is affiliated with the department but is initiated, organized, and conducted by students. All clubs are coeducational except as specified. Clubs, whose instructional classes meet the criteria for academic credit, are scheduled for meeting times as published each quarter in the Time Schedule. For additional information, contact Club Sports Director Shirley Schoof.

11C. Badminton Club Team
1 unit, Aut, Win, Spr

32C. Cycling Club Team
1 unit, Aut, Win, Spr

36C. Equestrian Club Team
1 unit, Aut, Win, Spr

70C. Horse Polo Club Team
1 unit, Aut, Win, Spr

72C. Ice Hockey Club Team (men)
1 unit, Aut, Win

75C. Lacrosse Club Team (men)
1 unit, Aut, Win, Spr

88C. Judo Club Team
1 unit, Aut, Win, Spr

104C. Rugby Club Teams (men’s and women’s teams)
1 unit, Aut, Win

118C. Ski Club Team
1 unit, Win

Additional clubs (Cricket, Racquetball, and Ultimate Frisbee) schedule activities each quarter for no credit.
BIOLOGICAL SCIENCES

Chair: Patricia P. Jones
Associate Chair: Peter Vitousek
Associate Professors: Mark W. Denny, William F. Gilly, Ron R. Kopito, Susan K. McConnell, Stuart H. Thompson
Assistant Professors: Barbara A. Block, Martha S. Cyert, Deborah M. Gordon, Paul M. McDonald, Michael A. Simon, Timothy P. Stearns
Professor (Research): R. Paul Levine
Courtesy Professors: Joseph A. Berry, Olle E. Bjorkman, Christopher Field, David C. Fork, Arthur Grossman, Richard Scheller, Frank E. Stockdale, Irving L. Weissman
Courtesy Assistant Professors: Neil S. Hoffman, Shauna C. Somerville
Lecturer: Sara Fultz
Director of Systematic Collections: John H. Thomas (Dudley Herbarium)
Librarian: Michael Newman

The facilities and personnel of the Department of Biological Sciences are housed in the Gilbert Building, Herrin Laboratories, Herrin Hall, the Jasper Ridge Biological Preserve on the main campus, and the Hopkins Marine Station in Pacific Grove on Monterey Bay.

The department provides: (1) courses designed for the nonmajor, (2) a major program leading to the B.S. degree, (3) a terminal program leading to the M.S. degree, (4) a terminal program leading to the M.S. degree, and (5) a program leading to the Ph.D. degree.

Course work and laboratory instruction in the Department of Biological Sciences conform to the “Policy on the Use of Vertebrate Animals in Teaching Activities” section of this bulletin.

The Jasper Ridge Biological Preserve is a 1,200-acre natural area containing an unusual diversity of plant communities. It is managed solely for teaching and research purposes and is available to investigators from various institutions. Stanford-based research at Jasper Ridge currently concentrates on physiological, ecological, and population studies.

Special laboratory facilities for marine research are described in the pamphlet Hopkins Marine Station, available at the department's Student Services office (Gilbert 108) or from Hopkins Marine Station.

The department's large collections of plants (Dudley Herbarium), fishes, reptiles, and amphibians, as well as smaller collections of birds, mammals, and invertebrates, are housed at the California Academy of Sciences in San Francisco, where they, and extensive collections of the academy, are available to those interested in the systematics of these groups. Entomological collections, restricted to those being used in particular research projects, are housed in the Herrin Laboratories. No general collections are maintained except for teaching purposes.

The Falconer Biology Library in Herrin Hall contains over 1,200 current subscriptions and an extensive collection of monographs and reference works. A specialized library is maintained at the Hopkins Marine Station.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

UNDERGRADUATE ADVISING

Most members of the Biological Sciences faculty are available for advising on such academic matters as choice of courses and career plans. The Student Services office maintains a current list of faculty advisers, advising schedules, and research interests.

The Student Services office is prepared to answer questions on administrative matters, such as requirements for the major, approved out-of-department electives, transfer course evaluations, and petition procedures. This office also distributes the department's Bachelor of Science Handbook, which delineates policies and requirements, and other department forms and information handouts.

The BioBridge is a student-staffed organization that assists the Student Services office. BioBridge staff members are available for informal, drop-in counseling for prospective and declared majors. The BioBridge offers advice on declaring the major, choosing an adviser, finding research positions, and selecting courses.

Each declared major in Biological Sciences is required to select a department adviser upon declaring the major. Students who plan to attend medical or graduate school, enroll in the honors or coterminal programs, take courses at Hopkins Marine Station, or attend one of the overseas campuses will find their faculty adviser particularly helpful.
COURSE REQUIREMENTS

Candidates for the B.S. degree must complete:

Core Courses and Electives —

<table>
<thead>
<tr>
<th>Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology 31</td>
<td>5</td>
</tr>
<tr>
<td>Biology 32</td>
<td>5</td>
</tr>
<tr>
<td>Biology 33</td>
<td>5</td>
</tr>
<tr>
<td>Biology 44X</td>
<td>4</td>
</tr>
<tr>
<td>Biology 44Y (may be replaced by 4 units of 175H)</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23</strong></td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>

Required Cognate Courses —
Students may take up to two cognate courses CR/NC.

1. Introductory, organic, and physical chemistry with lab: Chemistry 31, 33, 35, 36, 130 (or 132), 131, 135 (or 171). For those interested in population biology, an advanced math course of 100-level or above may be substituted for 130 or 132 upon petition.
2. General Physics: Physics 21, 22, 23, 24; or 51, 53, 55.
3. Mathematics through calculus: Math. 19, 20, 21; or 41, 42.
4. One additional course in mathematics, statistics, or computer science: Math. 43 or beyond; Biology 141 (if taken to fulfill additional cognate requirement, this does not count toward the 24 elective unit requirement), or Psychology 60; Statistics 60 or beyond; or Computer Science 106A.

Electives must be 100-level or above and selected from the offerings in the Department of Biological Sciences or from the list of approved out-of-department electives. This list may be obtained from the Student Services office. Biology majors must include two courses of at least 3 units each, taught by two different Biological Sciences faculty members, in the courses they take to fulfill the department's 24 elective unit requirement.

In response to rapid changes in the field and the need for increasing rigor of training, the department's faculty has adopted a new set of upper-division requirements for the class of 1996 and beyond.
The program for the junior and senior year should include a total of 24 elective units beyond the core. The courses making up these units should include at least one course from at least three of the following four areas. The rest of the 24 units can include more courses from this central menu, courses available in diverse areas directly after the core, or advanced courses for which "menu" courses are prerequisites.

Central menu courses are:

1. Molecular
   Biochemistry: Biochem. 200
   Genetics: Bio. 118 (may be used to satisfy either area I or area II requirement)
   Molecular Biology: Bio. 119 or Biochem. 201
2. Cell/Developmental
   Cell Biology: Bio. 121
   Cell Physiology: Bio. 160H
   Developmental Biology: Bio. 123
   Genetics: Bio. 118 (may be used to satisfy either area I or area II requirement)
   Macromolecules: Bio. 116
3. Organismal
   Comparative Animal Physiology: Bio. 162H
   General Botany: Bio. 120
   Human Physiology: Bio. 112
   Invertebrate Zoology: Bio. 161H
   Microbiology: Microbio. & Immun. 101
   Neurobiology: Bio. 153
   Vertebrate Biology: Bio. 110 (lecture only)
   Viruses: Bio. 213
4. Population
   Behavioral Ecology: Bio. 145
   Evolutionary Genetics: Bio. 111
   Oceanic Biology: Bio. 163H
   Principles of Ecology: Bio. 142
No more than 6 units from any combination of individual instruction courses (143, 175H, 198, 199, 290, 291, or 300) may be applied toward the total number of elective units. No more than 6 units applied toward the elective unit requirement may be taken CR/NC.

Students intending to pursue research careers in biology, especially in ecology, population genetics, or theoretical biology, should be aware that Math. 19, 20, 21, or Math. 41, 42 are minimum mathematics requirements for the B.S. degree in Biological Sciences. Substantial additional training in mathematics, including differential equations, linear algebra, and probability theory, is often highly advisable. Students should consult Biological Sciences faculty to discuss individual needs.

Additionally, even though only two or three quarters of physics are required, students should be aware that many graduate and professional schools (for example, medicine and education) require a year of general physics with a lab. Biological Sciences majors are therefore advised to take the year-long physics sequence Physics 21, 22, 23, 24, 25, 26 (or Physics 51, 52, 53, 54, 55, 56).

For students considering residence at Hopkins Marine Station during the junior or senior year, or an overseas program, the department recommends fulfilling as many University Distribution Requirements as possible in the first two years at Stanford. A student may use 175H for up to 6 departmental elective units (these are considered research units). For information, contact the Student Services office.
TYPICAL SCHEDULE FOR A FOUR-YEAR MINIMUM PROGRAM

FIRST YEAR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 19, 20, 21. Calculus</td>
<td>447</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 31, 33, 35, 36 and Analytic Geometry</td>
<td>334</td>
<td>3</td>
</tr>
<tr>
<td>Freshman requirements or electives</td>
<td>886</td>
<td>8</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

SECOND YEAR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio. 31. Principles of Biology</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Bio. 32. Principles of Biology</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Bio. 33. Principles of Biology</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Bio. 44. Core Experimental Laboratory</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Chem. 130 or 132, 131, 135 (or 171) Organic and Physical Chemistry</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Distribution Requirements or electives</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

THIRD YEAR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 21, 22, 23, 24. Introductory Physics</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Distribution Requirements or Electives</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

FOURTH YEAR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electives</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

TRANSFER STUDENTS

Because of differences between Stanford undergraduate courses and prerequisites and those of many other institutions, transfer students may face problems not encountered by entering freshmen. Transfer students are strongly urged to visit the Student Services office in Gilbert 108 during Transfer Orientation to obtain information on credit evaluations. Course catalogs, syllabi, and/or lecture notes from the former institution are necessary in the evaluation and accreditation process. Transfer students are encouraged to find a faculty adviser soon after arrival.

All transfer courses intended to fulfill department requirements must be evaluated on Evaluation of Transfer Course Content forms (available in the Student Services office), which is kept in the student’s file. This department procedure is in addition to the process of having units earned at other institutions transferred for Stanford credit and which appear on the Stanford transcript.

The department authorizes transfer credit only for courses whose content parallels the Stanford courses and that have comparable prerequisites (not merely a comparable course title). To substitute a course taken elsewhere for an upper-division Stanford course, course content must be approved by a department faculty member teaching in the area of the course. Submit as complete a course description as practical (including prerequisites and their descriptions) using the Evaluation of Course Content form available in the Student Services office before taking an off-campus course. Credit for natural history, culture-biology, and similar courses is rarely appropriate and can be obtained only by meeting the same criteria outlined above.

HONORS PROGRAM

To graduate with departmental honors, a student must:

1. Complete at least 10 units of an approved (Bio. 199) research project.
2. Obtain at least an average of 3.0 (B) letter grade indicator (LGI) in all Biological Sciences major requirements taken at Stanford (cognate, core, and elective courses). Grades earned from directed reading (198), teaching (290 and 291), and research (175H and 199) are not computed into this LGI.
3. Submit an honors petition proposal to the department’s Undergraduate Studies Research Coordinator the fifth Friday of the quarter, two quarters prior to graduation. For instance, students graduating Spring Quarter must submit petitions no later than mid-Autumn Quarter.
4. If graduating in June, participate in the Achauer Honors Symposium, which takes place Spring Quarter (or, if graduating in a quarter other than spring, produce a poster).
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 and both Academic Council members).

Further information on the honors program is available from the Student Services office.

PREMEDICAL, PREDENTAL, AND PREPARAMEDICAL REQUIREMENTS

Premedical, predental, and preparamedical students who are not biology majors should take at least the following courses in Biological Sciences: 31, 32, 33, 44X, 44Y, and such upper-division electives as may be recommended by
COTERMINAL B.S./M.S. DEGREE

The Department of Biological Sciences admits a limited number of undergraduate students to work for coterminal B.S. and M.S. degrees in Biological Sciences. Students must apply to the program between their seventh and eleventh quarters. They are required to submit a complete application, which includes a statement of purpose, a Stanford transcript, official GRE scores, two letters of recommendation from faculty members in this department, and a list of courses in which they intend to enroll to fulfill degree requirements. A minimum average LGI of 3.0 is necessary in all courses required for the undergraduate degree in Biological Sciences. Students must meet all requirements for both the B.S. and M.S. degrees. They must complete 15 full-time quarters (or the equivalent), or three full quarters after completing 180 units. Unit requirements for a coterminal program are 180 units for the bachelor's degree and 45 units for the master's degree. A more detailed description of the coterminal master's degree program may be obtained from the Student Services office.

GRADUATE PROGRAMS

MASTER OF SCIENCE

The M.S. degree program offers general or specialized study to individuals seeking biologically oriented course work, and to undergraduate science majors wishing to increase or update their science background or obtain advanced research experience. Students who have majored in related fields are eligible to apply, but must complete, or have completed by the time of graduation, the equivalent of a Stanford B.S. in Biological Sciences.

The M.S. program consists of Department of Biological Sciences (or otherwise preapproved) course work totaling at least 45 units of academic credit. Each candidate designs a coherent program of study in consultation with her or his department adviser. Although there are no specific courses required, program proposals must adhere to department parameters. A Program Proposal signed by the student's adviser, and approved by the chair of the M.S. Committee, must be filed during the first month of the first quarter of enrollment.

To apply, students submit an application for admission to the M.S. program, two letters of recommendation, official transcripts, and official Graduate Record Examination (GRE) scores. Financial support is not available from either the department or the University for students in this program.

MASTER OF ARTS IN TEACHING

The Master of Arts, Teaching degree is offered jointly by this department and the School of Education. The degree is intended for candidates who have a teaching credential and wish to strengthen their academic preparation. The program consists of a minimum of 25 units in the teaching field and 12 units in the School of Education. Detailed requirements are outlined in the "School of Education" section of this bulletin or may be obtained from the Admissions Director, School of Education.

TEACHING CREDENTIALS

For information concerning the requirements for teaching credentials, consult the "School of Education" section of this bulletin or address an inquiry to the Credential Administrator, School of Education.

DOCTOR OF PHILOSOPHY

Preparation for Graduate Study—Students seeking entrance to graduate study in Biological Sciences ordinarily should have the equivalent of an undergraduate major in Biological Sciences at Stanford. However, students from other disciplines, particularly the physical sciences, are also encouraged to apply. Such students are advised at the time of initial registration on how they should complete background training during the first year of graduate study. In addition to the usual basic undergraduate courses in biology, it is recommended that preparation for graduate work include courses in chemistry through organic chemistry, general physics, and mathematics through calculus. Reading knowledge of a foreign language is recommended.

Application, Admission, and Financial Aid—Prospective graduate students should request application information, instructions, and materials from Graduate Admissions, the Registrar's Office. The department's program is divided into two separate tracks—one in Population/Evolution Biology and the other in Molecular/Cell/Integrative Biology. Applications to the two tracks are evaluated separately; all applicants should specify the track which interests them. The deadline for receiving applications is December 15.

Scores on the general test and the advanced biology, chemistry, biochemistry, or cellular and molecular biology test of the Graduate Record Examination (GRE) are required. It is strongly recommended that the GRE be taken in October so that scores are available when applications are evaluated.

Competition for admission to the Ph.D. program is keen and in recent years it has been possible to offer admission to only 15 percent of the applicants.
Admitted students normally are offered financial support in the form of biology research assistantships, NIH traineeships, or Biological Sciences fellowships. Students making expected progress towards the degree are supported for four years by the department. 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 pre-doctoral national competitive fellowships, especially those from the National Science Foundation and the Howard Hughes Medical Institute. Applicants to the Ph.D. program should consult their financial aid officers for information and applications.

General Departmental Requirements—An admitted applicant is required to fulfill the requirements of the University as outlined in the "Graduate Degrees" section of this bulletin and the department requirements stated below.

Each student must take at least 3 units of course work under each of four or more Stanford faculty members. Course work is planned in consultation with an advising committee assigned for his or her track.

1. Teaching experience and training are part of the graduate curriculum. Each student assists in teaching two courses in the department's core lecture (31, 32, 33) or lab courses (44X, 44Y), and one advanced course in the student's area of specialization.

2. Seminar: each student must present a public seminar that is evaluated by two faculty members. Evaluation consists of meeting with each faculty member within one week following the seminar to obtain feedback and signatures. Faculty may require an additional seminar presentation.

Graduate seminars devoted to the discussion of current literature and research in particular fields of biology are an important means of attaining professional perspective and competence. Seminars are presented under individual course listings or are announced by the various research groups. A department seminar meets on most Mondays at 4 p.m. Topics of current biological interest are presented by speakers from Stanford and other institutions and are announced in the weekly Campus Report. Graduate students are expected to attend.

3. Third Year and Beyond: each student must meet with the Advising Committee beginning the third year, and each year thereafter prior to the end of the Spring Quarter. The committee signs a form to ensure compliance.

Academic requirements for the two tracks are as follows:

Molecular/Cell/Integrative Ph.D. Track Requirements—

1. First Year:

   a) Advising Committee: shortly after arrival, each entering student meets with the First-Year Advising Committee. The committee reviews the student's previous academic work and current goals and advises the student on a program of Stanford courses, some of which may be required and others recommended. Satisfactory completion of the Core Curriculum (below) is required of all students.

   b) Bio. 301: daily one-hour sessions are held the first three weeks of Autumn Quarter. Attendance is mandatory for all first-year students.

   c) Core Curriculum: all students are required to take the following courses for a letter grade, unless previous course work has fulfilled these requirements:

   - Biochemistry 201: Advanced Molecular Biology
   - Biology 203: Advanced Genetics
   - Biology 214: Cell Biology of Physiological Process
   - Biochemistry 201: Advanced Molecular Biology
   - Molecular and Cellular Physiology 215: Psychology 228; or Developmental Biology 210.

   d) Lab Rotations: successful completion of rotations in three different laboratories is required of all first-year students. As lab space is limited, students with a definite interest in a particular lab should make arrangements as early as possible. Written petitions for exemptions to requirements "Core Curricula" and "Lab Rotations" are considered by the Advising Committee. Approval is contingent upon special circumstances and is not routinely granted.

   e) Dissertation Lab: by the end of Spring Quarter, each first-year student is expected to have selected a lab in which to perform dissertation research and to have been accepted by the faculty member in charge. In consultation with the faculty member (who at this point becomes the student's adviser), the student chooses a projected field of expertise that is broader than the research of the adviser's lab, such as Developmental Biology or Plant Biology. Students electing to do a summer rotation at the Hopkins Marine Station may postpone selection of
1. First Year: each entering student is assigned a supervisory committee of three faculty members whose function is to develop an appropriate schedule of required and recommended courses and to meet once each quarter with the student during the first year.
   a) The "Committee of the Whole," that is, all population biology faculty, may meet with each student individually early in the first year.
   b) First-Year Paper: each student must prepare and submit a paper before the end of Spring Quarter their first year that is evaluated by the advising committee. This paper should be a step toward the development of a dissertation proposal and may consist of an analysis of new data or a literature review and synthesis. Evaluation is in written form by two faculty members.
2. Second Year: the student is expected to write a major dissertation proposal. The proposal is evaluated by a committee of three faculty (the Dissertation Advising Committee) in an oral presentation. This is to be completed by the end of Spring Quarter of the second year. Advancement to candidacy depends on satisfactory completion of the dissertation proposal. Failure to complete these requirements on schedule will result in withholding of the graduate stipend.
3. Third Year and Beyond:
   a) Dissertation and Dissertation Defense: at least one month before the oral exam takes place, the student must submit his or her dissertation to the Dissertation Advising Committee, which then becomes the Dissertation Reading Committee. At least two weeks before the oral exam, the student must incorporate into the dissertation any changes required by the committee. The exam cannot be formally scheduled or publicly announced until that time.

Language Requirement — A reading knowledge of a modern scientific language (ordinarily French or German) is recommended at the time of entry. If an entering student is deficient, the advising committee and the student should carefully weigh the value of language study compared to other needs and decide whether the student should undertake the further study of a foreign language.

Residency Requirement — A minimum of nine quarters of full-time graduate registration is required of each candidate. The department normally accepts only full-time students for study leading to the Ph.D. degree.
COURSES

Additional courses not listed here are frequently offered by selected postdoctoral or advanced Ph.D. personnel in the areas of their special research competence. They are listed in the quarterly Time Schedule, with course descriptions available in the Student Services office.

INTRODUCTORY

1. Introduction to the Science of Life — For general students. Introduces the conceptual structure of biology. Three meetings weekly focus on fundamental themes in biology; physical and chemical basis of life, mechanisms of inheritance, and evolution of environment adaptation and living diversity. A fourth weekly meeting focuses on the implications of biological ideas for broad intellectual and social issues. Discussions, by arrangement, on assigned problems and essays.

DR:5(7)
5 units, Spr (Watt, Staff) TWThF 10

2. Current Research Topics in Biological Sciences — Primarily for sophomores, enrollment limited to prospective and declared biological sciences majors. Weekly seminars by faculty on current research in biological sciences. Molecular biology and genetics; theory and mathematics in biology; ecology, physiology, and the environment; molecular and cellular aspects of neurobiology, immunology, and developmental biology; biological chemistry; behavioral biology; evolution. Prerequisite: prior or concurrent enrollment in Biology core, or consent of instructor.

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

3. Undergraduate Journal Club — Weekly discussion led by students and facilitated by faculty. Practice reading scientific literature and presenting discussion of the experiments. 44X and Y are limited enrollment. Prerequisites: 199.

MTWTh 4-5

31,32,33. Principles of Biology — Comprehensive study of the principles of modern biological sciences, taken in sequence, preferably in the sophomore year. Prerequisites: Chemistry 31, 33, 35; Math. 19, 20, 21; or 41, 42.

31. Biochemistry, Genetics, and Molecular Biology — Core lecture dealing with the biochemical and structural basis of cell function, emphasizing macromolecules (proteins, lipids, carbohydrates, and nucleic acids) and how their structure relates to function and to higher order assembly. Topics: enzyme structure, activity and kinetics, metabolism, hormone control, structural genetics, molecular basis of heredity; including nucleic acid and chromosome structure and function, mutagenesis, repair of DNA, and regulation of gene expression. Prerequisites: see above.

5 units, Aut (Simoni, Macdonald, Simon) MTWTh 10 plus optional discussion sections

32. Cell, Developmental, and Physiological Biology — Core lecture covering cell biology, development, and animal physiology. Topics: cell structure and function; basic concepts in determination, differentiation, and morphogenesis; the principles underlying the exchanges of mass and energy between organisms and their environments; and organ system specializations which utilize these principles in adapting organisms to different environments. The mechanisms by which the functions of each system are controlled and regulated. Prerequisites: see above.

5 units, Win (Cyert, McConnell, Heller, Sapolsky) MTWTh 10 plus optional discussion sections

33. Plant and Population Biology — Core lecture covering plant biology, biological diversity, evolution, and ecology. Topics: brief overview of plant physiology and development; control and transmission of genetic variation; evolutionary genetics; physiological, population, community, and ecosystem ecology; and evolution over long time scales. Prerequisites: see above.

5 units, Spr (Vitousek, Ray, Gordon) MTWTh 10 plus discussion sections

44X,Y. Core Experimental Laboratory — Two quarters of lab projects provide a working familiarity with the concepts, organisms, and techniques of modern biological research. Emphasis is on experimental design, analysis of data, and written and oral presentation of the experiments. 44X and Y are writing focus classes. Lab fee. Prerequisites: Chemistry 31, 33. Recommended: Biology or Human Biology core and statistics; 44X and Y should be taken sequentially in same year.

44X. 4 units, Win (Staff) lab T7 11-4
or 5-10 p.m. WThF 12:30-5:30

44Y. 4 units, Spr (Staff) lab MWThF 12:30-5:30 T 4:30-9:30 p.m.

96A,B. Jasper Ridge Biological Preserve Docent Training Program — Two-quarter preparation for students to serve as docents in the Jasper Ridge Biological Preserve. Aspects of natural history of plants and animals, ecology, archaeology, geology, meteorology, etc., are presented by a variety of faculty and staff. Apply before November 15. Pre-
110. Vertebrate Biology — (Same as Human Biology 110.) The evolution, form, function, and behavior of the vertebrates, from primitive fishes to birds and mammals, including humans. Prerequisite: Biology or Human Biology core.
3 units, Spr (Porzig) TTh 11-12:15

110L. Vertebrate Biology Lab — (Same as Human Biology 110L.) Comparative anatomy structure of the vertebrates, emphasizing osteology. Representatives of the seven vertebrate classes are available in lab. Three hours per week plus review labs and field trips. Prerequisite: current or previous enrollment in 110/Human Biology 110.
3 units, Spr (Porzig) by arrangement

111. Evolution and Evolutionary Genetics — Genetics as related to the processes of organic evolution. Theoretical and empirical treatment of population genetics, consideration of field, human genetic studies, aspects of molecular evolution, and coevolution. Prerequisite: Biology core.
4 units, Win (Macdonald) MWF 9

112. Human Physiology — The functioning of organ systems, emphasizing mechanisms of control and regulation. Topics: structure and function of endocrine and central nervous systems, cardiovascular physiology, respiration, salt and water balance, exercise and gastrointestinal physiology. Lectures/discussion. Prerequisite: Biology or Human Biology core.
4 units, Win (Heller, Harris) MWF 9

113. Molecular Developmental Biology — Student presentations and discussion of current literature in a selected area of molecular developmental biology. Prerequisites: 119 or equivalent; consent of instructor.
1 unit (Macdonald) alternate years, given 1996-97

116. Macromolecules — Structure and function of protein, nucleic acids, and membranes and the roles they play in cellular processes. Focus is on biochemistry and biophysics of macromolecules, how macromolecules interact to form cellular structures, and how molecular machines perform work in the cell. Enrollment limited to 40. Prerequisite: Biology core.
3 units, Aut (Stearns) MWF 2:15

117. Biology and Global Change — (Same as Earth Systems 111.) Biological causes and consequences of anthropogenic and natural changes in the atmosphere, oceans, and terrestrial and freshwater ecosysten. Topics: glacial cycles and marine circulation, greenhouse gases and climate change, tropical deforestation and species extinctions, and human population growth and resource use. Prerequisites: Biology or Human Biology core or graduate standing in any department.
3 units, Win (Vitousek, Mooney) MWF 11

118. Genetic Analysis of Biological Processes — Basic genetic principles and their experimental applications. Emphasis is on the identification and use of mutations to study cellular function. Prerequisite: Biology core.
5 units, Spr (Cyert, Simon) TTh 1-3

119. Intermediate Molecular Biology — Molecular analysis of genes and gene action in prokaryotic and eukaryotic systems. Regulation at transcriptional, translational, and post-translational levels. Emphasis is on understanding experimental design and interpretation. Prerequisite: Biology core.
3 units, Win (Schimke, Yanofsky) MWF 9

120. General Botany — The diversity of plant groups plus an introduction to the structure, development, physiology, and ecology of higher plants. Prerequisites: Biology or Human Biology core, or consent of instructor.
5 units, Aut (Fultz, Green, Mooney, Ray) MWF 11, lab T or W 2:15-5:05 plus discussion

121. Cell Biology — A molecular approach to the study of cellular structure and function. Topics: evolution and assembly of cell structures and organelles; biomembranes; cytoskeleton and motility, cell growth and differentiation; cell-cell interactions, signal transduction, and role of oncogenes. Emphasis is on an experimental perspective focusing on the design of experiments and critical analysis of data. Prerequisites: Biology core.
4 units, Win (Kopito) TTh 9-10:30 discussion one hour weekly by arrangement

123. Developmental Biology — Introduction to the principles of developmental biology, using selected examples of developmental processes from animal systems. Topics: embryogenesis, induction, pattern formation, organogenesis, gametogenesis, etc. Emphasis on experimental approaches (embryological, genetic, molecular biological) and their design and interpretation. Prerequisites: 31, 32. Recommended: 118, 119.
3 units, Spr (Macdonald) TTh 1:15-2:30 alternate years, not given 1996-97

124. Ecosystem Physiology — The physiological ecology of plants ecosystems, and landscapes. Prerequisites: 32, 33; or consent of instructor.
4 units, Win (Mooney, Berry, Field) TTh 11 alternate years, not given 1996-97

125. Ecosystems of California — Principles of ecosystem function with emphasis on vegetation com-
ponents and on California systems. Prerequisite: 33 or Human Biology 2A.
3-4 units, Spr (Mooney) TTh 11

128. Systematics and Ecology of Vascular Plants — Lectures, lab, field studies. Prerequisite: consent of instructor.
4-5 units, Spr (J. Thomas) WF 1:15
lab WF 2:15-5:05
field trips by arrangement

130. Algae/Fungi — Introduction to these groups, their utilization in molecular biology in studying biological problems, and their ecological significance. Lectures, lab, field trips. Prerequisite: Biology core or consent of instructor.
4 units, Spr (Fultz, Grossman) MWF 1:15
lab 72:15-5:05

134. Replication of DNA — Modes of DNA replication and their control in prokaryotic and eukaryotic systems. Emphasis on experimental approaches and their limitations. Critical review of current literature in seminar format. Lectures and student reports on specialized topics. Enrollment limited to 12 advanced undergraduates. Prerequisites: 31 and/or consent of instructor.
3 units (Hanawalt) alternate years, given 1996-97

137. Plant Genetics — Gene analysis, mutagenesis, and transposable elements; developmental genetics of flowering and embryonic development; biochemical genetics of plant metabolism; and lessons from transgenic plant studies. Prerequisite: 118 or consent of the instructor.
3 units (Walbot) alternate years, given 1996-97

139. Biology of Birds — Ways birds interact with their environments and each other, emphasizing studies that had impact in the fields of population biology, community ecology, and evolution. Students become familiar with local bird communities; emphasis is on field research. Two three-hour lecture/lab/field trips per week. Enrollment limited to 20. Prerequisites: 33 or equivalent, birding experience, and consent of instructor.
3 units, Spr (Ehrlich) alternate years, not given 1996-97

140. Population Biology of Butterflies — Lectures, field studies of the dynamics and genetics of butterfly populations, life histories, and resource utilization. The evolution and taxonomy of this group of insects, which has become a key research tool in population biology. Lab includes field work on Euphydryas populations now under study on campus and elsewhere in California. Students must register both quarters for field work credit. Prerequisites: 33, consent of instructor.
2-5 units (Ehrlich) alternate years, given 1996-97

141. Biostatistics — Introduction to the statistical analysis of biological data. Lectures, discussion, and student exercises. DR:4(6)
4-5 units, Win (Feldman) MWF 1:15

3 units (Roughgarden) given 1996-97

143. Ecological Field Studies — Introduction to field study of natural biotic systems. Jasper Ridge Biological Preserve serves as an outdoor lab. Prerequisite: consent of instructor.
4 units, Spr (Chariello, Mooney) by arrangement

144. Conservation Biology — (Enroll in Human Biology 119.)
4 units, Win (Boggs)

145/245. Behavioral Ecology — (Graduate students register for 245.) Animal behavior from an evolutionary and ecological perspective. Topics: foraging, territoriality, reproductive behavior, social groups. Lecture/seminar format; seminars include discussion of journal articles. Independent research projects. Prerequisites: Biology or Human Biology Core, or consent of instructor. Recommended: statistics.
4 units, Spr (Gordon) TTh 9 seminar by arrangement

146. Colloquium on Population Studies — Series of talks by distinguished speakers introducing a variety of approaches to population and resource studies.
1 unit, Win (Feldman) W 4:15-5:30

148. Colloquium on Biosystematics and Evolution — Panel discussion and outside speakers covering diverse topics of current interest in the systematics and evolution of living diversity; sponsored jointly with the California Academy of Sciences.
1 unit, Win (Watt) F 2:15-5:05 alternate years, not given 1996-97

149. Neural Basis of Sleep and Circadian Rhythms — 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, Kilduff) TTh 2:15-3:45 alternate years, given 1996-97

150/250. Human Behavioral Biology — (Graduate students register for 250.) The biological bases of normal and abnormal human behavior are exam-
ined 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 1996-97

152. Microscopy for Biologists — (Same as Molecular and Cellular Physiology 222.) Survey of instruments which use light and other radiation for analysis of cells in biological and medical research. Topics: basic light microscopy through confocal fluorescence and video/digital image processing. Lectures on physical principles; involves partial assembly and extensive use of instruments in projects. Prerequisites: some college physics, Biology core.

3 units, Spr (S. Smith, Green) TTh 1:15
plus lab by arrangement

153. Cellular Neuroscience: Cell Signaling and Behavior — (Enroll in Psychology 107.)
4 units (Wine) not given 1995-96

154. Human Development — (Same as Human Biology 156.) Biological, medical, and social aspects of normal and abnormal human development. Topics: in vitro fertilization and embryo transfer; gene and cell therapy; gametogenesis and imprinting; pattern formation in nervous system and limb development; gene activity in early development; cell recognition at fertilization; twinning and grand multiple pregnancies; prematurity, in utero effects of cocaine, alcohol, and teratogens; sex determination and differentiation; growth control; gigantism and dwarfism; neural tube defects; cardiac morphogenesis; current knowledge of the developmental biology of humans. Three hours lectures plus one hour required discussion section per week. Limited enrollment. Prerequisites: Human Biology or Biology core, or consent of instructor.

3-4 units, Aut (Porzig) TTh 11-12:15

155. Assessment of Chronic, Low Level Environmental Risks — Seminar limited to 25 advanced undergraduates. The scientific and policy considerations underlying the regulation of chronic, low-level risks to the environment and public health. Topics: epidemiological evaluation, exposure assessment, toxicology testing and extrapolation from animal studies, the statutes governing toxic substances and other regulation, setting regulatory priorities, managing risks. Students are expected to pursue an independent case study on some particular issue, e.g., asbestos, EMF, lead, chlorination of drinking water supplies, nuclear waste, food additives, etc.

3 units, Win (Kennedy, Sagan, North)
MW 3:15-4:30

156. Plant Physiology — Physiological functions of land plants from an analytical and quantitative points of view; photosynthetic energy and gas exchange; water and photosynthetic long-distance transport; mineral nutrient ion uptake and transport; growth at cellular and organismal levels, and its hormonal regulation; responses to light, gravity, temperature, etc. Prerequisite: Biology core.

4 units, Win (Ray) MWF 10
alternate years, not given 1996-97

158. Developmental Neurobiology — Lecture/seminar for advanced undergraduates and coterminal masters students. Principles of nervous system development from the molecular control of patterning, cell-cell interactions, and trophic factors to the level of neural systems and the role of experience in influencing brain structure and function. Topics: neural induction and patterning cell lineage, neurogenesis, neuronal migration, axonal pathfinding, synapse elimination, the role of activity, critical periods, and the development of behavior. Enrollment limited to 75. Prerequisites: 32 or equivalent; and 153 or Neurobiology 200, or consent of instructor.

4 units (McConnell)
alternate years, given 1996-97

HOPKINS MARINE STATION

Note that several of these courses can be used to fulfill department menu requirements and that completion of the Biology core is a prerequisite for all of these courses. For course descriptions, see Hopkins Marine Station section.

160H/260H. Cell Physiology
4 units (Epel, Gilly, Thompson)
alternate years, given 1996-97

161H/261H. Invertebrate Zoology
4 units, Win (Watanabe)

162H/262H. Comparative Animal Physiology
4 units Win (Block)

163H/263H. Oceanic Biology
4 units, Win (Denny)
alternate years, not given 1996-97

164H/264H. Marine Botany
4 units, Win (Staff)
alternate years, not given 1996-97

165H/265H. Air and Water
3 units (Denny) given 1996-97

166H/266H. Locomotion
3 units (Denny) given 1997-98

167H/267H. Nerve, Muscle, and Synapse
3 units, Win (Gilly) not given 1996-97

168H/268H. Cellular Signal Transduction
2 units, Win, Spr (Thompson)

169H/269H. Neurobiology and Behavior
3 units (Thompson) given 1996-97
170H/270H. Seminar: Topics in Marine Biology  
1-3 units, Win, Spr (Block, Denny, Epel, Gilly, Powers, Thompson, Watanabe)

174H/274H. Chance in Biology: Experimental Design and Probability  
3 units, Spr (Denny, Watanabe)

175H. Problems in Marine Biology  
12 units, Spr (Block, Denny, Epel, Gilly, Levine, Powers, S. Thompson, Watanabe)  
by arrangement

177H. Cell Biology of Early Development  
6 units, Sum (Epel) by arrangement

179H. Subtidal Communities  
6 units, Sum (Wantanabe) by arrangement

180H. Problems in Subtidal Ecology  
6 units, Sum (Watanabe) by arrangement

UNDERGRADUATE, INVOLVING INDIVIDUAL WORK

Students majoring in biological sciences are encouraged to pursue directed reading and research opportunities. An introduction to research is provided by Bio. 2.

191. Research in Bird Biology — Semi-independent field research in ornithology, emphasizing ecological relationships. Projects complement ongoing research, planned and carried out by the student in consultation with the instructor. Results are written in publication format. Enrollment limited. Prerequisites: 33, concurrent or subsequent enrollment in 139, and consent of instructor.  
3 units, Win, Spr (Ehrlich)  
by arrangement

198. Directed Instruction/Reading — May be taken as a prelude to research and may also involve participation in a lab or research group seminar and/or library research. Credit for work arranged with out-of-department instructors restricted to Biological Sciences majors and requires department approval.

198H. Directed Instruction/Reading — For work done under supervision of Hopkins Marine Station faculty.

199. Undergraduate Research — Individual research taken by arrangement with in-department or out-of-department instructors. Credit for work arranged with out-of-department instructors restricted to Biological Sciences majors and requires department approval.

199H. Undergraduate Research — For undergraduate research done under supervision of Hopkins Marine Station faculty.

ADVANCED UNDERGRADUATE AND GRADUATE

203. Advanced Genetics — (Same as Genetics 203.) Explores the genetic toolbox. Examples of analytic methods and modern synthetic genetic manipulation, including original papers. Emphasis is on use of genetic tools in dissecting complex biological pathways, developmental processes, and regulatory systems. Graduate students in biological sciences welcome; those with minimal experience in genetics should prepare themselves by working out problems in Suzuki, et al, or Hart, et al.

3 units, Aut (Botstein, Baker) TTh 9

205. DNA Repair and Mutagenesis — Interactions of endogenous and environmental mutagens with DNA. Responses of living systems to damaged DNA, including molecular mechanisms for DNA repair and recombinational modes. Inducible repair responses and “error-prone” mechanisms. Human hereditary deficiencies in DNA repair that predispose to cancer. Relationships of DNA repair to mutagenesis and carcinogenesis. Lectures and student oral reports on selected topics and review of current research literature. Prerequisites: 31, 118, and 119, or consent of instructor.  
3 units (Hanawalt)  
alternate years, given 1996-97

208. Developmental Biology — (Same as Developmental Biology 210.) Acquaints graduate students and upper-level undergraduates with advances in current developmental biology. Goal: to discover unifying themes in how organismic complexity is generated during embryonic and postembryonic development. The roles of genetic hierarchies, induction events, cell lineage, maternal inheritance, cell-cell communication, and hormonal control in developmental processes in well-studied organisms (mammals, insects, and nematodes). Small groups of students and faculty discuss current papers in depth. Team taught by department faculty. Undergraduate prerequisite: consent of instructor. Recommended: familiarity with basic techniques and experimental rationales of molecular biology, biochemistry, and genetics.

5 units, Spr (Baker, Clayton, Crabtree, Fuller, Hogness, Kaiser, Kim, Kingsley, Nusse, Scott, Shapiro, Spudich, Weissman)  
MWF 9-10:50

209. Advanced Neurosciences Laboratory — The use of equipment and techniques required to record and analyze extracellular and intracellular neural activity in vertebrates and invertebrates. In-depth training in a subset of these techniques as applied to a specific research project. Enrollment limited to 10; admission by application (available in Student Services office). Prerequisites: Biological Sciences or Human Biology core sequence and core lab (44 or
213. Viruses — Principles of virus growth, genetics, architecture, and assembly. Relation of temperate viruses and other episomes to the host cell. Prerequisite: 31.
3 units, Spr (Campbell) MWF 9

214. Cell Biology of Physiological Processes — (Same as Molecular and Cellular Physiology 221.) Basic mechanisms of membrane and cellular biogenesis in relation to physiological processes. Emphasis on regulatory and signaling mechanisms involved in coordinating complex cellular phenomena such as cellular organization, function, and differentiation. Topics: cellular compartmentalization, transport and trafficking of macromolecules, organelle biogenesis, cell division, motility and adhesion, and multicellularity. Prerequisites: Biology core, Biochemistry 201.
5 units, Win (Kopito, W. Nelson) MWF 9-10:50

215. Biochemical Evolution — Lectures/discussion covering biochemical viewpoints on diverse aspects of the evolutionary process. Topics: prebiotic biochemistry and the origins of life; adaptive organization of metabolism; enzyme polymorphisms and other biochemical aspects of population genetics; macromolecular phylogeny and protein clocks. Prerequisites: Biology core or substantial equivalent.
3 units, Win (Watt) TTh 8:35-9:50

216. Ecosystem Ecology and Global Biogeochemistry — Nutrient cycling and the regulation of primary and secondary production in terrestrial, freshwater, and marine ecosystems; land-water and biosphere-atmosphere interactions; global element cycles and their regulation; human effects on biogeochemical cycles. Prerequisite: graduate standing in science or engineering; consent of instructor for undergraduates or coterminal students.
3 units, Spr (Vitousek) TTh 2:15-3:30 alternate years, not given 1996-97

217. Climate Theory, Modeling, Applications and Implications — (Same as Civil Engineering 264.) History of the co-evolution of climate and life. Theories of climate, external and internal climatic forcings, definitions of climate and the climate system, and rationale for climatic modeling. Hierarchy of climatic models; interactions among atmosphere, biosphere, oceans, hydrosphere, and cryosphere. Climatic predictability; implications of predictions and relevance to current controversies. Prerequisites: Biology core or Civil Engineering 163 and math through differential equations, or consent of instructor.
3 units, Win (Schneider) TTh 11-12:30 alternate years, not given 1996-97

230. Molecular and Cellular Immunology — For graduate students and advanced undergraduates. Basic components of the immune system: structure and functions of antibody molecules; cellular basis of immunity and its regulation; molecular biology of antigen recognition structures, genetics of immunity and disease susceptibility. Prerequisites for undergraduates: Biology core or consent of instructor.
4 units, Aut (Jones) MWF 10 plus discussion by arrangement

237. Introduction to Biotechnology — (Same as Biophysics 237, Chemical Engineering 237, Chemistry 237, Civil Engineering 237, Developmental Biology 237, Structural Biology 237.) Faculty from the Departments of Biochemistry, Biological Sciences, Chemical Engineering, Chemistry, Civil Engineering, Developmental Biology, Structural Biology, and invited industrial speakers review the interrelated elements of modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering.
3-5 units, Spr (Robertson) TTh 2:15-3:30 F 3:15-4:30

238H. Biomechanics of Intertidal Organisms — See Hopkins Marine Station section.
6 units (Denny) alternate years, given 1996-97

242. Theoretical Ecology — Mathematical models in ecology for upper-division undergraduates and graduate students. Topics from behavioral ecology, population dynamics and genetics, and community ecology. Theme varies each year. Focus in 1995 is to develop a computer-based primer on ecological theory. Prerequisites: differential equations, linear algebra, and computer programming.
3 units, Aut (Roughgarden) TTh 10 alternate years, not given 1996-97

4 units, Win (Schimke) TTh 4:15 alternate years, not given 1996-97

252. Gene Action — Student seminars on aspects of gene structure and function, and regulation of gene expression in microorganisms. Prerequisites: Biochemistry 201 or equivalent; consent of instructor.
3 units, Spr (Yanofsky) TTh 9-10:50 alternate years, not given 1996-97
258. Developmental Neurobiology — Seminar for graduate students, with optional lectures that meet jointly with 158. Principles of nervous system development from the molecular control of patterning, cell-cell interactions and trophic factors, to the level of neural systems and the role of experience in influencing brain structure and function. Topics: neural induction and patterning, cell lineage, neurogenesis, neuronal migration, axonal pathfinding, synapse elimination, the role of activity, critical periods, and the development of behavior. Prerequisites: 32 or equivalent; and 153 or Neurobiology 200, or consent of instructor. Enrollment limited to 30.

4 units (McConnell) alternate years, given 1996-97


3-4 units, Win (F. Thomas) by arrangement

283. Theoretical Population Genetics — Detailed survey of models in population genetics. Selection, random drift, gene linkage, migration and inbreeding, and the influence they have on the evolution of gene frequencies and chromosome structure is analyzed. Models related to DNA since evolution. Prerequisite: consent of instructor.

3 units, Aut (Feldman) by arrangement

290. Teaching of Biological Science — Open to upper-division undergraduates and graduate students. Practical experience in teaching lab biology or serving as an assistant in a lecture course. Prerequisite: consent of instructor.

1-5 units, Aut, Win, Spr (Staff) 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 teaching either of the above courses. Prerequisite: selection by instructor.

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

PRIMARILY FOR GRADUATE STUDENTS

300. Research — Individual research at the graduate level taken by arrangement with in-department or out-of-department instructors. For coterminous master's students: credit for work with out-of-department instructors requires an approved department petition.

300H. Research — For graduate research done under supervision of Hopkins Marine Station faculty.

301. Current Topics in Biology — Enrollment limited to Biological Sciences Ph.D. students in the first year of graduate study. Lectures in areas of the faculty's current research interests first three weeks.

1 unit, Aut (Staff) MTWThF 1:15

302. Current Topics in Population Biology — Lectures in areas of the faculty's current research interests.

1 unit, Aut (Staff) T 3


1 unit, Win, Spr (Ehrlich, Feldman, Rield, Gordon, Mooney, Roughgarden, Vitousek, Watt) W 12

305. Seminar in DNA Repair and Genetic Toxicology — Literature review and discussion of current research, emphasizing experimental approaches for studying DNA damage processing in bacteria, yeast, and mammalian cells. Prerequisite: consent of instructor.

1-3 units, 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, Win (Watt) by arrangement

325. Professional Responsibility and Academic Duty — Seminar for dissertation-level Ph.D. candidates who intend academic careers. Topics: teaching and preparation for it, obligations to students, faculty governance, obligations to the institution and conflict of interest, consulting, research and research funding, regulation of the conduct of research, roles of reviewers and editors, intellectual property and academic authorship, misconduct in research, constraints on freedom of publication. Class participation and final paper required. Enrollment limited to 25. Prerequisite: consent of instructor.

3 units (Kennedy) not given 1995-96

333H. Molecular Approaches to Ion Channels — See Hopkins Marine Station section.

6 units, Sum (Gilly) by arrangement

335. Seminar in Immunobiology and Immunogenetics — Literature review of current topics in immunology. Prerequisites: introductory immunology course and (for undergraduates) consent of instructor.

1-2 units, Aut, Win, Spr (Jones) M 12

339. Plant Development and Molecular Biology — Topics: plant genome organization, coordination of nuclear and organelar gene expression, environmental and developmental regulation of gene expression, the function of vegetative and floral
meristem, parameters of plant cellular and tissue growth, and special topics such as the development of epidermal cell specializations and flowering in which both molecular and developmental approaches are being used in current research. Discussion sections focus on the original literature.

3 units (Walbot, Green, Grossman, Hoffman, Long, C. Somerville, S. Somerville) alternate years, given 1996-97

340. Plant Biochemistry: Cellular, Physiological and Ecological Aspects — Topics: light regulation of plant processes, photosynthesis and its control, ATP synthesis, respiration, regulation of carbon flux in metabolism, amino acid and lipid biosynthesis, secondary metabolites, plant microbe signal molecules, etc. Emphasis on regulatory interactions at the chemical, organismal, and ecological-global levels. Weekly section meetings focus on the original literature.

3 units, Spr (Walbot, Berry, Bjorkman, Briggs, Long, Ray, C. Somerville, S. Somerville) MWF alternate years, not given 1996-97

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, Hoffman, Long, Mooney, Ray, Vitousek, Walbot) T 4:15

345. Seminar in Behavioral Ecology — Selected topics in the evolution and ecology of social behavior; discussion of research papers. Prerequisite: consent of instructor.

1-3 units, Win (Gordon) by arrangement

346. Seminar in Genetics and Molecular Biology — Enrollment limited to graduate students directly associated with departmental research groups in genetics or molecular biology.

1 unit, Aut, Win, Spr (Campbell, Hanawalt, Long, Walbot, Yanofsky) M 12

349. Seminar in Population Ecology — Prerequisite: consent of instructor.

1-3 units, Aut, Win, Spr (Ehrlich) by arrangement

358. Seminar in Developmental Neurobiology — Enrollment limited to graduate students and advanced undergraduates doing research in developmental neurobiology. Formatted entirely around student presentations of journal articles reporting recent findings in developmental neurobiology. Prerequisites: 158 or 258 or equivalent.

1 unit, Aut, Win, Spr (McConnell) F 4

383. Seminar in Population Genetics — Literature review and research discussion of current problems in the theory and practice of population genetics. Student participation required. Prerequisite: consent of instructor.

1-3 units, Spr (Feldman) by arrangement

384. Seminar in Theoretical Ecology — (Same as Geophysics 385 Y.) Discussions of recent and classical research papers in ecology, and presentation of work in progress by seminar participants. Prerequisite: consent of instructor.

1-3 units, Spr (Roughgarden) by arrangement

The Hopkins Marine Station is at Pacific Grove, on the south side of Monterey Bay, 90 miles from the main University campus. The 11-acre grounds, on the main portion of Cabrillo Point, include a sheltered landing place and storage for small boats. Buildings include the Lawrence Blinks Laboratory, Alexander Agassiz Laboratory, Jacques Loeb Laboratory, Harold A. Miller Library, Monterey Boat Works, Walter K. Fisher Laboratory, Tuna Research and Conservation Center, and Denault Laboratory. The 15,000 volume library subscribes to approximately 450 journals, and its collections are particularly strong in embryology, marine biology, microbiology, and oceanography.

The station is open during the entire year and maintains a permanent staff of resident investigators and technical assistants. The staff is supplemented by visiting faculty members, especially during the summer. There are facilities for visiting investigators and for elementary and advanced instruction in biology. For further information, write Hopkins Marine Station, Pacific Grove, CA 93950.

COURSES

160H/260H. Cell Physiology — (Graduate students register for 260H.) The structures and processes that control life at the cellular level. Topics: membrane structure and function, signal transduction, the cytoskeleton, transport processes, cell division, cell-cell interactions, and motility. Similar to Bio. 121 (Cell Biology), but using marine examples. Three lectures per week. Pre-
requisites: Biology Core or consent of instructor.

4 units (Epel, Gilly, Thompson)
alternate years, given 1996-97

161H/261H. Invertebrate Zoology — (Graduate students register for 261H.) Introduction to the diversity of form and function in invertebrates. Local marine fauna are used in a hands-on study. Traditional systematic approach augmented by topics such as comparative skeletal mechanics, comparative neuroanatomy and physiology. Three lectures, one lab per week. Prerequisites: Biology Core or consent of instructor.

4 units, Win (Watanabe) by arrangement

162H/262H. Comparative Animal Physiology — (Graduate students register for 262H.) How animals work. Topics: respiration, circulation, reproduction, digestion and energy metabolism, temperature and osmotic regulation, muscle physiology and locomotion, sensory and neurophysiology. Three lectures per week. Prerequisites: Physics 21 or 51; Chemistry 31, 135; Biology Core; or consent of instructor.

4 units, Win (Block) by arrangement

163H/263H. Oceanic Biology — (Graduate students register for 263H.) How the physics and chemistry of the oceanic environment affects marine plants and animals. Topics: seawater and ocean circulation, separation of light and nutrients in the two-layered ocean, oceanic food webs and trophic interactions, oceanic environments, biogeography, and global change. Three lectures per week; three field trips. Prerequisites: Physics 21 or 51; Chemistry 31, 135; Biology Core; or consent of instructor.

4 units, Win (Denny) by arrangement

164H/264H. Marine Botany — (Graduate students register for 264H.) Introduction to plants in the sea. Phytoplankton and oceanic productivity, macrophytes and nearshore ecology, marine angiosperms from taxonomical, physiological, and ecological perspectives. Three lectures, one lab per week. Prerequisites: Biology Core or consent of instructor.

4 units, Win (Staff)
alternate years, not given 1996-97

165H/265H. Air and Water — (Graduate students register for 265H.) Introduction to environmental physics. The physical properties of life's fluids compared and contrasted. How and why life has evolved differently on land than in water. Topics: density, viscosity, diffusion, thermal properties, sound, light, evaporation, and surface tension. Three lectures per week. Prerequisites: Physics 21, 23, or 51, 53; calculus; Biology Core; or consent of instructor.

3 units (Denny) given 1996-97

166H/266H. Locomotion — (Graduate students register for 266H.) How animals and plants swim, crawl, run, and fly. The principles of fluid and solid mechanics determine the possibilities and limitations of organismal motion. Three lectures per week. Prerequisites: Physics 21 or 51, Biology Core, or consent of instructor.

3 units (Denny) given 1997-98

167H/267H. Nerve, Muscle, and Synapse — (Graduate students register for 267H.) The fundamental aspects of membrane excitability and conduction, synaptic transmission, excitation-contraction coupling, and selected mechanisms of sensory transduction. Lectures/seminars. Labs on the experimental and analytical methods to study these processes, using invertebrate giant cell preparations. Three lectures per week, one lab. Prerequisites: Physics 21, 23, or 51, 53; Chemistry 31, 135; calculus; Biology Core or consent of instructor.

3 units, Win (Gilly) by arrangement

168H/268H. Cellular Signal Transduction — (Graduate students register for 268H.) Lecture seminar, group discussions. Focus is on the physiology, biochemistry, and molecular biology of signaling cascade, from basic principles to advanced and current topics. Prerequisite: consent of instructor.

2 units, Win, Spr (Thompson) by arrangement

169H/269H. Neurobiology and Behavior — (Graduate students register for 269H.) The neural mechanism responsible for generating animal behavior. Topics: neuronal excitability, synaptic plasticity, signal transduction, and small neural circuits. Lectures, seminars, and journal discussions. Lab demonstrations and guided projects introduce methods used to explore neural circuits. Three lectures, one full-day lab per week. Prerequisites: Physics 21, 23, or 51, 53; Chemistry 31, 135; calculus; Biology Core; or consent of instructor.

3 units (Thompson) given 1996-97

170H/270H. Seminar: Topics in Marine Biology — (Graduate students register for 270H.) A specific topic of current interest to marine science is explored through discussion of the primary literature. One seminar meeting per week. Prerequisites: Biology Core or consent of instructor.

1-3 units, Win, Spr (Block, Denny, Epel, Gilly, Powers, Thompson, Watanabe) by arrangement

174H/274H. Chance in Biology: Experimental Design and Probability — (Graduate students register for 274H.) Random behavior on the part of molecules, organisms, and the environment is an integral part of life. Introduction to the study of chance effects in a biological context. Topics: the use of statistics in the proper design and analysis of experiments and the use of probability theory to predict the effects of chance in diffusion, action
potentials, chemotaxis, sight, hearing, and predator-prey interactions. Prerequisites: Biology Core or consent of instructor.

3 units, Spr (Denny, Watanabe)

175H. Problems in Marine Biology — Designed primarily to engage advanced undergraduates in research. Lectures, lab work, field studies, and individual problems. Prerequisites: junior or senior standing in biology and consent of instructors.

12 units, Spr (Block, Denny, Epel, Gilly, Levine, Powers, Thompson, Watanabe) by arrangement

198H. Directed Instruction/Reading — May be taken as a prelude to research and may also involve participation in a lab or research group seminar and/or library research. Credit for work arranged with out-of-department instructors restricted to Biological Sciences majors and requires department approval.

Aut, Win, Spr, Sum (both terms) (Staff) by arrangement

199H. Undergraduate Research — Forexperience in biological research, qualified undergraduate students may undertake individual work in the fields listed under 300H. Arrangements must be made by consultation or correspondence.

Aut, Win, Spr, Sum (both terms) (Staff) by arrangement

300H. Research — Graduate study involving original work may be undertaken with members of the staff in the fields indicated:

B. Block: Comparative Vertebrate Physiology — biomechanics, metabolic physiology, and phylogeny of pelagic fishes, evolution of endothermy.

M. Denny: Biomechanics — the mechanical properties of biological materials and their consequences for animal size, shape, and performance.


W. Gilly: Neurobiology — analysis of giant axon systems in marine invertebrates from molecular to behavioral levels.

R. P. Levine: Symbiosis and Parasitism — molecular biology and biochemistry of intracellular symbionts and bacterial pathogens and their hosts.


S. Thompson: Neurophysiology — neuronal control of behavior and mechanisms of ion permeation in membranes, signal transduction, calcium imaging.

Aut, Win, Spr, Sum (both terms) (Staff) by arrangement

SUMMER PROGRAM

The summer program is open to all advanced undergraduate, graduate, postdoctoral students, and teachers whose biological backgrounds, teaching, or research activities can benefit from a summer’s study of marine life. Application blanks and further information may be obtained by writing to Hopkins Marine Station, Pacific Grove, CA 93950. Completed applications should be submitted by March 31. Applications received later are considered if space is still available.

The Summer Quarter is divided into two terms of five weeks each. It is possible to register for either term, or for the full quarter. Registration is possible for only one course during each five-week session.

FIRST TERM

177H. Cell Biology of Early Development — Post-graduate level; advanced undergraduates are encouraged to apply. Five-week workshop on cellular phenomena seen during early embryonic development. Gametes of marine organisms are utilized; emphasis on experimentation and observation of living cells, including their microscopy, micromanipulation, and chemistry.

6 units (Epel) by arrangement

179H. Subtidal Communities — Lectures, lab, and field trips treating shallow water marine communities. Emphasis on local habitats and the introduction of physical environmental parameters, community composition, aspects of the biology of constituent species, and methods for subtidal studies. Prerequisites: SCUBA certification, SCUBA equipment, ocean diving experience, and some background in biology.

6 units (Watanabe) by arrangement

238H. Biomechanics of Intertidal Organisms — Introduction to the mechanical design of wave-swept organisms, emphasizing the ecological implications of wave forces. The theories of water waves, fluid dynamics and solid mechanics; the design of materials, structures, whole organisms, and communities. Each student completes an individual research project. Recommended: background in invertebrate zoology, algology, or intertidal ecology; also basic physics and calculus.

6 units (Denny) alternate years, given 1996-97

SECOND TERM

180H. Problems in Subtidal Ecology — Group and individual research projects focus on shallow water marine communities, emphasizing the importance of identifying a relevant problem through review of the scientific literature, formulating an adequate research plan, and collecting data in the field. Lectures/discussions focus on proper experimental design, data analysis, and critiques of selected papers from the scientific
literature. Required final paper in the form of a formal research proposal based on extensive literature review and preliminary data collected. Prerequisites: 179H or equivalent experience and knowledge, SCUBA certification, SCUBA equipment, and ocean diving experience.

6 units (Watanabe) by arrangement

333H. Molecular Approaches to Ion Channels — Advanced treatment of the function and regulation of ion channels and molecular-level methods of study. Daily lectures and intensive lab provide working knowledge of whole cell/single channel patch clamp, voltage clamp of oocytes in conjunction with microinjection and expression of mRNA, and biochemical analysis of channel synthesis and processing.

6 units (Gilly) by arrangement

BIOPHYSICS PROGRAM

Professors: Richard W. Aldrich (Molecular and Cellular Physiology), Art Boyer (Radiation Physics), Steven Boxer (Chemistry), Martin J. Brown (Radiology), Gilbert Chu (Oncology), Steven Chu (Applied Physics), David A. Clayton (Developmental Biology), Sebastian Doniach (Radiation Oncology), John Griffin (Chemistry), Philip C. Hanawalt (Biology), Daniel Herschlag (Biochemistry), Keith O. Hodgson (Chemistry), Wray H. Huestis (Chemistry), Oleg Jardetzky (Molecular Pharmacology), Ron Kopito (Biological Sciences), Roger D. Kornberg (Structural Biology), Michael Levitt (Structural Biology), Harden M. McConnell (Chemistry), David B. McKay (Structural Biology), Robert Pecora (Chemistry), Norbert Pelc (Radiology), Paul Phizackerley (SSRL), John Ross (Chemistry), Robert D. Simoni (Biological Sciences), Ed Solomon (Chemistry), James A. Spudich (Biochemistry and Developmental Biology), Lubert Stryer (Neurobiology), William Weis (Structural Biology)

The Biophysics Program offers instruction and research opportunities leading to the Ph.D. in Biophysics. Students admitted to the program may perform their graduate research in any appropriate department.

GRADUATE PROGRAM

A small number of highly qualified applicants are admitted to the program each year. Applicants should present strong undergraduate backgrounds in the physical sciences and mathematics. The graduate course program, beyond the stated requirements, is worked out for each student individually with the help of appropriate advisers from the Committee on Biophysics.

The requirements and recommendations for the Ph.D. degree include:

1. Training in physics or chemistry equivalent to that of an undergraduate physics or chemistry major at Stanford.
2. Completion of the following courses (or their equivalents):
   a) Biophysics 250
   b) Biochemistry 200, 201
   c) Chemistry 131, 171, 173, and 175
   d) Additional courses as required for the individually tailored program.
3. Proficiency in one or more foreign languages and/or a computer language may be required at the discretion of the major professor.
4. Opportunities for teaching are available during the first nine quarters, at the discretion of the advising committee.
5. Passing a comprehensive qualifying examination in biophysics is required for admission to Ph.D. candidacy. This examination is normally taken in the second year of study, and it emphasizes the student's area of specialization in biophysics.
6. The student must prepare a Dissertation Proposal defining the research to be undertaken, including methods of procedure. This proposal should be submitted by Spring Quarter of the second year, and it must be approved by a committee of at least three members including the principal research adviser and at least one member from the Committee on Biophysics. The candidate must defend the dissertation proposal in an oral examination. The Dissertation Reading Committee normally evolves from the Dissertation Proposal Review Committee.
7. The student must present a Ph.D. dissertation as the result of independent investigation and expressing a contribution to knowledge in the field of biophysics.
8. The student must pass the University oral examination, taken only after the student has substantially completed the research. The examination is preceded by a public seminar in which the research is presented by the candidate.

COURSES

205. DNA Repair and Mutagenesis — (Enroll in Biology 205, Pathology 292.)
3 units (Hanawalt)
alternate years, given 1996-97

210. Advanced Topics in Membrane Biochemistry — (Enroll in Biochemistry 210.)
4 units (Pfeffer) not given 1995-96

214. Physical Biochemistry — (Enroll in Biochemistry 214.)
3 units, Win (Baldwin)
225. Molecular Motor Proteins and the Cytoskeleton — (Enroll in Biochemistry 225, Developmental Biology 225.)

3 units (Spudich, Fuller) given every third year

228. Protein and Nucleic Acid Structure, Dynamics and Engineering — (Enroll in Structural Biology 228.)

3 units, Win (Levitt)

232. Macromolecular Structure: Diffraction Methods and Diffraction Results — (Enroll in Structural Biology 232.)

3 units, Win (Weis, McKay)

237. Introduction to Biotechnology — (Same as Biochemistry 237, Biology 237, Chemical Engineering 237, Civil Engineering 237, Developmental Biology 237, Structural Biology 237.) Faculty from the Departments of Biochemistry, Biological Sciences, Chemical Engineering, Chemistry, Civil Engineering, Developmental Biology, Structural Biology, and invited industrial speakers review the interrelated elements of modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering.

3-5 units, Spr (Robertson) TTh 2:15-3:30 F 3:15-4:30

250. Seminar in Biophysics — All graduate students in Biophysics must participate. Presentation of current research projects and results by all faculty in the Biophysics Program.

1 unit, Aut, Win (Staff)

289. Biophysical Chemistry — (Enroll in Chemistry 289.)

3 units (Staff) not given 1995-96

291. Biophysical Chemistry — (Enroll in Chemistry 291.)

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

297. Biophysical Chemistry — (Enroll in Chemistry 297.)

3 units, Win (Solomon) TTh 9-11

300. Research

(Staff) by arrangement

Other biophysics courses in related departments: Chemistry 251, Neurobiology 216, Structural Biology 229.

Other recommended courses:

Biological Sciences 230, 252; Biochemistry 200, 201, 212; Chemistry 271, 273, 275; Physics 170, 171, 230, 231, Structural Biology 211.

COMMITTEE ON BLACK PERFORMING ARTS

Director: Harry Elam (Drama)

Steering Committee: Ryan Bathe (student), Elena Becks (Committee on Black Performing Arts), Earl Black (African and Afro-American Studies), LaVeta Hughes-Blanchard, Paula Ebron (Anthropology, Urban Studies), Kim Fowler (Committee on Black Performing Arts), Jomo Graham (student), Sharon Holland (English), Jewel Hudson (ASSU Law Office), Cheryl Irvin (student), Jaqueline Jones (graduate student, Communications), Robert Moses (Committee on Black Performing Arts, Dance Lecturer), Judith Williams (graduate student, Drama)

The Committee on Black Performing Arts (CBPA) is an interdisciplinary program supporting the presence of Black art forms at Stanford. Started as a student project in 1968, the committee became an official University program in 1972. Presentations include professional performing artists, symposia, films, and student productions framed by related academic study in drama, history, sociology, anthropology, and philosophy. It functions as (1) a liaison with departments in hiring faculty and devising courses in Black performing arts; (2) a producer of shows in dance, drama, and music; and (3) a resource for student organizations promoting artistic expression in the Black cultural tradition. Through the cooperation of the departments, students are able to take relevant courses in dance, drama, music, and literature. While the offerings do not constitute the basis for an academic major, students are able to concentrate studies in Black performing arts as part of the A.B. major in African and Afro-American Studies.

COURSES

Students are advised to consult the Time Schedule each quarter to note changes.

AFRICAN AND AFRO-AMERICAN STUDIES

105. Introduction to African and Afro-American Studies DR:3(*)

5 units, Win (Staff)

DANCE

81. Jazz Dance I

1 unit, Aut, Win, Spr (Kramer)

182. Jazz Dance II

1 unit, Aut, Win, Spr (Moses)

183. Jazz Dance III

1 unit, Aut, Win (Moses)
185. African-Caribbean Roots of American Jazz Dance
   2 units, Spr (Moses)

DRAMA
29. Acting in Performance
   1-3 units, any quarter (Staff) by arrangement

39A,B,C. Theater Performance: Crew
   1-3 units, any quarter (Staff) by arrangement

CHEMISTRY*

Chair: John I. Brauman
Professors: Hans C. Andersen, Steven G. Boxer, John I. Brauman, James P. Collman, Carl Djerassi, Michael D. Fayer, Keith O. Hodgson, Wray H. Huesis, Harden M. McConnell, Robert Pecora, John Ross, Edward I. Solomon, Barry Trost, Paul A. Wender, Richard N. Zare
Associate Professors: Christopher E. D. Chidsey, Robert M. Waymouth
Assistant Professors: Dale G. Drueckhammer, John H. Griffin, T. Daniel P. Stack, Thomas J. Wandless
Courtesy Professors: Curtis W. Frank, Alice P. Gast, Daniel Herschlag, Robert J. Madix

* The curriculum leading to the B.S. degree in Chemical Engineering is described in the “School of Engineering” section of this bulletin.

UNDERGRADUATE PROGRAMS
BACHELOR OF SCIENCE
ENTRANCE PREPARATION
Students intending to major in chemistry are expected to have entrance credit in the preparatory subjects of chemistry, physics, and mathematics (including algebra and plane trigonometry). Those who do not have entrance credit or equivalent training in these subjects, particularly mathematics, may experience some difficulty in meeting the department requirements for graduation in four years, especially if they expect to pursue a program leading to professional certification by the American Chemical Society or to the B.S. degree with Honors. A year or more of secondary school preparation in German is also desirable.

MINIMUM REQUIREMENTS
University writing and distribution requirements; Math. 19, 20, 21, 43, or Math. 41, 42, 43; Physics 41, 43, 45, 46, 47, 48, 70, 72; Chemistry 31, 33, 35, 36, 131, 132, 133, 134, 151, 153, 171, 173, 174, 175, 176. In addition, a reading knowledge of scientific German is strongly recommended. Chemistry 133 is offered as staffing permits. In years when it is not offered, students may petition in advance to substitute other courses relevant to their programs. Students interested in attending overseas campuses should consult their advisers as early as possible to avoid scheduling problems. Note that it is particularly convenient to attend an overseas campus during Spring Quarter of the second year, since the courses listed in this quarter may be delayed to subsequent years without disadvantage. No required course may be taken on a Satisfactory/No Credit basis.

TYPICAL SCHEDULE FOR A FOUR-YEAR PROGRAM

FIRST YEAR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 31. Chemical Principles</td>
<td>A W S</td>
</tr>
<tr>
<td>Chem. 33. Structure and Reactivity</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 35. Monofunctional Compounds</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 36. Chemical Separations</td>
<td>3</td>
</tr>
<tr>
<td>Math. 41, 42, 43. Analytic Geometry and Calculus</td>
<td>5 5 5</td>
</tr>
<tr>
<td>Writing and Distribution Requirements or Electives</td>
<td>6 6 3</td>
</tr>
<tr>
<td>Totals</td>
<td>15 15 15</td>
</tr>
</tbody>
</table>

SECOND YEAR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 131. Polyfunctional Compounds</td>
<td>A W S</td>
</tr>
<tr>
<td>Chem. 132. Qualitative Organic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 133. Special Topics in Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>Chem. 134. Theory and Practice of Quantitative Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 136. Synthesis Laboratory (elective)</td>
<td>5</td>
</tr>
<tr>
<td>Physics 41, 43, 45-46. Mechanics, Electricity, and Magnetism</td>
<td>3 3 4</td>
</tr>
<tr>
<td>Electives (see note below)</td>
<td>4 5 8</td>
</tr>
<tr>
<td>Totals</td>
<td>15 16 15</td>
</tr>
</tbody>
</table>

THIRD YEAR

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Qtr. and Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 151, 153. Inorganic Chemistry</td>
<td>A W S</td>
</tr>
<tr>
<td>Chem. 171, 173, 175. Physical Chemistry</td>
<td>3 3</td>
</tr>
<tr>
<td>Chem. 174, 176. Physical Chemistry Laboratory</td>
<td>3 3</td>
</tr>
<tr>
<td>Physics 47-48, 70-72</td>
<td>5 4</td>
</tr>
<tr>
<td>Totals</td>
<td>8 13 9</td>
</tr>
</tbody>
</table>
FOURTH YEAR

<table>
<thead>
<tr>
<th>Electives (see note below)</th>
<th>A</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

Note — Elective courses must be used to complete the University Writing, Distribution, and Language Requirements. They may also be used to broaden one’s background in science and nonscience areas and to provide an opportunity for advanced study in chemistry. Courses offered by other departments that may be of interest to chemistry majors include Biochem. 200, 201; Biol. Sci. 31, 32, 33; Chem. Engr. 20, 120, 130; Civ. Engr. 170; Comp. Sci. 106; Econ. 1; English 191; Engr. 50; Geo. & Envr. Sci. 1, 278; Math. 44, 106, 113, 130, 131, 132; Mat. Sci. & Engr. 50; Microbio. & Immun. 101; Physics 110, 111, 132; Stat. 40, 110, 116.

AMERICAN CHEMICAL SOCIETY CERTIFICATION

Students who wish to be certified as having met the minimum requirements of the American Chemical Society for professional training must complete, in addition to the above requirements, at least 6 units from Chemistry 136 and/or 190; and at least 3 additional units from one of the following: Chemistry 136, any chemistry course numbered above 200 for which permission to register had been granted by the instructor, Biochemistry 200, or an advanced course in mathematics or physics. A reading knowledge of German or Russian is strongly recommended.

HONORS PROGRAM

A limited number of undergraduates may be admitted to the Chemistry honors program at the beginning of the senior year. Those completing the program satisfactorily receive the B.S. degree in Chemistry with Honors. Admission to the program requires a letter grade indicator (LGI) of at least ‘B’ in all course work in the University. In addition to the minimum requirements for the B.S. degree, the student must complete 9 units of Chemistry 190 to be taken 3 units per quarter for three quarters; and 9 additional units from Biochemistry 200, 201; Chemistry 221, 223, 225, 251, 253, 255, 271, 273, 275; Math. 130, 131, 132; Physics lecture courses numbered 100 or higher; Geological and Environmental Sciences 278; or other advanced courses approved by the department’s Undergraduate Study Committee. An overall LGI of 3.3 in all chemistry, mathematics, and physics course work including 9 (most recent) units in Chemistry 190 is required for a degree with honors. Students who wish to be admitted to the honors program should register in the department undergraduate office in Mudd 283 at the beginning of the senior year. Those who do not meet all of the above formal requirements may petition the department for admission.

TEACHING CREDENTIALS

The requirements for certification to teach chemistry in the secondary schools of California may be ascertained by consulting the section on credentials under the “School of Education” section of this bulletin and the Credential Administrator of the School of Education.

GRADUATE PROGRAMS

GENERAL REQUIREMENTS

Qualifying examinations are given prior to the first week of the Autumn Quarter and in the first week of the Winter Quarter. Each new graduate student must take these examinations on entrance. Satisfactory performance is required for permission to begin dissertation research and to continue work for an advanced degree. Students on full-time fellowships may complete all requirements for the Ph.D. degree in nine quarters. Students on research or teaching assistantships may complete their requirements in fifteen quarters. 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 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 department approval. In addition to department requirements, candidates for advanced degrees must meet the general University regulations as stated in the “Graduate Degrees” section of this bulletin.

QUALIFYING EXAMINATIONS

These examinations consist of three written exams of two hours each in the fields of inorganic, organic, and physical chemistry, and cover such material as ordinarily is given in a rigorous one-year undergraduate course in each of these subjects. Students majoring in biochemistry must pass examinations in biophysical and physical chemistry, and either organic or inorganic chemistry. Students who fail to pass these examinations in the Autumn Quarter are required to repeat them during the first week of the Winter Quarter. All qualifying examinations are given
September 25, 26, and 27, 1995, and must be taken at that time.

MASTER OF SCIENCE

Applicants for the M.S. degree in Chemistry are required to complete, in addition to the requirements for the bachelor's degree, a minimum of 36 units of work and an M.S. thesis. Of the 36 units, approximately two-thirds must be in the department and must include at least 12 units of advanced course work in chemistry exclusive of the thesis. Of the 12 units, at least 3 units must be from Chemistry 221, 223, 225, 251, 253, 255, 271, 273, or 275.

MASTER OF ARTS IN TEACHING (CHEMISTRY)

In cooperation with the School of Education, the department offers a program leading to the Master of Arts in Teaching (Chemistry). This degree is for candidates who have a teaching credential and wish to strengthen further their academic preparation. The program consists of a minimum of 25 units in the teaching field and 12 units in the School of Education. Detailed requirements are outlined under the "School of Education, Master of Arts in Teaching" section of this bulletin. Not offered 1995-96.

DOCTOR OF PHILOSOPHY

Graduate students are eligible to become formal candidates for the Ph.D. degree after passing the department qualifying examinations, satisfactorily completing most of the formal lecture course requirements, and beginning satisfactory progress on a dissertation research project. They then file for admission to candidacy for the Ph.D. degree. This filing must be done before June of the second year of graduate registration.

After passing the departmental qualifying examinations, students select research advisers by first interviewing at least ten members of the Chemistry faculty about their research. Students then file an Application to Start Research form with the Department of Chemistry Graduate Study Committee and begin research on their Ph.D. dissertation under the supervision of an adviser. All students in good standing are required to start research by the end of the Winter Quarter of the first year of graduate registration.

The foreign language requirement for the Ph.D. in organic chemistry must be met with German. The foreign language requirement in physical, biophysical, or inorganic chemistry may be met with French, Japanese, German, or Russian. The requirement may be met by completing one year (two semesters or three quarters) of the given language at the college level, by receiving a passing grade in a college-level intensive reading course (for example, German 10, French 50), or by successfully completing a reading test in the language given by the Department of Chemistry.

Candidates for the Ph.D. degree are required to participate continually in the department seminar (Chemistry 300), and in the division seminar of the major subject. In addition, continuous enrollment in Chemistry 301 is expected after the student has passed the qualifying examinations and chosen a research supervisor. As part of graduate training, Ph.D. candidates are required to gain experience as teaching assistants.

Before candidates may request scheduling of the University oral examination, clearance must be obtained from the major professor and the chair of the department's Graduate Study Committee. Conditions that must be fulfilled before clearance is granted vary with the different divisions of the department and may be ascertained by consulting the chair of the committee.

It is the policy of the department to encourage and support in every possible way the pursuit of research and other advanced work by qualified students. Information about staff members with lists of their recent research publications is found in Chemistry at Stanford 1995-96 and the Directory of Graduate Research published by the American Chemical Society.

COURSE REQUIREMENTS

Students may major in Inorganic, Organic, Physical, or Biophysical Chemistry. All graduate students are required to take six graduate-level courses (course numbers greater than 199) of at least 3 units each in chemistry or related disciplines (for example, biochemistry, electrical engineering, mathematics, pharmacology, physics, and so on), to be selected in consultation with their research adviser and the Graduate Study Committee. At least four of these courses should be taken in the first year. In addition, students majoring in Organic Chemistry must take 3 units in Chemistry 233 in the second and third year.

CHEMICAL PHYSICS

Students with an exceptionally strong background in physics and mathematics may, upon special arrangement, pursue a program of studies in chemical physics.

Ph.D. MINOR

Candidates for the Ph.D. degree in other departments who wish to obtain a minor in chemistry must complete, with an LGI of 'B' or better, 20 graduate-level units in chemistry.

FELLOWSHIPS AND SCHOLARSHIPS

In addition to school fellowships and scholarships open to properly qualified students, there are several department fellowships in chemistry. Undergraduate scholarships are administered through the Financial Aid Office. Teaching as-
sistsants and research assistantships are open
gatory chemistry of oxygen and nitrogen aliphatic
molecular orbital theory, periodicity, bonding properties of
matter, stoichiometry. Prerequisite: high school al-

graphical, and bio-inorganic chemistry. DR:5(7)

cut across the traditional subdivisions of chemistry.
structural chemistry background. Preparation for chem-
istry, chemical engineering, medicine, biochemis-

*33. Structure and Reactivity — Organic chemistry, functional groups, hydrocarbons, stereochemistry, thermochemistry, kinetics, chemical equilibria. Prerequisite: 31, 32, or an AP Chemistry score of 4 or 5. DR:5(7)

*34. Organic Monofunctional Compounds — Organic chemistry of oxygen and nitrogen aliphatic compounds. Prerequisite: 33.

*35. 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.


*134. Physical Chemical Principles — Terminal physical chemistry for non-chemistry majors. Emphasis on portions of physical chemistry most useful for students of the life sciences. Introduction to chemical thermodynamics, heterogeneous equilibria, thermodynamics of solutions, electrolytes, chemical kinetics, macromolecular solutions, and colloidal dispersions. Prerequisites: 31, calculus.

*135. Synthesis Laboratory — Advanced synthetic methods in organic and inorganic laboratory chemistry. Prerequisites: 130 or 132, 131.

**CHEMISTRY 363**
151. Inorganic Chemistry I — Systematic introduction to theories of electronic structure, stereochemistry, and symmetry properties of inorganic and organometallic molecules. Topics: ionic and covalent interactions, electron-deficient bonding, and elementary ligand field and molecular orbital theories. Emphasis on the chemistry of the metallic elements. Prerequisites: 35, 171.

*3 units, Win (Hodgson) MW 1:15-2:30

153. Inorganic Chemistry II — Systematic presentation of the theoretical aspects of inorganic chemistry. Group theory; many electron atomic theory; molecular orbital theory, emphasizing general concepts and group theory; ligand field theory; application of physical methods to predict the geometry, magnetism, and electronic spectra of transition metal complexes; and theoretical aspects of electron transfer reactions. Prerequisites: 151, 173.

*3 units, Spr (Solomon) MW 1:15-2:30

171. Physical Chemistry — Chemical thermodynamics; fundamental principles, Gibb's equations, equilibrium conditions, phase rule, systematic deduction of equations, gases, solutions. Prerequisites: 35; Math. 19, 20, 21 (or equivalent); Physics 41, 43, 45, 46; and previous or concurrent registration in Physics 47.

*3 units, Aut (McConnell) MWF 11

173. Physical Chemistry — Introduction to quantum chemistry: basic principles of wave mechanics, the harmonic oscillator, the rigid rotator, infrared and microwave spectroscopy, the hydrogen atom, atomic structure, molecular structure, valence theory.

*3 units, Win (Fayer) MWF 11

*174. Physical Chemistry Laboratory — Lectures/lab introduce electronics, electrochemistry, optics, rotation-vibration spectroscopy, and electronic spectroscopy. Lectures, lab tours on experimental techniques used in research projects at Stanford. Prerequisites: 171, previous or concurrent enrollment in 173.

4 units, Win (Chidsey) TTh 10-11:15
lab M, T, W, Th or F 2:35-5:25


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

*176. Physical Chemistry Laboratory — Use of chemical instrumentation to study fundamental areas of physical chemical time-dependent processes. Experiments include gas-phase kinetics, fluorimetry, and nuclear magnetic resonance spectroscopy. Prerequisites: 173, 174, previous or concurrent enrollment in 175.

*3 units, Spr (Boxer) TTh 9
lab T or W 1:15-4:05

GRADUATE

Undergraduates may register for chemistry courses numbered above 200 only if admitted to the honors program or if special permission has been granted by the instructor.


*3 units, Aut (Griffin) TTh 9-10:30

223. Advanced Organic Chemistry — Continuation of 221 with emphasis on physical methods. Prerequisite: 221 or consent of instructor.

*3 units, Win (Trost) WF 2:15-3:45

225. Advanced Organic Chemistry — Continuation of 223. Organic reactions, new synthetic methods, conformational analysis, and exercises in the syntheses of complex molecules. Prerequisite: 223 or consent of instructor.

*3 units, Spr (Wender) TTh 9-11

227. Selected Topics in Organic Chemistry — May be repeated for credit. Possible topics: synthetic organic chemistry, photochemistry, inorganic-organic chemistry, bio-organic chemistry, reaction mechanisms, stereochemistry, structural chemistry of organic and biological molecules.

*3 units, Aut (Draeckhammer) MWF 8:30-9:50

229. Organic Chemistry Seminar — Attendance required of all graduate students majoring in organic chemistry.

1 unit, Aut, Win, Spr (Brauman) W 4

233. Creativity in Organic Chemistry — Required of all second- and third-year Ph.D. candidates in organic chemistry. The art of formulating, writing, and orally defending a research progress report is practiced and criticized, with the student using his own research as a vehicle.

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

237. Introduction to Biotechnology — (Same as Biochemistry 237, Biology 237, Biophysics 237, Chemical Engineering 237, Civil Engineering 237, Developmental Biology 237, Structural Biology 237.) Faculty from the Departments of Biochemistry, Biological Sciences, Chemical Engineering, Chemistry, Civil Engineering, Developmental Biology, Structural Biology, and invited industrial speakers review the interrelated elements of modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene
expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering.

3-5 units, Spr (Robertson) TTh 2:15-3:30
F 3:15-4:30

251. Selected Topics in Advanced Inorganic Chemistry — May be repeated for credit. Prerequisites: one year of physical chemistry, consent of instructor.

3 units (Staff) not given 1995-96

253. Advanced Physical Inorganic Chemistry — Electronic structure and physical properties of transition metal complexes. Ligand field and molecular orbital theories, magnetism and magnetic susceptibility, electron paramagnetic resonance (including hyperfine interactions and zero field splitting) and electronic absorption spectroscopy (including vibrational interactions). Prerequisite: 153 or the equivalent.

3 units, Win (Solomon) TTh 9-11


3 units, not given 1995-96

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 critiqued.

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

259. Inorganic Chemistry Seminar — Attendance required of all graduate students majoring in inorganic chemistry.

1 unit, Aut, Win, Spr (Staff) T 4

271. Advanced Physical Chemistry — Principles of quantum mechanics. General formulation, mathematical methods, and elementary applications of quantum theory to the structure of atoms and molecules, including variational procedures, perturbation theory, operator and matrix methods, theory of angular momentum, and elements of the electronic structure of atoms. Prerequisite: 175.

3 units, Aut (Fayer) TTh 11-12:15

273. Advanced Physical Chemistry — Topics in advanced quantum mechanics: vibrations and rotations of polyatomic molecules (normal modes, anharmonicity, wavefunctions and energy levels of rigid rotations, vibration-rotation interaction), ab initio electronic structure theory (Hartree-Fock, configuration interaction, multiconfiguration self-consistent-field, and many-body perturbation theory techniques), angular momentum theory (operators and wavefunctions, Clebsch-Gordan coefficients, rotation matrices), time-dependent quantum mechanics (time evolution operator, Feynman path integrals, scattering theory, Born approximation, Lipmann-Schwinger equation, correlation functions), interaction of radiation and matter (semiclassical and quantum theories of radiation, transition probabilities, selection rules). Prerequisite: 271 or Physics 230.

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

275. Advanced Physical Chemistry — Basic principles and methods of statistical mechanics from the ensemble point of view, statistical thermodynamics, heat capacities of solids and polyatomic gases, chemical equilibria, equations of state of fluids, phase transitions. Prerequisite: 271.

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

277. Selected Topics in Physical Chemistry — Possible topics: structure elucidation using diffraction techniques, advanced statistical mechanics, crystal field theory, advanced quantum mechanics, magnetic relaxation, advanced thermodynamics, chemical applications of group theory. May be repeated for credit. Prerequisite: 275 or consent of instructor.

3 units (Staff)

279. Physical Chemistry Seminar — Required of all graduate students majoring in physical chemistry.

1 unit, Aut, Win, Spr (Staff) M 4

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 (Staff) not given 1995-96

289. Biophysical Chemistry — Experimental methods in biophysics. Emphasis on spectroscopic techniques including magnetic resonance and optical methods. Prerequisite: 287.

3 units (Staff) not given 1995-96

291. Biophysical Chemistry — Special topics in biophysical chemistry. Prerequisites: previous or concurrent registration in 171 and 173, or the equivalent.

3 units, Win (McConnell) TTh 1:15-2:30
293. Structural Inorganic Chemistry — Structural biophysical chemistry, x-ray crystallography, and related techniques as used in biophysical research. Electron and optical microscopy and neutron diffraction. Prerequisite: 291 or consent of instructor. 3 units (Staff) not given 1995-96

297. Biophysical Chemistry — (Same as 253.) Physical-inorganic and bio-inorganic chemistry for inorganic chemists. Introduction to metalloenzymes as unique inorganic complexes. Ligand field theory and its applications to spectroscopic and magnetic techniques. Metalloenzymes containing copper, iron, and molybdenum active sites. Background in biochemistry not necessary. Group theory and a basic understanding of quantum mechanics and molecular orbital theory is assumed. 3 units, Win (Solomon) TTh 9-11

299. Teaching of Chemistry — Required of all teaching assistants in chemistry. Techniques of teaching chemistry by means of lectures and labs. 1-3 units, Aut, Win, Spr (Staff) by arrangement

300. Department Colloquium — Required of all graduate students. 1 unit, Aut, Win, Spr (Staff) Th 4

301. Research in Chemistry — Required of all graduate students who have passed the qualifying examination. Open to qualified graduate students with the consent of the major professor. Research seminars and directed reading dealing with newly developing areas in chemistry and experimental techniques. May be repeated for credit. Students register giving section number of staff member and number of units agreed upon. 2 units, Aut, Win Spr (Staff) by arrangement

CHICANO/A FELLOWS PROGRAM

UNDERGRADUATE STUDIES ON MEXICAN SOCIETY AND CULTURE IN THE UNITED STATES

Director: Yvonne Bejarano, Associate Professor of Spanish and Portuguese
Visiting Associate Professor: Maria Ochoa
Teaching Fellows: Martin Valdez, Jaqueline Olvera

Recognition of the growing social importance and size of the population in the United States with Mexican origins has led many leading American universities to establish Chicano studies programs. By sponsoring the Chicano/a Fellows Program, the School of Humanities and Sciences at Stanford has affirmed the educational necessity of providing academic opportunities for undergraduates to learn about Mexican society and culture in the United States.

Since its inception, the Chicano/a Fellows Program has had a dual purpose: to offer courses on the Mexican experience in this country and to provide a teaching-mentorship opportunity to advanced Stanford graduate students. The program also offers courses designed especially for undergraduates, which are taught by visiting faculty and graduate fellows in various disciplines. These offerings are often innovative and experimental; they are usually given as seminars rather than as lecture courses.

A visiting scholar has been appointed to teach two courses of special interest to students wishing to develop a scholarly understanding of the nation’s second largest ethnic group, an ethnic group that by the year 2030 is expected to become the largest in California.

The program’s annual offerings supplement and complement a small selection of outstanding courses on diverse aspects of Mexican society and culture in the United States, taught by regular members of the Stanford faculty.

COURSES

The 1995-96 Chicano/a Fellows Courses pamphlet may be obtained from the Program Administrator, Chicano/a Fellows Program, Bldg. 590, room L (El Centro); telephone 415-723-3091.

110. Introduction to Chicano Life and Culture — (Same as Spanish 180.) Exploration of the interdisciplinary nature of Chicana/o Studies. Lectures by professors and graduate students from a variety of departments (humanities, social science, and law) highlight the underlying assumptions and questions that inform research in their disciplines, share their own research relevant to Chicana/o Studies (narrowly and broadly conceived), and draw connec-
CHILDREN AND SOCIETY CURRICULUM

Affiliated Faculty: Sanford M. Dornbusch, Director (Sociology, Human Biology, Education, emeritus); Christina Johannes, Assistant Director; John Baugh (Education), Gary S. Becker (Hoover Institution), David W. Brady (Political Science, Hoover Institution), Robert C. Calfee (Education) Elizabeth G. Cohen, (Education, Sociology), Harvey J. Cohen (Pediatrics), Phyllis Dennery, (Pediatrics), Alain Enthoven (Graduate School of Business), S. Shirley Feldman (Psychiatry, Human Biology), Shirley B. Heath (English, Linguistics), Donald Kennedy (Biological Sciences), Michael W. Kirst (Education), Paul R. Krugman (Economics), Eleanor E. Maccoby (Psychology, emerita), Ellen Markman (Psychology), Milbrey W. McLaughlin (Education), Joseph D. McNamara (Hoover Institution), Roger G. Noll (Economics, Public Policy), Amado M. Padilla (Education), Donald F. Roberts (Communication), Timothy K. Stanton (Haas Center for Public Service, Public Policy), Claude M. Steele (Psychology), James Stayer (Education), David B. Tyack (Education, History), Michael S. Wald (School of Law), Arthur P. Wolf (Anthropology)

The Children and Society Curriculum exists under the auspices of the Department of Sociology.

The School of Education collaborates with the curriculum on behalf of those undergraduates who wish to build into their studies a concentration on education and children. Students with a concentration in education are encouraged to take Education 144X to fulfill the curriculum’s research requirement.
UNDERGRADUATE STUDY

The curriculum on Children and Society focuses on the study of children and society from diverse points of view including biological, cross-cultural, developmental, economic, historical, and legal perspectives. Emphasis is on public policy, and the curriculum is intended to serve students who plan to pursue careers in law, government, education, medicine, social sciences, and social services. The curriculum includes research and field experiences with organizations that serve children and youth and form public policy. The goal is to sensitize students to the problems of children in today’s society. Issues are addressed on various levels, from the family to the nation.

The curriculum on Children and Society does not in itself constitute a major. Students major in another department or program such as American Studies, Anthropology, Economics, Human Biology, Political Science, Psychology, Public Policy, or Sociology. Students who fulfill the Children and Society curriculum’s requirements receive a certificate, authorized by the academic senate, upon graduation. These requirements are:

1. Sociology 155
2. One of seven policy courses: Economics 150; Education 105 or 141; Political Science 101P or 187; or Public Policy 50 or 182
3. A research experience to be met in one of five ways:
   a) A data interpretation and evaluation course: Education 144X
   b) Individual research work supervised by a faculty member
   c) An honors thesis
   d) A group research project
   e) Community service work with children, youth, or families, followed by a methodical, supervised evaluation of the quality of the outreach experience and the utility of the activity
4. A policy-related internship

Interested students should contact the curriculum at 415-725-2521.

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 Assistant Director, Curriculum on Children and Society.

COURSES

ECONOMICS

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 policy-making, and the relationship of income distribution issues to policy choice. How economic analysis is done, and why the political process regards it as useful but not as necessarily determinative of policy choices. Readings: the theoretical foundations of economic policy analysis and policy decisions, and the analysis of the adoption and implementation of programs in a variety of policy areas. Writing Focus course. Prerequisites: Economics 51, 52 (52 may be taken concurrently).

5 units, Win (Cogan)

EDUCATION

105. American Education and Public Policy — (Same as History 158B.) Treats policy issues in education, drawing on history and political science. Who influences schooling and how? How have American schools responded to human diversity? What consequences do schooling have? What are the prospects for reform in public education? Lectures and small group discussions.

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

and by arrangement

141. Children, Civil Rights, and Public Policy in the U.S. — Overview of the critical issues and policies that impact children and civil rights in our society. Lectures, readings, and discussions on challenges facing America in the 1990s. National policy and legal concerns pertaining to children and civil rights in a historical and practical perspective. The people and institutions that play central roles in the policy making and judicial process.

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

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

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

220B. Introduction to the Politics of Educational Analysis — The relationships between political analysis and policy formulation in education; focus is on alternative models of the political process, the nature of interest groups, political strategies, community power, the external environment of organizations, and the implementations of policy. Applications to policy analysis, implementation, and policies of reform emphasized. Prerequisite: Political Science or Public Policy major.

4 units, Win (Kirst) MW 8:30-10:30
POLITICAL SCIENCE

101P. Politics and Public Policy — (Same as Public Policy 101.) The domestic policy-making process, emphasizing how elected officials, bureaucrats, and interest groups shape government policies in various areas including tax, environmental, and social-welfare policy, given their goals and available tactics. How public policies are formulated and implemented. The results of this process using equity and efficiency criteria.
5 units, Spr (Heller)

PUBLIC POLICY

50. Current Trends in Policy Making — Guest speakers address current policy issues (the environment, health care, education, and the budget). Discussions about these policies, stressing interactive learning that puts the students in the positions of the policy makers.
3 units, Spr (Cogan)

182. Policy Making and Problem-Solving at the Local and Regional Level — Public policy issues, processes, and organizations at the local and regional level. Focus: public and non-profit sector institutions and organizations; structure and context of community problem-solving and local policy formulation, implementation, and analysis. Case study investigation of public issues in the community, e.g., homelessness, toxic waste disposal, child care, land use planning. Opportunity to learn from local policy makers and community leaders.
4 units (Stanton) given 1996-97

SOCIOLOGY

5 units, Win (Wald) TTh 9-10:50

COMMUNICATION

170. Communication and Children (Roberts) given 1996-97

ECONOMICS

118. Economics of Development (Kocher)
147. Economics of Human Resources (Royalty)
148. Urban Economics (Nechyba)
156. Economics of Health and Medical Care (McClellan)

EDUCATION

179X. Urban Youth and Their Institutions: Research and Practice (McLaughlin)
201. History of Education in the United States — (Same as History 158.) (Tyack)
210. Problems in Sociology of Education — (Same as Sociology 232/330.) (Cohen)
220A. The Social Sciences and Educational Analysis: Introduction to the Economics of Education (Levin)
221. Issues in Policy Analysis (McLaughlin)
239. Contemporary Social Issues in Child and Adolescent Development (Padilla)

HUMAN BIOLOGY

3B. The Human Life Cycle (Feldman, Kaichadourian)

PSYCHOLOGY

111. Developmental Psychology (Flavell)
115. Social Development (M. Lepper)
120. Cognitive Development (Markman)
130. Development in Infancy (A. Fernald)

SOCIETY

130. Education and Society (Meyer)
CLASSICS

Emeriti: (Professors) Mark W. Edwards, Michael H. Jameson, Antony E. Raubitschek
Chair: Susan A. Stephens
Professors: Andrew M. Devine, Wilbur Knorr (Classics, Philosophy, and History and Philosophy of Science), Marsh H. McCall, Jr., Ian Morris (Classics and History), Susan A. Stephens, Susan Treggiari (Classics and, by courtesy, History, on leave)
Associate Professors: Jody Maxmin (Art History and Classics), Michael Wigodsky (on leave Spring)
Assistant Professors: W. Martin Bloomer, Andrea Wilson Nightingale (on leave Winter, Spring)
Professor (Teaching): Robert C. Gregg (Religious Studies)
Courtesy Professors: George Brown (English), C. Julius Moravcsik (Philosophy), Valentin Y. Mudimbe (French and Comparative Literature)
Courtesy Associate Professor: Maurice Rehm (Drama)
Lecturers: Maud Gleason, Benjamin Hughes, Patrick Hunt, Peter A. Hunt, Steven Johnstone, Lisa Maurizio
Visiting Associate Professors: Karen Bassi (Spring), James Porter (Winter)
Undergraduate Director: Andrea Nightingale

UNDERGRADUATE PROGRAMS

The Department of Classics offers courses on all aspects of Greek and Roman culture: language, literature, history, art and archaeology, philosophy, and cultural studies. The department offers four majors in Classics (Classical Studies, Greek, Latin, and Greek and Latin) which vary in the number of language courses they require; each of these majors can be completed in conjunction with a second major in the sciences or in other humanities departments.

The major in Classics affords an opportunity to develop a competence in the classical languages; an appreciation, comprehension, and enjoyment of classical literature; and an understanding of the history and culture of the ancient world. The department is interested in students who wish to do their major work in Classics and in students who wish to relate work in Classics to work in other departments.

BACHELOR OF ARTS

Prospective majors in Classical Studies, Greek, and Latin (options 1, 2, and 3) are encouraged to declare at the beginning of the junior year but are urged to discuss their plans with the Undergraduate Director as early as possible. Students who choose to major in Greek and Latin (option 4) should begin the curriculum as soon as possible, since it is difficult to complete the language requirements without an early start; those with no previous knowledge of Latin or Greek should begin study in the freshman year or as early as possible in the sophomore year.

To declare the major, a student must fill out the Declaration of Major form in the Registrar’s Office and meet with the Undergraduate Director in the Department of Classics. At that time, the Undergraduate Director assigns each student a department adviser who helps to prepare a program of study; students should meet with their advisers at least once a quarter. Each student’s progress towards fulfillment of the major requirements is recorded in a file kept in the main office. It is the student’s responsibility to work with his or her adviser in keeping this file up to date.

The A.B. degree may be earned by fulfilling the requirements for one of the four following majors:

1. Classical Studies: at least 55 units, including at least two courses in Latin or Greek at the 100 level or higher or one course in one of the languages at the 100 level or higher plus the 1, 2, 3 or 51, 52 series in the other language (or an equivalent approved by the department).

In addition, students are required to take the Majors Seminar (176) and at least one course in each of the following five groups: ancient history, art and archaeology, literature in translation, philosophy, religion and mythology. Students are also encouraged to do some of the course of study in Greece or Rome (programs and funding are described below).

This major is recommended for students who wish to study the classical civilizations in depth but do not wish to study the languages to the extent required by options 2, 3, and 4. It is not suitable for students who wish to do graduate work in Classics or to teach Latin or Greek in high school, as the language work is insufficient for these purposes.

2. Greek: at least 55 units, including a minimum of 31 units in Greek courses at the 100 level or higher (it is recommended that one of these courses be Greek 175A, although this course should not be attempted until students have completed three years of Greek). In addition to courses in Greek, students are required to take the Majors Seminar (176) and at least one course in each of the following three groups: history/archaeology, literature in translation, and religion/philosophy. The introductory sequence (1, 2, 3) or 51, 52 or one 100-level course in Latin is recommended. Beginning courses in Greek, if required, may be counted towards the total of 55 units. Relevant courses in other departments of the humanities may count towards the major with the consent of
the Undergraduate Director. Students are strongly encouraged to do some course of study in Greece (programs and funding are described below).

3. **Latin:** at least 55 units, including a minimum of 31 units in Latin courses at the 100 level or higher (it is recommended that one of these courses be Latin 175A, although this course should not be attempted until students have completed three years of Latin). In addition to courses in Latin, students are required to take the Majors Seminar (Classics 176) and at least one course in each of the following three groups: history/archaeology, literature in translation, and philosophy/religion. The introductory sequence (1, 2, 3 or 51, 52) or one 100-level course in Greek is recommended. Beginning courses in Latin, if required, may be counted towards the total of 55 units. Relevant courses in other departments of the humanities may count towards the major with the consent of the Undergraduate Director. Students are strongly encouraged to do some of the course of study in Rome (programs and funding are described below).

4. **Greek and Latin:** at least 60 units, including 27 units in Greek courses and the same number in Latin. It is recommended that students take Greek 175A or Latin 175A (or both), although these courses should not be attempted until students have completed three years of the respective language. All students are required to take the Majors Seminar (Classics 176); it is strongly recommended that students take a course in ancient history. Relevant courses in other departments of the humanities may count towards the major with the consent of the Undergraduate Director. Students are also encouraged to do some of the course of study in Greece or Rome (programs and funding are described below).

**Note 1** — University credit earned by placement tests or advanced placement work in secondary school is not counted towards any major program in the department; work done in other universities or colleges is subject to department evaluation.

**Note 2** — A letter grade is required in all courses taken for the major. No course receiving a letter grade indicator (LGI) lower than 'C' is counted toward fulfilling major requirements.

**HONORS PROGRAMS**

A minimum LGI of 'B+' in Classics courses is required for students to enroll in the honors program. To be considered for honors in Classics, the student must select a professor who can supervise his or her honors thesis. Together with the supervisor, the student writes a two- to three-page proposal at the beginning of the senior year. The proposal should outline the project in detail, list relevant courses that have been taken, and name the supervisor. The department gives approval only if it is satisfied that the student has a sufficient basis of knowledge derived from department course work in the general areas the thesis will cover (that is, course work in art, Greek and/or Latin language, history, literature, philosophy, and so on). If the proposal is approved, the student may sign up for Classical Studies 199 during one or two quarters of the senior year for a maximum of 6 units a term, up to an overall total of 10 units. Honors are awarded only if the essay receives an LGI of 'B+' or higher from the supervisor and a second reader.

**HUMANITIES**

For majors in Classics with appropriate interests, the honors program in Humanities is available, a description of which is found under the "Humanities Special Programs" section of this bulletin.

**OVERSEAS STUDIES**

**Funding** — Students whose record in Classics indicates that they are fully qualified for a given program may apply for funding from the Department of Classics. Students must submit a proposal to the Undergraduate Adviser, which should include an itemized list of expenses based on the fees charged by the program (that is, room, board, tuition, and other expenses). Limited funding is available each year; preference is shown to students with strong records.

**Programs**

1. **Rome:** Classics majors are encouraged to apply for the Intercollegiate Center for Classical Studies (ICCS) in Rome. The center is managed by Stanford University for about 50 constituent colleges and universities. It is open to Stanford majors in Classics, History, and Art History. All courses receive full credit at Stanford and may be applied to the respective major. Students interested in this program should consult the Undergraduate Director and the ICCS representative in the Department of Classics as early as possible in their career at Stanford to plan their course preparation and application. Applicants should note that competition is strong and that they are expected to have taken one or more courses in Roman history and at least two years of Latin before they arrive in Rome. Brochures are available at the department office.

Other programs offer a quarter, semester, or summer session in Rome. Interested students are urged to visit Bechtel International Center.

2. **Greece:** students are encouraged to apply for the summer session at the American School...
of Classical Studies in Athens. The school is recommended principally for Classics majors with at least two years of ancient Greek. Students wishing to apply should prepare themselves by taking courses in Greek history, archaeology, and art; Beginning Modern Greek is strongly recommended. Applicants should see the Undergraduate Director early in the academic year. Other programs offer a quarter, semester, or summer session in Greece. Interested students are urged to visit Bechtel International Center.

**GRADUATE PROGRAMS**

**MASTER OF ARTS**

Students who have completed an undergraduate major in Classics (Greek and/or Latin) or its equivalent may be accepted as candidates for the A.M. degree in Classics or A.M. in Classics in the field of Greek or Latin, and may expect to complete the program in twelve months (usually three quarters of course work plus three months study for the thesis or examination). Students without an undergraduate major in Classics may also be accepted as candidates, though they may require a longer period of study before completing the requirements for the degree. These requirements are:

1. Attaining a standard of scholarship such as would normally be reached by three quarters of study in the department after fulfilling the requirements for an undergraduate major in the department. Normally, this means completing at least 18 units of graduate courses and 18 units of work at the 140 level or above.
2. Satisfactory completion of one Greek course at the 100 level (if the undergraduate major has been Latin) or one Latin course at the 100 level (if the undergraduate major has been Greek).
3. Passing an examination testing the candidate's ability to translate into English from a selected list of Greek and/or Latin authors.
4. Satisfactory completion of the 175A,B sequence in at least one language (Latin or Greek).
5. Writing a thesis or passing an examination on a particular author or topic, or submitting written work accepted by the graduate committee as an equivalent.
6. Reading knowledge of French or German.

Candidates for the Ph.D. degree may also (on the recommendation of the department) become candidates for the A.M. degree. In their case, requirement 5 above is waived provided that they have completed some work beyond the course requirements listed under requirements 1 and 2 above.

**DOCTOR OF PHILOSOPHY**

University requirements for the Ph.D. are discussed in the “Graduate Degrees” section of this bulletin.

All candidates for the Ph.D. degree in Classics must fulfill the following requirements:

1. Completing at least three years (nine quarters) of full-time work, or equivalent, in study beyond the bachelor's degree. This must include the 175-205 sequence and the 202-203 sequence (unless the student is exempted by examination) and normally at least twelve graduate seminars acceptable to the department, in addition to the doctoral dissertation. At least three consecutive quarters of graduate work and the final units of credit in the program must be taken at Stanford. More detailed information on the Ph.D. program is available in brochure form in the Department of Classics office.

2. Candidates are required to pass examinations as follows:
   a) Reading examinations in French and German. In some circumstances Italian may be substituted for French. Students should plan to satisfy this requirement as soon as possible, normally no later than the end of the second year.
   b) Translation examinations into English from a prepared set of Greek and Latin authors and at sight. These examinations must be taken at the end of the first year and at the end of the second year as part of the requirement for the 202-203 sequence.
   c) General examinations in four of the following fields: Greek literature, Latin literature, ancient philosophy, Greek history, Roman history. At least one field must be historical and another must be literary. Students select the fields in consultation with the Graduate Director no later than June of the second year of graduate study. Three of the fields are tested by written examination combined with a supplemental general oral examination. General examinations must be taken in October of the third year.
   d) The University oral examination on the candidate’s dissertation.

The examinations in translation from Greek and Latin authors must be taken at the end of the first and at the end of the second year of graduate work, the general written and oral examinations in October of the third year, and the University oral examination at the end of the dissertation. In preparing for the general examinations, candidates are expected to make full use of relevant secondary material in modern languages. They should therefore plan to satisfy the requirements in French and German as soon as possible, preferably before
the translation examinations. Except in very special circumstances, candidates may not take the general examinations until the modern language requirements have been completed.

3. Each candidate, after passing the general examination, selects a dissertation director who must be a member of the Academic Council. In consultation with the dissertation director, the candidate prepares a statement of the dissertation topic to be submitted for approval by the Graduate Committee. When the statement of the dissertation topic has been approved, the candidate, the dissertation director, and the Graduate Committee collaborate to select an appropriate dissertation committee.

4. All students are required to undertake the equivalent of four one-quarter courses of teaching under department supervision. This teaching requirement must be completed during the second and third years of study.

Ph.D. MINOR

For a graduate minor, the department recommends at least 20 units in Latin or Greek at the 100 level or above, and at least one course at the graduate (200) level.

CLASSICS AND A MINOR FIELD

The Ph.D. in Classics may be combined with a minor in another field, such as anthropology, history, humanities (see below), classical linguistics (see below), or philosophy. Requirements for the minor field vary, but might be expected to involve about six graduate-level courses in the field and one written examination, plus a portion of the University oral exam. Such a program is expected to take five years. The department encourages such programs for especially able and well-prepared students and is normally able to offer one fellowship each year to support a student in the fifth year of a combined program. The following timetable would be typical for a five-year program:

First Year — Course work, almost entirely in Classics. One translation exam taken in June. One or both modern language exams taken.
Second Year — Course work, both in Classics and the minor field. Second translation exam completed. French and German exams completed.
Third Year — Course work, both in Classics and the minor field. General examinations in Classics.
Fourth Year — Remaining course work, both in Classics and the minor field. General examination in the minor field. Preparation for dissertation.

GRADUATE PROGRAM IN HUMANITIES

The Department of Classics participates in the Graduate Program in Humanities leading to the joint Ph.D. degree in Classics and Humanities. For a description of that program see the “Humanities Special Programs” section of this bulletin.

COMPARATIVE LITERATURE

The Department of Classics cooperates closely with the graduate program in the Department of Comparative Literature. Interested students should consult the chair of the department.

COURSES

GREEK

INTRODUCTORY

Those who have not studied Greek begin with Greek 1. The series 1, 2, 3 begins in Autumn Quarter (5 units a quarter). The combined Greek 51/52 course is offered Spring Quarter (five weeks Latin, five weeks Greek for 10 units, two hours a day) and covers the same ground as 1, 2, 3 at a more rapid pace.

The intensive Greek course (Greek 10) offered in the Summer Quarter also prepares students to enter Greek 101 in Autumn Quarter.

The series 101, 102, 103 forms a sequel to Greek 3 and 10. These second-year courses all form part of a series, but qualified students may join the class in Winter or Spring Quarters with the consent of the instructor.

Students whose major work is in another department and who wish to fulfill a departmental foreign language requirement by taking Greek should consult their department advisers to determine the precise nature of that department’s requirements. Most departments are satisfied if part of the series 101, 102, 103 is completed.

All language courses at the 111 level and higher require a term paper.

Courses in Greek all have department prefix 373.

1. First-Year Greek — For beginners.
   5 units, Aut (Chapman) MWF 9
2. First-Year Greek — Continuation of 1.
   5 units, Win (Maurizio) MWF 9
3. First-Year Greek — Continuation of 2.
   5 units, Spr (Vasunia) MWF 9
10. Intensive First-Year Greek — Intensive beginning Greek equivalent to 1, 2, 3. The goal is the reading of easy classical or New Testament Greek by the end of the Summer Quarter. Short readings in philosophical Greek are included.
   8-9 units, Sum (Staff) MTWThF
INTERMEDIATE/ADVANCED

Students are admitted to these courses by completing Greek 3 and 10, or on the basis of previous work done in secondary school or elsewhere. Usually two to three years of secondary school Greek qualifies a student for 101, three to four years for 111. Students with previous knowledge of Greek should consult the Undergraduate Director in Classics to determine the course for which they are best suited. Students who have completed Greek 111 may sign up for one of the Reading Tutorials offered in conjunction with lecture courses in Greek literature, philosophy and history (listed below under “Courses in Translation”). Students who have completed three years of Greek may take graduate-level courses, beginning with Greek 175 and 202 or 203.

51/52. Accelerated First Year Greek
10 units, Spr (McLaren) MTWThF

101. Second-Year Greek — Plato, one short dialogue and selections.
5 units, Aut (Stephens) MWF

102. Second-Year Greek — Greek Tragedy, one play.
5 units, Win (Clayton) MWF

103. Second-Year Greek — Homer, selected books from the Odyssey.
5 units, Spr (Staff) MWF

111. Greek Prose
5 units, Aut (Stephens) by arrangement

175A,B. Greek Style and Syntax — For undergraduates who have taken a minimum of three years of Greek and for first-year graduate students. The nuances of Greek syntax and style, stylistic analysis of selected prose authors, techniques of sight-translation, and the writing of idiomatic Greek prose.
2 units, Win (Hughes) TTh (five weeks)
4 units, Spr (Hughes) TTh

370. Advanced Greek Prose or Verse Composition
1-15 units (Stephens) by arrangement

UNDERGRADUATE AND GRADUATE

Note — See undergraduate/graduate Latin.

LATIN

INTRODUCTORY

Those who have not studied Latin may begin with either Latin 1 or 51. The series 1, 2, 3 begins in Autumn Quarter (5 units a quarter); the series 51, 52 begins in Winter Quarter (6 units a quarter) and is designed to cover the same ground as 1, 2, 3, at a more rapid pace.

The intensive Latin course (Latin 10) offered in the Summer Quarter also prepares students to enter Latin 101 in Autumn Quarter.

The series 101, 102, 103 forms a sequel to Latin 3, 10, and 52. These second-year courses all form part of a series, but qualified students may join the class in Winter or Spring Quarters with the consent of the instructor.

Students whose major work is in another department and who wish to fulfill a departmental foreign language requirement by taking Latin should consult their department’s advisers to determine the precise nature of those requirements. Most departments are satisfied if part of the series 101, 102, 103 is completed.

Courses in Latin have department prefix 375.

1. First-Year Latin — For beginners.
5 units, Aut (Hirt) MWF

2. First-Year Latin — Continuation of 1.
5 units, Win (Roman) MWF

3. First-Year Latin — Continuation of 2.
5 units, Spr (Hunt) MWF

10. Intensive First-Year Latin — Intensive beginning Latin equivalent to 1, 2, 3, or 51, 52. The goal is the reading of easy Latin prose and poetry by the end of Summer Quarter.
8-9 units, Sum (Staff) MTWThF

51. First-Year Latin — Accelerated.
6 units, Win (Devine) MTWThF

52. First-Year Latin — Accelerated; continuation of 51.
6 units, Spr (Devine) MTWThF

INTERMEDIATE/ADVANCED

Students are admitted to these courses by completing Latin 3, 10, or 52 or on the basis of previous work done in secondary school or elsewhere. Usually two to three years of secondary school Latin qualifies a student for 101, three to four years for 111. Students with previous knowledge of Latin should consult the Undergraduate Director in Classics to determine the course for which they are best suited. Students who have completed Latin 111 may sign up for one of the Reading Tutorials offered in conjunction with lecture courses in Latin literature, philosophy, and history (listed below, under “Courses in Translation”). Students who have completed three years of Greek may take graduate-level courses, beginning with Latin 175.

5 units, Aut (Bloomer) MWF

5 units, Win (Jervis) MWF

103. Second-Year Latin — Selections from Vergil, Aeneid, selected books.
5 units, Spr (Reay) MWF

111. Latin Poetry: Gender and Genre
4 units, Aut (Maurizio)
175A,B. Latin Style and Syntax — Designed for undergraduates who have taken a minimum of three years of Latin and for first-year graduate students. The nuances of Latin syntax and style. Stylistic analysis of selected prose authors, the techniques of sight-translation, and the writing of idiomatic Latin prose.
   4 units, Aut (Devine)
   2 units, Win (Devine) (five weeks)

370. Advanced Latin Prose or Verse Composition
   1-15 units (Bloomer) by arrangement

UNDERGRADUATE AND GRADUATE
These courses have department prefix 378.

202-203A,B,C. Survey of Greek and Latin Literature — Required two-year sequence focusing on the origins, development, and interaction of Greek and Latin literature, history, and philosophy. Greek and Latin material is in roughly equal proportions, poetry as well as prose; organization is generic. Non-Classics majors may take one or more quarters without the language component.
   202A. Epic
   4-5 units, given 1996-97
   202B. Philosophy and Rhetoric
   4-5 units, given 1996-97
   202C. Greek Tragedy
   4-5 units, given 1996-97
   203A. History
   4-5 units, Aut (Johnstone)
   203B. Didactic and Satire
   4-5 units, Win (Edwards, Wigodsky)
   203C. Lyric and Bucolic
   4-5 units, Spr (Edwards, Bloomer)

205A,B. The Semantics of Grammar — Supplements Latin and Greek 175, providing an introduction to the grammatical encoding of semantic and informational meaning. Topics: case, gender, tense, aspect, mood, voice, topic, focus. Provides a theoretical background for teachers of beginning Latin and Greek and for the analysis of literary and non-literary texts.
   2 units, Aut (Devine)
   1 unit, Win (Devine)

Some of the above courses may be continued the following quarter by arrangement with the instructor. This usually requires the writing of an extended research paper based on work directly related to the course.

COURSES IN TRANSLATION
GENERAL
These courses have department prefix 378.

11. The Concept of the Hero — DR:7(2)
   3-5 units, not given 1995-96

11A. Reading Tutorial in Epic — In Greek or Latin.
   3-4 units

12. Greek Tragedy — DR:7(2)
   3-5 units, Win (McCall)

12A. Reading Tutorial in Tragedy — In Greek.
   3-4 units, Win (Staff)

18. Greek Mythology — DR:8(3)
   3-4 units, Spr (Maurizio)

18A. Reading Tutorial in Mythology — In Greek.
   3-4 units, Spr (Staff)

109. Two Gospels: Matthew and Thomas — Questions about the early collection and uses of the teachings of Jesus pursued through close reading of one canonical, one non-canonical Gospel. “Q” source of Jesus-sayings, and related topics.
   4-5 units, Spr (Gregg)

117. Greek Religion and Society: Sacred Violence and Sacred Bodies — Fundamental issues in ancient Greek religion, emphasizing the intersection of gender and violence in religious practices. How ancient concepts of gender informed religious rituals and determined how men and women participated in them. Why contact with the divine often necessitated violence, in honor of the gods (sacrifice) or as a result of contact with the divine (ecstasy); why men and women partook of this sacred violence in such different ways; why sacred bodies, offered to the gods on the altar, or as vehicles for divine possession, were usually imagined as female bodies. DR:9(5)
   3-4 units, Aut (Maurizio)

139. Medicine in Ancient Greece and Rome — Modern Western medical science traces its origins to classical Greece. Its founders viewed medicine as much a philosophy of nature as a practice of therapy. Themes of medical theory and practice through writings, particularly Hippocrates and Galen.
   3-4 units, Aut (Knorr)

165. Hellenistic Philosophy — Stoicism and Epicureanism as comprehensive systems of philosophy, attempting to base ethics on theories of nature. The skeptics attack of those attempts. Recommended: previous work in earlier Greek philosophy. DR:8(3)
   4 units, Aut (Wigodsky)

169. Greek Ethical Philosophy: Socrates, Plato, Aristotle — DR:7(2) or 8(3)
   3-4 units, given 1996-97

169A. Reading Tutorial in Philosophy — In Greek.
   3-4 units, Spr (Staff)

176. Majors Seminar: Interpreting Antiquity — Required for all Classics majors. Introduction to basic theoretical issues in classical literature, history, and philosophy. Evolution and coherence of the discipline of Classics, and the various ways in which antiquity was/is appropriated by post-classical cultures. Writing intensive course.
   3-5 units, Win (Johnstone)
201. Introduction to Classical Scholarship
1 unit, Aut (Wigodsky)

INDIVIDUAL STUDY

These courses have department prefix 378.

160. Directed Reading (Undergraduate)
1-15 units, any quarter (Staff)

199. Undergraduate Thesis
6-10 units, any quarter (Staff)

260. Directed Reading (Graduate)
1-15 units, any quarter (Staff)

360. Dissertation Research
1-15 units, any quarter (Staff)

CLASSICS/HISTORY

These courses have department prefix 371.

101. History of Greece — The social, political, economic, and cultural history of ancient Greece, from the fall of the Bronze Age palaces (c. 1200 B.C.) to the death of Alexander the Great (323 B.C.). Focuses on the class and gender structures of Athenian democracy, and on the struggles for power between the Greek city-states. Readings from original sources in translation. DR:9(5)
4-5 units, Aut (Morris) TTh

101 A. Reading Tutorial in History — In Greek.
3-4 units, Aut (Staff)

102. Greek and Roman History from Alexander to Caesar — The social, political, economic and cultural history of the ancient Mediterranean world, from the death of Alexander the Great (323 B.C.) to the fall of the Roman Republic (31 B.C.). Focuses on the Roman destruction of the kingdoms of the E. Mediterranean, and the effects of continuous war and mass slavery on Rome’s economy and society, culminating in the fall of the Republic. Readings from original sources in translation. DR:9(5)
4-5 units, Win (Morris) MWF

102A. Reading Tutorial in History — In Latin.
3-4 units, Win (Staff)

103. Roman History II: The Empire — The Roman Empire from the dictatorship of Julius Caesar and the Prinipe of Augustus through the consolidation of the system and the brink of its later crisis. Emphasis is on the achievement of Augustus in establishing a constitutional system, the Prinipe, which gave relative peace and security to the Roman world for 250 years; the subsequent history of the Julio-Claudian dynasty; the life and culture of the empire (Mediterranean lands and Europe) during the first two centuries A.D., and the enduring contribution of Rome to the cultures of western Europe and its successors (e.g., literature, architecture, law, the transmission of Greek and Judeo-Christian ideas and the acculturation of Romans to non-Romans and the non-transmission of Roman culture else-

where). Contemporary texts and archaeological data where possible. DR:9(5)
4-5 units, Spr (Gleason) MWF

103A. Reading Tutorial in History — In Latin.
3-4 units, Spr (Staff)

105. History and Culture of Egypt — Surveys Ancient Egyptian culture from the Pharaonic period to the Arab conquest, with its achievement and influence on other Mediterranean societies. The representation and misrepresentation of this ancient culture that prevailed in the West from time of the Renaissance. DR:2(*) or 9(5*)
3-4 units not given 1995-96

108A. Reading Tutorial in Late Antiquity — In Greek or Latin.
3-4 units, Aut (Staff)

114. History of Liberal Education from Greece to Renaissance — Significant and critical periods in the history of Western education, examining the processes of social and cultural transformation. Materials and sites of education and theoretical accounts, ancient and modern. The education of women, the role of slaves and slavery, corporal punishment, the teaching of literacy, the polemics of liberal vs. technical education, debates about curricular change.
3-4 units, Win (Bloomer)

121. Slavery Ancient and Modern — How and why slave labor becomes important in some societies; the relationships between slavery, serfdom, and free labor; the violent domination of slaves; slave resistance and rebellions; and the collapse of servile economies. Emphasis is on comparative approaches; case studies taken from ancient Greece and Rome and modern Africa and America. DR:9(5)
3-4 units, Spr (Morris)

CLASSICS, ART/ARCHAEOLOGY

Courses in Classical Art and Archaeology have department prefix 372.

14. Classical Athletics—DR:9(5)
not given 1995-96

20. Introduction to Classical Archaeology—DR:9(5)
4 units, Aut (Hunt)

100A. Archaic Greek Art
4 units, Aut (Maxmin) MWF 11-12:15

100B. Classical and Hellenistic Art—DR:7(2)
4 units, Win (Maxmin) MW

100C. Ancient Art III: Roman Art
4 units, Spr (Maxmin) MWF

120A. Undergraduate Colloquium: Greek Art—
(Same as Art 202A.)
4 units (Maxmin) not given 1995-96
HISTORY OF SCIENCE

The Department of Classics participates in the History and Philosophy of Science Program, described in that program's section of this bulletin.

Courses in History of Science have department prefix 378.

138A,B,C. Introduction to Cosmology — (Same as History and Philosophy of Science 138A,B,C; Philosophy 138A,B,C) Three-quarter sequence on the history of the exact sciences, emphasizing cosmology. Technical aspects of the classical theories (Ptolemaic and Copernican), including mathematics, astronomy, physics, and chemical theory, together with speculative aspects in natural philosophy and theology.

138A. Ancient Period — DR:8(3)
4 units, Aut (Knorr) MWF 2:15
138B. Cosmology: Middle Ages and Renaissance — DR:8(3)
4 units, Win (Knorr) MWF 2:15
138C. Modern Period: Newton to Einstein — DR:8(3)
4 units, Spr (Knorr) MWF 2:15

GRADUATE SEMINARS

Graduate seminars vary each year. The following are given this year.

ANCIENT HISTORY (371)

334A,B. Democratic Athens — For the last 200 years, Athenian history has been written primarily as a political narrative. Whether the demokratia of 507-322 B.C. makes more sense as a system of class, gender, and ethnic relations than as a constitutional order, and whether we should understand it as a cultural rather than as an institutional form. Focus is on recent historical writing and its treatment of the themes of equality, freedom, and manhood.

4-5 units, Aut, Win (Morris)

CLASSICS, GENERAL (378)

335. Jews, Pagans, and Christians in Late Antiquity — Seminar investigation of distinctive expressions of Judaism, Roman polytheism, and Christianity from 100-450, emphasizing interactions between the groups. Primary documents and new studies of late Roman religious-political competition and conflict.

4-5 units, Win (Morris)

411. Ancient Literary Criticism — Introduction to concepts in ancient literary criticism (language, expression, thought; form and matter; exegesis; morals), against the larger philosophical and aesthetic trends and issues (musical theory, philology, rhetoric, the visual arts) in their historical development, from Greece in the 5th century B.C. to Rome in the 1st century A.D.

4-5 units, Win (Porter)

GREEK (373)

408. Plato and Augustine — Seminar. Analysis of the Phaedrus, Timaeus, and Confessions as philosophical narratives. The collision and/or collusion of narrative and analytic discourse in each text, the construction of the "self" through narrative, the dramatization and conceptualization of time and memory, the relation of language to "reality," and the location of the "body" and the "soul" in each thinker's story of salvation. Recommended: reading knowledge of Greek and/or Latin.

4-5 units, Aut (Nightingale)

409. Greek Tragedy in Critical Perspective — Euripidean tragedy in the context of Attic drama as a cultural and civic institution. Trojan Women, Helen, Bacchae, and Aristophanes' Frogs, with attention to relevant work in contemporary literary and cultural theory (feminist film criticism, performance theory, postcolonialism).

4-5 units, Spr (Bassi)

LATIN (375)

336. Early Latin Poetry — Why study early Latin poetry? Aside from the plays Plautus and Terence, it is fragmentary and superseded by the works of the Augustans. This quest looks like a caricature of Latin Philology: edition and recovery of snippets, exegesis of strange words and forms, anticipations of the glories of Virgil and Horace, archeology of meter and style. Can we assess the invention and development of a literary language? Do Catullus, etc. represent something new (what is Hellenistic about these early poets)? How does study of the first poets change our understanding of patronage and the social roles of literature at Rome? What principles lie behind the preservation of the texts? Can we imagine a critical response to these works as poetry and not as source for Virgil? These poets in dialogue with the Alexandrians and with Horace, Virgil, Lucretius, Lucan, and Statius.

4-5 units, Spr (Bloomer)

COMMUNICATION

Emeriti: (Professors) Elie Abel, Richard A. Brody, Lyle M. Nelson, William Rivers; (Professor Teaching) Ronald Alexander, Marion Lewenstein
Chair: Donald F. Roberts
Director, Institute for Communication Research and Media Studies: Steven H. Chaffee
Director, John S. Knight Fellowships for Professional Journalists: James V. Risser
Director, Film and Video: Kristine Samuelson
Director, Journalism: Theodore L. Glasser
Professors: Henry S. Breitrose, Steven H. Chaffee, Jan Krawitz, Byron B. Reeves, Donald F. Roberts, Kristine Samuelson
Associate Professors: Theodore L. Glasser, Clifford I. Nass
Assistant Professors: Francois Bar, Laura Leets
Professor (Teaching): James V. Risser
Lecturer: James R. Bettinger
Consulting Professor: Jon Else
Visiting Lecturer: Dale Maharidge

The Department of Communication engages in research in communication and offers curricula leading to the A.B., A.M., and Ph.D. degrees. The A.M. degree prepares students for research on mass media or for careers in journalism or documentary film and video. The Ph.D. degree leads to careers in teaching and research-related specialties.

The Institute for Communication Research offers research experience primarily to advanced Ph.D. students.

The John S. Knight Fellowship Program brings promising mid-career professional journalists to the University to study for nine months in a nondegree program. Twelve U.S. journalists are joined by six International Fellows sponsored by Reuter Foundation, the Knight Foundation, and others.

ADMISSION
Prospective Undergraduate Students — Write to the University’s Office of Undergraduate Admissions, Stanford University, Stanford, California 94305.

Prospective Graduate Students — Write to Graduate Admissions, the Registrar’s Office, Stanford University, Stanford, CA 94305-3005.

The department requires that applicants for graduate admission submit verbal and quantitative scores from the Graduate Record Examination (GRE).

UNDERGRADUATE PROGRAMS
BACHELOR OF ARTS

The undergraduate curriculum is intended for liberal arts students who wish to build a fundamental knowledge of communication in society. Majors take courses from three different communication orientations within the Department of Communication, plus a selection of elective courses. In addition, undergraduates take one class in statistics. The two-course Area I requirement considers the roles and interaction of institutions such as broadcasting, film, journalism, constitutional law, and business within communication and mass communication contexts. The two-course Area II requirement provides an experiential approach in which students take practicum courses such as news writing and reporting, broadcasting, and film and video. Area III is a three-course requirement in which the emphasis is on the ways communication scholars conduct research in, and consider the issues of, human communication. Through electives, including an optional senior project or honors thesis, a student may build greater depth in one of these areas.

To be recommended for the A.B. degree in Communication, students must complete at least 50 units (preferably not more than 60 units) within the department, plus statistics, which can be taken for Credit/No Credit (CR/NC). No more than 12 units of transfer credit or Summer Session credit may be applied to meet department requirements.

Communication majors must register for a letter grade for all communication courses unless offered for Satisfactory/No Credit (S/NC).

CURRICULUM
1. Students should declare the major during either the sophomore or junior year. To declare, a student should have completed or be enrolled in the following courses:
   a) Communication 1
   b) Psychology 60; or Statistics 60 or 70

2. Majors must take courses in the following three areas as specified below:
   a) Area I — minimum of two courses from: 101, 110, 122A, 125, 131, 139, 140, 141, 142, 176, 178
   b) Area II — minimum of two courses from: 104, 114, 136, 150, 175, 177, 180

Some courses are not given every year. Refer to course listings and Time Schedules each quarter, noting individual course prerequisites in this bulletin.

HONORS PROGRAM

The honors program provides the opportunity to undertake a significant program of research. It represents the department’s commitment to and recognition of the value of research and of the individual professor/student mentoring relationship in undergraduate education. Working in a one-on-one mentor relationship with a faculty adviser, seniors may earn up to 15 communication units culminating in an honors thesis. Interested majors should apply to the program late in their junior year.

The designation “graduation with honors” is awarded by the Department of Communication to those graduating seniors who, in addition to having completed all requirements for the Communication major:

1. Complete an honors thesis
2. Maintain a distinguished grade average in all communication course work
3. Are recommended for distinction by the Communication faculty.
COMMUNICATION 379

COTERMINAL PROGRAM

The Department of Communication offers a coterminal program with an A.M. emphasis in Media Studies; applications can be picked up at Graduate Degree Progress Section, Registrar's Office, room 131, Old Union.

Applications must be submitted at least four quarters in advance of the expected master's degree conferral date. Stanford undergraduates may apply as early as the eighth quarter (or upon completion of 105 units) but no later than the eleventh quarter of undergraduate study. The application requirements are: Application for Admission to Coterminal Master's Program, preliminary Program Proposal, statement of purpose, three letters of recommendation from Stanford professors, and a current Stanford transcript. GRE scores are required and a request must be submitted to the Graduate Admissions Support Section office in order to send the official score report to the department. Applications are submitted directly to the department. Review procedures and criteria are determined by the Graduate Admissions Committee.

GRADUATE PROGRAMS

MASTER OF ARTS

The department awards terminal A.M. degrees in three fields: Documentary Film and Video Production, Journalism, and Media Studies. Applicants for each program, and for doctoral work are evaluated for admission on different criteria. (Students who complete the A.M. degree and who desire entry into the Ph.D. program must file a new application for admission and are considered together with all other doctoral applicants.) A student may complete more than one A.M. degree in the department, but course work applied to the requirements for one A.M. degree may not be applied to a second. All work to fulfill graduate degree requirements must be in courses numbered 100 or above.

DOCUMENTARY FILM AND VIDEO

The graduate program in documentary film and video is a master’s program designed to train students in the conceptual and craft skills for the production of nonfiction film and video.

RESIDENCY

The program requires continuous enrollment for a period of two academic years, with a completion date of June in the second year.

Students proceed through the program as a cohort. The degree requires three full terms of registration in the first year and 2.5 terms in the second year. Full-time registration consists of minimum of 11 units; half-time registration consists of 9 units. The residency requirement is calculated on the basis of terms of registration and not on the basis of total number of units earned. The program does not allow for leaves of absence.

CURRICULUM

The curriculum is intended to teach you an array of technical and conceptual relevant historical and theoretical knowledge.

First-Year Curriculum —

Autumn Quarter
202A. Graduate Colloquium in Film and Television
222A. Documentary Film
223A. Documentary Film/Video Directing I
224A. Film Production I

Winter Quarter
202B. Graduate Colloquium in Film and Television
223B. Documentary Film/Video Directing II
224B. Film Production II
Elective (3-4 units)

Spring Quarter
202C. Graduate Colloquium in Film and Television
223C. Documentary Film/Video Directing III
224C. Film Production III
Elective (3-4 units)

Second-Year Curriculum —

Autumn Quarter
202A. Graduate Colloquium in Film and Television
222B. Documentary Film
292A. Documentary Film/Video A.M. Project Seminar I

Winter Quarter
202B. Graduate Colloquium in Film and Television
292B. Documentary Film/Video A.M. Project Seminar II

Spring Quarter
202C. Graduate Colloquium in Film and Television
292C. Documentary Film/Video A.M. Project Seminar III
Elective* (3-4 units)

* Students may choose to enroll for half-time registration in either the Winter or Spring Quarter of their second year, depending on which quarter they choose to take their elective.

ELECTIVES

At least three electives must be from Department of Communication courses, including the required two-course sequence of documentary history/theory classes taken in the Autumn Quarter of the first and second year. Some elective courses are not offered every year, and there may be time conflicts with core courses. Students should consult the University Time Schedule each quarter for current information.

Each term, courses which are relevant to the curriculum may be offered by other departments at Stanford. We require that at least one elective be taken outside the department. A list of approved electives, both within and outside the department, is provided each quarter. Other electives relevant to the subject matter of the A.M. project may be substituted, with permission of your adviser.
EQUIPMENT AND SUPPLIES

The department maintains film and video production facilities for teaching and research purposes. However, the costs of supplies and processing services are the responsibility of the student.

In the first year, students purchase a "course kit" at the beginning of each quarter which includes sufficient materials to complete the assignments. Once students have depleted the supplies in the "course kit," subsequent purchases are made at outside vendors. The expense for normal film processing is included in the "course kit" fee during the Autumn and Winter Quarters, but each student sets up an account directly with a film lab during the Spring Quarter. In the second year, students are responsible for purchasing all materials and setting up their own accounts for necessary services during the production of the A.M. project. Students are given a partial list of vendors, on-line facilities, and motion picture laboratories.

Material costs are approximately $1,800 for the first year of residence. In the second year, costs vary depending on subject, format/length and logistics, but $5,000 is typically the minimum average cost of an A.M. project.

A.M. PROJECT

In the second year of the program, each student produces an A.M. project, which consists of a 15-20 minute film or video documentary. In order for students to have sufficient time to complete their own A.M. projects and gain the experience of assisting others, shooting must begin prior to Thanksgiving break, and shooting days are limited to a total of ten.

Students own their own work, but the department reserves the right to use students projects for non-profit University-related purposes.

In order to graduate, students must deposit with the faculty adviser a Beta SP copy of their film or video project and a revised final budget that reflects the projected and actual cost of their production. In the case of film, the Beta SP copy must be made on-line and in the case of video, the Beta SP copy must be made from the on-line master. Students must contact the department's Student Services Administrator during the quarter in which they expect to graduate in order to determine what needs to be done to file for graduation. Students working in film may not have completed their final printing work prior to the end of the Spring Quarter. It is therefore possible for a student to officially graduate in the Summer Quarter immediately following their enrollment in Communication 292C, although they will not have access to facilities during that period. No extensions or leaves of absences are granted.

All A.M. projects must be completed by the end of the Spring Quarter of the second year. In the case of video, the student must have completed on-line editing, and in the case of film, the student must have completed the final sound mix. The A.M. projects are screened for the public during Commencement weekend.

JOURNALISM

The graduate program in Journalism is a one-year professional program designed for students with an interest in the news-editorial area of journalism. Students without significant journalism experience or an undergraduate degree in journalism are encouraged to apply. Basic coursework in reporting and editing must be completed before the beginning of the academic year (Autumn Quarter) in order for students to have sufficient time to complete their own A.M. projects. The students share a core of six communication courses as follows:

- Media Law
- Information Technology in the Newsroom
- Perspectives on American Journalism
- Reporting of Public Affairs
- A.M. Project
- Graduate Journalism Seminar

Students are required to take a minimum of four additional courses, two in specialized writing and two in communication.

The two special writing courses must be chosen from the following:

- Broadcast Journalism
- Magazine Writing
- Science Writing
- Environmental Reporting
- Feature and Analytical Writing
- Social Issues Reporting
- Specialized Reporting
- Specialized Reporting
- Film Criticism

The two communication courses must be chosen from the following:

- Film Aesthetics
- Communication Research Methods
- Mass Communication Theory
- Documentary Film
- Media Ethics and Responsibility
- Communication and Culture
- History of Film
- Broadcasting in America
- Interethnic Communication
grounded in the social science literature. In addition to methods, and statistics. These core courses are communication theory and research, research communication Theory and Research. First-year students are required to complete introductory courses in communication courses listed below.

278. Media Management
276. International Communication
273. Communication and Health
272. Psychological Processing of Media
269. Communication, Technology, and Society
260. Political Communication
257. Public Information Programs
256. Media Management
255. Media Ethics and Responsibility
254. Communication and Culture
253. Communication and Children
252. Psychological Processing of Media
251. Communication and Health
248. International Communication
247. Media Management
246. Media Law
245. Communication Law
244. Communication Theory
243. Seminar in Communication Institutions
242. History of Film
241. History of American Journalism
239. History of the Press
238. Media Ethics and Responsibility
237. Communication and Culture
236. Communication and Children
235. Psychological Processing of Media
234. Communication and Health
233. Communication and Culture
232. Media Ethics and Responsibility
231. Communication and Culture
230. Communication and Children
229. Psychological Processing of Media
228. Communication and Health
227. International Communication
226. Media Management

Not all of these courses are offered every year. Additional courses are selected in consultation with an academic adviser. A course in statistical methods is strongly recommended.

MEDIA STUDIES

The Media Studies master's program provides a broad introduction to scholarly literature in mass communication. This one-year program is designed primarily for students without prior academic preparation for teaching, or coterminous students. Media Studies students must complete 42 units in Communication and related areas in the social sciences and humanities, maintaining high academic standing throughout. In consultation with professors, students must also complete extensive projects in two of the required communication courses listed below.

206. Communication Research Methods
208. Theories of Mass Communication
205. Political Communication
204. Communication Law
203. Communication Theory
202. Film Aesthetics
201. Film Aesthetics
210. Communication Law
216. Media Law
225. Perspectives on American Journalism
231. Media Ethics and Responsibility
233. Communication and Culture
239. Literature of the Press
240. History of American Journalism
241. History of Film
242. Seminar in Communication Institutions
251. Communication and Children
252. Psychological Processing of Media
253. Communication and Culture
254. Communication and Children
255. Media Ethics and Responsibility
256. Media Management
257. Public Information Programs
260. Political Communication
269. Communication, Technology, and Society
270. Communication and Children
272. Psychological Processing of Media
273. Communication and Health
276. International Communication
278. Media Management

Two additional courses from within or outside the department are selected in consultation with an academic adviser. In addition to coursework, the journalism program requires satisfactory completion of a master's project.

DOCTOR OF PHILOSOPHY

The department offers the Ph.D. in Communication Theory and Research. First-year students are required to complete introductory courses in communication theory and research, research methods, and statistics. These core courses are grounded in the social science literature. In addition, Ph.D. students must complete a minimum of four literature survey courses and four advanced seminars in communication and related departments. Each student builds a research specialty relating communication to such areas as campaigns, children, ethics, health, information processing, law, human-computer interactions, politics and voting, and technology. Regardless of the area of specialization, the Ph.D. program is designed primarily for students interested in teaching and research careers or policy formation positions.

The Ph.D. program encompasses four years of graduate study (subsequent to completion of the A.B. degree) during which, in addition to satisfying University residency requirements, Ph.D. candidates are required to:

1. Complete all departmental course requirements with an LGI of at least 'B.'
2. Pass general qualifying examinations by the end of the second quarter of the second academic year of study and pass a specialized area examination by the end of the third academic year of study.
3. Demonstrate proficiency in tools required in the area of specialization. Chosen with the advice of the faculty, such tools may include foreign languages, statistics, computer programming, and other technical skills.
4. Complete two predissertation research projects.
5. Teach or assist in teaching at least two courses, including Communication 1.
6. Complete a dissertation satisfactory to an advisory committee of three or more faculty members.
7. Pass the University oral examination, which is a defense of the dissertation.

Students are expected to complete department examinations and the first research project by the end of the second year of study, after which they must apply for admission to candidacy.

Because the multifaceted nature of the department makes it possible for the Ph.D. student to emphasize one of several areas of communication study, there tend to be several "typical" programs of course work followed by students, depending on their area of specialization. The variation in course programs tends to occur after the first year of graduate study, since the first year is devoted primarily to the "core" courses required of all students.

In addition, students must complete other advanced Communication theory courses. Specification of these courses depends on (1) individual student needs to prepare for preliminary and area examination, and (2) the requirements of the particular area of emphasis chosen by the student. Ph.D. candidacy is valid for five years. Extensions of candidacy are rarely granted and require reexamination.
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 a department adviser.

THE INSTITUTE FOR COMMUNICATION RESEARCH

This institute operates as an office of project research for the faculty of the Department of Communication on grants from foundations, communication media, and other agencies. Research assistantships are often available to qualified Ph.D. students in communication.

MASS MEDIA INSTITUTE

During Summer Quarter, the Department of Communication conducts a series of eight-week workshop production courses in Film Production, Screenwriting, Broadcast News, and Professional Journalism. These are designed as preprofessional training courses and are open to students with junior or higher standing at Stanford and other colleges and universities. Additional courses in Film Aesthetics and Mass Communication in Society are also offered. Stanford undergraduates may apply a maximum of 12 units to their communication major requirements.

Information about the Mass Media Institute may be obtained by writing to: Director, Mass Media Institute, Department of Communication, Stanford University, Stanford, CA 94305-2050.

COURSES PRIMARILY FOR UNDERGRADUATES

1. Mass Communication and Society — Media Technologies, People, and Society — Open to non-majors. Examines the traditional and new technologies and industries that make up the new world of “digital convergence,” and their effects on psychological life, on industry, and on communities local and global. Demonstrations and critiques, theory, and research on: interface design, attention and memory, interactivity, emotions, consumer behavior, and tele-communities. Lectures plus one-hour weekly discussion sections. DR:9(5)

   5 units, Win (Nass, Reeves)

101. Film Aesthetics — (Graduate students register for 201.) Theoretical, historical examination of the nature of the film medium. Emphasis is on the problems of aesthetics and communication from the viewpoints of practitioner, critic, and audience.

   3 units, Spr (Breitrose)

101S. Film Aesthetics — (Graduate students register for 201S.) Theoretical, historical examination of the nature of the film medium. Emphasis is on the problems of aesthetics and communication from the viewpoints of practitioner, critic, and audience.

   3 units, Sum (Staff)

104. Reporting and Writing the News — Reporting and writing, emphasizing various forms of journalism: news, broadcast, interpretation, features, opinion. Detailed criticism of writing. Prerequisite: typing speed of 35 wpm.

   5 units, Aut, Spr (Staff)

   Win (Maharidge)

106. Communication Research Methods — (Graduate students register for 206.) Formulation of research problems and design, sampling, data collection, and statistical analysis. Basic research approaches: experiments, surveys, and content and secondary analysis. A variety of studies are critically evaluated. Class designs and conducts a small communication study. Prerequisite: statistics.

   4 units, Aut (Leets)

108. Mass Communication Theory — (Graduate students register for 208.) Mass communication processes and effects. The relationship between media, individuals, and society. DR:9(5)

   4 units, Spr (Staff)

110. Communication and Law — (Graduate students register for 210.) The interactions among freedom of expression, communication, and American law. Issues such as pornography and campus speech codes introduce the application of communication research to law and policy formation. Students consider assumptions about communication in law and the effects of law and communication on each other.

   4 units, Win (Leets, Calveri)

114. Introduction to the Moving Image — For junior or senior Communication majors only. Students acquire the basic practical and conceptual skills to write, shoot, direct, and edit.

   5 units, Aut (Krawitz)

   Win (Samuelson)

122A. Documentary Film — (Graduate students register for 222A.) Analysis of the techniques and strategies of films designed to effect attitudinal and behavioral change. Prerequisite: consent of instructor.

   4 units, Aut (Breitrose)

122B. Documentary Film — (Graduate students register for 222B.) Issues in contemporary documentary film/video including objectivity/subjectiv-
125. Perspectives on American Journalism — (Graduate students register for 225.) Survey of issues, ideas, and concepts in the development of American journalism, emphasizing the role of the press in society, meaning and nature of news, and professional norms that influence conduct in and outside of the newsroom. Prerequisite: 1 or junior standing.

4 units, Aut (Glasser)

131. Media Ethics and Responsibility — (Graduate students register for 231.) The development of professionalism among American journalists, emphasizing the emergence of objectivity as a professional and epistemological norm. An applied ethics course where questions of power, freedom, and truth autonomy are treated normatively so as to foster critical thinking about the origins and implications of commonly accepted standards of responsible journalism.

4 units, Spr (Glasser)

133. Communication and Culture — (Graduate students register for 233.) The relationship between communication and culture, emphasizing the mass media and their symbolic import.

4 units (Glasser)

136. Broadcast Journalism — (Graduate students register for 236.) Survey of broadcast journalism, focusing on commercial and public broadcast news outlets. Students are introduced to broadcast newswriting and prepare tapes for radio news broadcast. Additional lab. Prerequisite: 104.

5 units, Spr (Staff)

140. History of American Journalism — (Graduate students register for 240.) Evolution of the democratic mass media in its social, political, economic, technological, and professional aspects.

4 units (Staff) not given 1995-96

141A. History of Film: The First 50 Years — (Graduate students register for 241A.) Studies in the development of the motion picture as an art form and cultural industry. Lab. Screenings of films announced in class.

4 units (Breitrose) not given 1995-96

141B. History of Film: The Second 50 Years — (Graduate students register for 241B.) The evolution of the motion picture as an art form and cultural industry in the U.S. and other nations from 1941. Topics: the decline of the studio system, the impact of WW II, the rise and fall of the auteur cinema, television, industrial concentration and its effects, and the "high concept" film. Mandatory evening screenings.

4 units, Win (Breitrose)

alternate years, given 1996-97

142. Broadcasting in America — (Graduate students register for 242.) The development of American broadcasting and its contemporary problems.

4 units, Spr (Breitrose)

150. Magazine Writing — (Graduate students register for 250.) Practice in writing magazine articles, with emphasis on marketing manuscripts. Conferences. Prerequisite: 104.

4 units, Win (Maharidge)

155. Interethnic Communication — (Graduate students register for 255.) Working from an intergroup perspective, examines the influence of ethnicity on the process of interpersonal communication. The problems and opportunities inherent in communication among people from different ethnic heritages and value orientations, and the steps relevant for improving interethnic communication.

4 units, Win (Leets)

157. Public Communication Campaigns — (Graduate students register for 257.) Emphasizes health information programs and their effects on public knowledge, attitudes, and behavior; information programs concerned with energy conservation, environmental protection, educational and occupational opportunity, consumerism, etc. The interplay of research and fieldwork is analyzed in case studies of successful programs. DR:9(5)

4 units (Staff) not given 1995-96

160. Political Communication — (Graduate students register for 260.) Analysis of the role of mass media and other channels of communication in political and electoral processes. DR:9(5)

4 units, Aut (Chaffee)

169. Communication, Technology, and Society — (Graduate students register for 269.) Methods for analyzing and addressing the question: Does technology drive societal change or does society drive technological change? Three case studies: computers and the self, mass media and community, and the information economy. DR:9(5)

4 units (Staff) not given 1995-96

170. Communication and Children I — (Graduate students register for 270.) Developmental approach to how children come to use and process mass media, what information they obtain, and how their behavior is influenced by the media. Prerequisite: 1, Psychology 1, or Sociology 1. DR:9(4)

4 units (Roberts) not given 1995-96

172. Psychological Processing — (Graduate students register for 272.) Examines literature related to psychological processing and effects of media. Topics: unconscious processing, picture perception, attention and memory, emotion, physiology of
processing media, person perception, pornography, consumer behavior, advanced film and television systems, and differences between reading, watching, and listening.

4 units (Reeves) not given 1995-96

176. Global Communication — (Graduate students register for 276.) Comparative study of national media systems and the policy issues arising from existing imbalances between developed and developing countries.

4 units (Staff) not given 1995-96

177. Specialized Workshops — (Graduate students register for 277.) One or more classes are offered in specializations such as science or sports writing, or other areas. Organized around writing projects oriented toward the field of specialization.

177B. Science Writing — (Graduate students register for 277B.)

4 units (Staff) not given 1995-96

177D. Environmental Reporting — (Graduate students register for 277D.)

4 units, Win (Risser)

177F. Feature and Analytical Writing — (Graduate students register for 277F.)

4 units, Win (Bettinger)

177G. Social Issues Reporting — (Graduate students register for 277G.)

4 units (Staff) not given 1995-96

177I. Specialized Reporting Course — (Graduate students register for 277I.)

4 units, Spr (Staff)

177J. Specialized Reporting Course — (Graduate students register for 277J.)

4 units, Spr (Staff)

178. Media Management — (Graduate students register for 278.) The management and financial aspects of media organization. Topics: capital investment decisions, circulation and audience-share planning, advertising strategies, personnel management, new technologies and their influence on business decisions, financial controls and promotion. The interplay between editorial and business decisions. Prerequisite: consent of instructor.

4 units (Staff) not given 1995-96

180. Film Criticism — (Graduate students register for 280.) A practical and critical view of film. Readings/discussion consider models of artistic and literary criticism as points of comparison. Weekly reviews stress the analysis of the films and a lucid writing style. Prerequisite: 101 or 141.

4 units (Breitrose) alternate years, given 1996-97

185. Internship Experience — Professional experience in the media. Prerequisite: Communication major.

1-4 units, Aut, Win, Spr (Staff) by arrangement

190. Senior Project — Research project or production of a finished piece of work in journalism or film.

A combination of the senior project and an internship is possible. Prerequisite: senior standing.

5 units, Aut, Win, Spr (Staff)


5-15 units, Aut, Win, Spr (Staff)

199. Individual Work — Communication majors with high academic standings are permitted to undertake individual work.

1-4 units, any quarter (Staff) by arrangement

PRIMARILY FOR A.M. STUDENTS

200S. Film Production Workshop — Introduction to film writing and production techniques, covering the basics of cinematography, sound, and editing. Students do one or two short super-8 projects, using this as a sketchbook for 16mm, with each student producing, shooting, and editing a 2-minute, black and white film with mixed sound track.

9 units, Sum (Staff)

201. Film Aesthetics — Graduate section; see 101.

201S. Film Aesthetics — Graduate section; see 101S.

202A,B,C. Graduate Colloquium in Film and Television — Topics in film and television focusing mainly on production-related issues. Prerequisite: A.M. student in film or television program.

1 unit, Aut (Krawitz) Win (Breitrose) Spr (Samuelson)

204S. Reporting and Writing the News — Reporting and writing, emphasizing various forms of journalism: news, interpretation, features. Assignments are completed under realistic time and space constraints. Lectures and labs focus on skills needed to produce polished publishable material.

5 units, Sum (Staff)

206. Communication Research Methods — Graduate section; see 106.

207S. Editing the News — Copy editing, headline writing, news display, and photo cropping. Lab includes editing copy, Associated Press style, news circulation, and page make-up.

4 units, Sum (Staff)

208. Mass Communication Theory — Graduate section; see 108.

208G. Advanced Mass Communication Theory — Mass communication processes and effects. The relationship between media, individuals, and society. Prerequisite: Media Studies graduate student.

4 units, Aut (Kubey)

209S. Broadcast News Workshop — News production techniques and a lab emphasizing reporting techniques. Training in producing, directing, writing, and delivering television newscasts.

9 units, Sum (Staff)
210. Communication and Law — Graduate section; see 110.

211S. Screenwriting — Fundamentals of screenwriting for film and television: structure, plot and subplots, dialogue, exposition, character, and backstory. The business and logistics of the professional scriptwriter (agents, WGA, pitching, etc.).

5 units, Sum (Staff)

212S. Script Analysis — Knowing how a script translates to the screen is essential for the screenwriter. Analyzes classic, paradigmatic films and their scripts for the purpose of understanding successful structures, strategies, and techniques of screenwriting.

4 units, Sum (Staff)

216. Media Law — Law and government regulation impacting on journalists. Topics: libel, privacy, news gathering, protection of sources, fair trial and free press, theories of the First Amendment, broadcast regulation, etc. Prerequisite: graduate student.

5 units, Aut (Calvert)

217. Information Technologies in the Newsroom

4 units, Win (Bar)

220S. Mass Communication and Society — The nature of communication and social responsibilities of the media, structure of the industry, problems of regulation, management, educational and commercial interests. Guest speakers from the industry and related fields. Does not replace Communication 1 for department majors.

3 units, Sum (Staff)

222A. Documentary Film — Graduate section; see 122A.

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 preproduction at an introductory level. Prerequisite: admission to the A.M. Documentary Film and Video program.

5 units, Aut (Samuelson)

223B. Documentary Film/Video Directing II — For graduate students. Further professional training in pre-production and producing for motion pictures and television. Interview skills and other documentary directing techniques are developed utilizing video. Taken concurrently with 224B. Prerequisite: 223A.

5 units, Win (Samuelson)

223C. Documentary Film/Video Directing III — For graduate students. Further examination of structure, emphasizing writing and directing the documentary. Practical training in fundraising and distribution. Taken concurrently with 224C. Prerequisite: 223B.

5 units, Spr (Samuelson)

224A. Documentary Film Production I — For graduate students. First of a three-quarter sequence leading to professional training in motion picture production. 16mm exercises and a short 16mm non-synchronous film with multiple sound tracks and sound effects. Corequisite: 223A.

5 units, Aut (Krawitz)

224B. Documentary Film Production II — For graduate students. Produce a short 16mm film exercise in color utilizing synchronous sound, with emphasis on observational filming techniques. Prerequisite: successful completion of 223A and 224A. Corequisite: 223B.

5 units, Win (Krawitz)

224C. Documentary Film Production III — For graduate students. Final quarter of professional training in motion picture production. A five- to seven-minute, 16mm film utilizing skills acquired in 224A and 224B. Issues of documentary form and content. Prerequisites: successful completion of 224A and 224B. Corequisite: 223C.

5 units, Spr (Krawitz)

225. Perspectives on American Journalism — Graduate section; see 125.

231. Media Ethics and Responsibility — Graduate section; see 131.

233. Communication and Culture — Graduate section; see 133.

236. Broadcast Journalism — Graduate section; see 136.

240. History of American Journalism — Graduate section; see 140.

241A. History of Film: The First 50 Years — Graduate section; see 141A.

241B. History of Film: The Second 50 Years— Graduate section; see 141B.

242. Broadcasting in America — Graduate section; see 142.


4 units (Breitrose)

alternate years, given 1996-97

250. Magazine Writing — Graduate section; see 150.

255. Interethnic Communication — Graduate section; see 155.

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.
272. Psychological Processing — Graduate section; see 172.
275. Reporting of Public Affairs — For graduate students. Coverage of traditional news beats, e.g., police; city hall, education, courts and issue-oriented coverage of policy area beats. Prerequisite: consent of instructor.
5 units, Aut (Maharidge)
276. Global Communication — Graduate section; see 176.
277. Specialized Workshops — Graduate section; see 177.
277B. Science Writing
277D. Environmental Reporting
277F. Feature and Analytical Writing
277G. Social Issues Reporting
277I. Specialized Reporting Course
277J. Specialized Reporting Course
278. Media Management — Graduate section; see 178.
280. Film Criticism — Graduate section; see 180.
290. A.M. Project
4-8 units, any quarter (Staff) by arrangement
291. Graduate Journalism Seminar — Required of all A.M. journalism students. Discussions are devoted to preparation for the A.M. project and to current issues in the practice and performance of the press. Meets throughout the academic year.
1 unit, Aut, Win, Spr (Staff)
292A, B, C. Documentary Film and Video A.M. Project Seminar — Discussions devoted to A.M. projects and to current issues in the practice and performance of documentary film and video production.
6 units, Aut (Samuelson)
Win (Breitrose)
Spr (Krawitz)
299. Individual Work
1-4 units, any quarter (Staff) by arrangement

PRIMARILY FOR Ph.D. STUDENTS
1-3 units (Chaffee) not given 1995-96
311. Theory of Communication — Required of all communication doctoral students. Approaches to communication theory, seminar and tutorial meet-
Advanced Communication Theory and Method Seminar III — May be repeated for credit. Topic and instructor change each year. Prerequisites: 311A, 319. 1-3 units, Win (Kubey)

Seminar in Psychological Processing — Limited to Ph.D. students. Advanced topics in psychological processing. Prerequisite: 272 or consent of instructor. 1-3 units (Reeves) not given 1995-96

Seminar in Communication and Health — Limited to Ph.D. students. Advanced topics in communication and health. Prerequisite: 273 or consent of instructor. 1-3 units (Staff) not given 1995-96

Seminar in Structure and Control of Communication — Limited to Ph.D. students. Advanced topics in structure and control of communication. Prerequisite: 273 or consent of instructor. 1-3 units (Glasser) not given 1995-96

Communication Theory Review Seminar — Limited to Ph.D. students. Prerequisite: 311. 3 units (Staff) by arrangement

Communication: History and Evolution of the Field — The history and current status of the field of communication research. Prerequisite: graduate standing in the Department of Communication. 3-4 units, Spr (Chaffee, Glasser)

First Research Project — Individual research in lieu of master's thesis. 3-6 units, Aut, Win, Spr (Staff) by arrangement

Predissertation Research Project — Advanced research for Ph.D. candidates. 3-6 units, Aut, Win, Spr (Staff) by arrangement

Advanced Individual Work 1-8 units, Aut, Win, Spr (Staff) by arrangement

Dissertation Research 6-10 units, Aut, Win, Spr (Staff) by arrangement

AFFILIATED DEPARTMENT OFFERINGS

See individual department offerings for course descriptions of the following, all of which are accepted for credit toward the communication major.

ANTHROPOLOGY

Film Images of African-American Culture 5 units, Win (Gibbs)

Mass Media and Subjectivities 5 units, Win (Mankekar)

ENGLISH

Cinema and Literature 5 units, Win (Marsh)

OVERSEAS STUDIES

FLORENCE

Realism, Utopia, Myth, and Society in Italian Cinema: Bernardo, Bartulucci, Pien Paolo Pasolini, and Federico Fellini 5 units, Win (Campani)

The interdisciplinary program in Comparative Literature (CL) admits students for the Ph.D. It works toward the Ph.D. in individual language departments and, in conjunction with the Humanities honors program, offers a concentration in comparative literature for undergraduates.
UNDERGRADUATE PROGRAM
BACHELOR OF ARTS

As contrasted with conventional literature majors which promote the study of a single national literature, a major in Comparative Literature involves the additional challenge of studying national literatures in their relations to one another. Such a comparative approach requires not just a solid grounding in multiple languages and literatures, but also the study of poetics, literary criticism, and theory, and of literature's relation to other disciplines, arts, and media (film, video, and so on). The advantage of this broad approach to literary study is that it provides students with the opportunity to probe questions that are fundamental to the literary fields as a whole and, more generally, to all forms of humanistic inquiry: for example, questions regarding the nature of representation and interpretation, how cultural traditions take shape and undergo change, how high and low cultural forms may interact with one another, or form's relation to content and vice versa. The Department of Comparative Literature offers students the opportunity to undertake such a program of study by combining rigorous training in a principal literature and in literary theory and interpretation with the study of a second literature and/or field. The major additionally requires a core of course work built around the student's principal area of specialization, as well as one course from outside this area meant to provide an unfamiliar vantage point of the area of specialization.

The undergraduate major in Comparative Literature is designed for students who combine the drive and ability to master foreign languages with a strong commitment to literary study. In all cases, students must do a substantial portion of their work in at least one foreign language. The "comparative" aspect of their program of specialization is fulfilled according to which of two available tracks they elect to follow.

1. **Literary Studies**: Track A integrates in-depth work in a primary literature with extensive work in a second literature (in the original language) and complementary course work in an outside field.

2. **Interdisciplinary**: Track B integrates in-depth work in a primary literature with the focused study of literature in relation another art (music, painting, film, and so on) or intellectual discipline (philosophy, history, linguistics, anthropology, and so on).

An honors program is available in Comparative Literature for both of these tracks (see below) that integrates substantial in-depth work in a primary literature with extensive work in a second literature (in the original language) or discipline, but also requires the writing of a senior honors paper.

In each of these tracks, students work closely with the Director of Undergraduate Studies in designing an individually tailored program of specialization involving two related areas of study. Individual study requires considerable advance planning and must meet the approval of the Director of Undergraduate Studies.

**CORE REQUIREMENTS FOR TRACKS A AND B**

All majors in Comparative Literature (including honors) complete the following Comparative Literature (CL) courses, the first as close as possible to the date of declaration and the second during senior year. Together, these core seminars ensure that majors have been introduced to the framing propositions and principal methods of the discipline. These courses are designed to lead students to inquire about the historical standing of such concepts as the "literary," the "aesthetic," "criticism," "genre," "text," and "theory."

1. **CL 101**, Seminar on Literature and the Institution of Literary Study, introduces students to the comparative study of literature, the history of poetic theory, and the historical development of literary fields. The course is concerned with foundational questions such as: What kind of knowledge is literary knowledge? How has this knowledge been codified and categorized with respect to other forms of knowledge?

2. **CL 199**, Senior Seminar on Literary Theory, offers advanced students of comparative literature the opportunity for in-depth study of the evolution of modern literary theory and of contemporary theoretical perspectives regarding the study of literary artifacts.

**LITERARY STUDIES TRACK**

Literary works are shaped by a complex interplay of historical forces and constraints, including contacts between differing cultures and traditions; the evolution of literary genres, practices, and conventions; shifts in media and technologies of reproduction and diffusion; and the imitation of model authors. By combining in-depth work in a primary literature with work in a second literature, this track emphasizes the study of such phenomena. It requires:

1. Five courses (using materials in the original language and making up an intellectually coherent program) in the literature of the first language. **Plus three courses** (using materials in the original language) in the literature of the second language. These course selections must be coordinated with the courses selected in the literature of the first language in order
that, taken together, they form a cohesive program of study focused on one of the following:

a) a specific literary genre
b) a historical epoch
c) a theoretical question

2. Three cognate courses supplementing a student's work in the two chosen literatures and lending it further intellectual shape according to the criteria noted above. One course from the CL 100 series (but neither 100 or 199) may be counted under this rubric.

3. One course, usually in translation, on a literature distant from the literatures of the student's concentration that can provide an "option" perspective on the student's area of specialization.

4. At least one written seminar paper that is comparative in nature. This paper should bring together material from courses taken in the primary and secondary literatures and may be an honors paper (see below), an individual research paper developed through independent work with a faculty member (for example, 198), or may integrate materials developed for two separate courses by arrangement with the two instructors. It must be submitted to the Director of Undergraduate Studies and receive his or her approval no later than the end of Winter Quarter in the fourth year of study.

Note—If either the first or second language is the student's native language, further work must be done in a third language to the extent of at least one course in its literature. Literature courses usually begin after two years of college level study. Bilingual students may count either tongue as "native" and the other as acquired. If any language above is Chinese, Japanese, or Russian, "native" and the other as acquired. If any language above is Chinese, Japanese, or Russian, the student's native language, further work must be counted under this rubric.

INTERDISCIPLINARY TRACK

Literary creation is a complex human enterprise that intersects a wide array of other fields of human endeavor and creation. This track is designed to promote the focused study of intersections between literature and another art (music, painting, film, and so on.) or discipline (philosophy, history, linguistics, anthropology, feminism, studies, and so on.) It requires:

1. Five courses using materials in the original language and making up an intellectually coherent program in the literature of a language other than the student's native tongue. Bilingual students may satisfy this requirement in either of their original languages or in a third language.

2. Six courses (chosen as a function of the courses noted above) in:

a) a single discipline, or
b) in the cultural history of a single historical epoch.

This course work must be shaped around the literature courses selected in item 1. It must either treat cogent analytical or thematic issues in the chosen discipline or be directly relevant to the chosen historical specialization. Each of these six courses must be approved in advance by the Director of Undergraduate Studies.

3. One course (usually in translation) on a literature distant from the two of the student's concentrations and intended, as above, to offer an "outside" perspective on the student's field of specialization.

4. At least one written seminar paper that is interdisciplinary in nature. This paper should bring together material from courses taken in their primary and secondary literatures and may be an honors paper (see below), an individual research paper developed through independent work with a faculty member (for example, 198), or may integrate materials developed for two separate courses by arrangement with the two instructors. It must be submitted to the Director of Undergraduate Studies and receive his or her approval no later than the end of Winter Quarter in the fourth year of study.

Students who choose the interdisciplinary option should be aware that it requires careful advance planning given that many course offerings are offered on alternate years.

Note—It is worth emphasizing that, as even a cursory review of the Stanford Bulletin demonstrates, this track in no way overlaps with current offerings in the modern language and literature departments whose majors neither require nor encourage students to pursue an integrated program of interdisciplinary study in tandem with their specialization in a national literature field. What it provides is an opportunity currently unavailable to Stanford undergraduates: namely, a major analogous to the English Department's "English with an Interdisciplinary Emphasis" track but grounded in the study of non-English literature(s) and offering broad training in literary theory.

HONORS PROGRAM

The honors option is reserved for exceptionally motivated students who wish to undertake an even more intensive and extensive program of study leading to the writing of a senior honors paper. The track allows for either a "Literary Studies" or an "Interdisciplinary" emphasis and requires:
1. Six courses using materials in the original language and making up an intellectually coherent program in the literature of first language.

2. For a Literary Studies Emphasis:
   a. Three courses (using materials in the original language) in the literature of second language. These course selections must be coordinated with the courses selected in the literature of first language in order that, taken together, they form a cohesive program of study focused on one of the following:
      1) a specific literary genre
      2) an historical epoch
      3) a theoretical question, and
   b. three cognate courses that supplement a student’s work in the two chosen literatures and lend it further intellectual shape. One course from the CL 100 series (but not 101 or 199) may be counted under this rubric.

3. For an Interdisciplinary Emphasis: six courses in either a single discipline or in the cultural history of a single historical epoch. This course work must be shaped around the literature courses selected in item 1. It must either treat cognent analytic or thematic issues in the chosen discipline or be directly relevant to the chosen historical specialization. Each of these six courses must be approved in advance by the Director of Undergraduate Studies.

4. One further course is required, usually in translation, on a literature distant from the two of the student’s concentrations, so as to provide an “outside” perspective on the student’s area of specialization.

5. During the Spring Quarter of the junior year, a letter requesting admission to the honors program must be submitted to the department’s Director of Undergraduate Studies. This letter must be accompanied by:
   a) an updated transcript
   b) a sample seminar paper
   c) an intended plan of study for the senior year (drawn up according to the emphasis selected)
   d) a preliminary statement (two to five pages) regarding the proposed topic of the honors paper (elaborated in consultation with the Director of Undergraduate Studies).

   This application is voted on by the Comparative Literature honors committee and, should it be approved, a faculty tutor is appointed by the Director of Undergraduate Studies according to the topic.

6. Once his or her request for admission to the honors track has been approved, the student must enroll in a 3-unit tutorial with the faculty tutor during the Autumn Quarter of the senior year in order to refine the project description, begin all necessary research, and initiate the composition of the honors paper.

7. During Winter Quarter of the senior year, the student must enroll in a 5-unit independent study (CL 198) with his or her faculty tutor for purposes of drafting the honors paper. At the end of the quarter, a completed draft must be submitted to the tutor. If it meets his or her approval as is, two copies are forwarded to the honors committee which decides on the basis of the paper’s quality whether or not the student is awarded honors. If the faculty tutor feels that the paper requires rewriting at the end of Winter Quarter, the student may enroll for 2 independent study units during Spring Quarter for purposes of final submission. Two copies of the final paper must be submitted to the honors committee no later than the fifth week of Spring Quarter in order to be considered for honors in Comparative Literature.

   Honors papers vary considerably in length as a function of their topic, historical scope, and methodology. They may make use of previous work developed in seminars and courses, but must be of appropriate comparative or theoretical scope and should reflect the student’s chosen emphasis. Quality (not quantity) is the key criterion. As a rule of thumb, however, they run in the range of 40-70 pages.

   **Note** — Track A’s rules regarding the student’s native languages, bilingualism, and special exemptions for students studying Chinese, Japanese, or Russian also govern students in the honors program who opt for a Literary Studies emphasis.

**GRADUATE PROGRAM**

**DOCTOR OF PHILOSOPHY**

The Ph.D. program is designed for a small group of students whose linguistic background, breadth of interest in literature, and curiosity about the problems of literary scholarship and theory (including the relation of literature to other disciplines) make this program more appropriate to their needs than the Ph.D. in one of the individual literatures. Students take courses in at least three literatures (one may be that of the native language) to be studied in the original. The program is designed to encourage familiarity with the major approaches to literary study prevailing today.

Before starting graduate work at Stanford, students should have completed an undergraduate program with a strong background in one literature and some work in a second literature studied in the original language. Since the program demands an advanced knowledge of two non-native languages and a reading knowledge of a third non-native language, students should at the time of application have an advanced enough knowledge of one of the three to take graduate level courses in that language when they enter the program. They should be making enough
A considerable part of a student’s work consists of individual study toward the oral examinations, for which each student devises reading lists in consultation with the graduate adviser. These examinations are centered on the study of particular periods, genres, and problems of literary study.

Students are admitted under a fellowship plan which attempts to integrate financial support and completion of residence requirements with their training as prospective university teachers. Tenure as a fellow, assuming satisfactory academic progress, is for a maximum of four years, graduate-level work in literature completed elsewhere being counted as part of this four-year period. The minimum teaching requirement is the same regardless of financial support. (For specific teaching requirements, see below.) Although financial support is limited to four years, the completion of requirements often requires five years. Students in the fifth year ordinarily apply for outside fellowships or for part-time teaching positions in language and literature departments at Stanford.

APPLICATION PROCEDURES

Competition for entrance into the program is keen. The program is kept small so that students have as much opportunity as possible to work in individual projects under faculty supervision throughout the period of study. No more than 16 students are in residence at any one time. The department does not plan to admit more than three or four new students for the class entering in September. Completed applications are due January 1.

Because of the special nature of comparative literature studies, the statement of purpose included in the application for admission should contain the following information besides the general plan for graduate work called for on the application:

1. A detailed description of the applicant’s present degree of proficiency in each of the languages studied, indicating the languages in which the applicant is prepared to do graduate work at present and outlining plans to meet additional language requirements of the program.

2. A description of the applicant’s area of interest (for instance, theoretical problems, genres, periods) within literary study and the reasons for finding comparative literature more suitable to his or her needs than the study of a single literature. Applicants should also indicate what they think will be their primary field.

All applicants should arrange to have the results of the general section of the Graduate Record Examination sent to the Department of Comparative Literature. Those who consider English or American literature a major field of study should take the subject test on “Literature in English.” Recommendations should, if possible, come from faculty in at least two of the literatures in which the student proposes to work.

Applicants must submit a copy of an undergraduate term paper which they consider representative of their best work.

DEGREE REQUIREMENTS

Residence — A candidate for the Ph.D. degree must complete three years (nine quarters) of full-time work, or the equivalent, in graduate study beyond the A.B. degree. The student is expected to offer at least 72 units of graduate work in addition to the doctoral dissertation. At least three consecutive quarters of course work must be taken at Stanford.

Languages — Students must know three non-native languages, two of them sufficiently to qualify for graduate courses in these languages and the third sufficiently to demonstrate ability to read a major author in this language. Only the third language may be certified by examination. The other two are certified by graduate-level course work specified below. Language preparation must be sufficient to support graduate-level course work in at least one language during the first year and in the second language during the second year. Students must demonstrate a reading knowledge of the third non-native language no later than the beginning of the third year.

Literatures made up of works written in the same language (such as Spanish and Latin American) are counted as one. One of the student’s three literatures usually is designated as the primary field, the other two as secondary fields, although some students may offer two literatures at the “primary level” (six or more graduate courses). Teaching — Fellows, whatever their sources of financial support, are ordinarily required to undertake a total of five quarters of supervised apprenticeships and teaching at half time. Fellows must complete whatever pedagogy courses are required by the departments in which they teach. The department’s minimum teaching requirement is a total of three quarters.

Minimum Course Requirements —Students are advised that the range and depth of preparation necessary to support quality work on the dissertation, as well as demands in the present professional marketplace for coverage of both traditional and interdisciplinary areas of knowledge, render these requirements as bare minimum.

1. CL 369.
2. A sufficient number of courses (six or more) in the student’s primary field to assure knowl-
edge of the basic works in one national literature from its beginnings until the present.

3 At least two additional complementary courses, with most of the reading in the original, in each of two different national literatures. Students whose primary field is a nonnative language are required to take two courses in one additional literature not their own.

Minimum course requirements must be completed before the student is scheduled to take the University oral examination. These requirements are kept to a minimum so that students have sufficient opportunity to seek out new areas of interest. A "course" is an offering of 3-5 units. Independent study may take the place of up to two of the required courses, but no more; classroom work with faculty and other students is central to the program.

Examinations — Three examinations are required. The third and last is the University oral examination. Students' reading lists for each examination must be approved by an examination committee and by the graduate adviser. The examinations consist of the following, each of which takes the form of an oral colloquy between the student and a committee of faculty members with interests in the subject areas:

1. First One-Hour Examination: on a literary genre, to consist of (a) a knowledge of a substantial number of literary works in a single genre, the list to include works from a number of centuries and from at least three national literatures, and (b) a grasp of the theoretical problems involved in dealing with this genre and with the question of genre in general. The examination must be taken no later than the beginning of the student's second year of graduate work (or the third quarter of the first year for students who enter with a year of previous graduate work).

2. Second One-Hour Examination: on literary criticism and theory, to consist of the exploration of a specific problem proposed and defined by the student. The problem must be sufficiently wide-ranging to demand the reading of critical texts from a variety of periods. The examination must be taken no later than the first quarter of the student's third year of graduate work (or the third quarter of the second year for students who enter with a year of graduate work). Students may elect to take this section of the examination before the genre section, in which case it must be taken at the earlier time.

3. University Oral Examination: on a literary period, to consist of in-depth knowledge of a period of approximately a century in three or more literatures with primary emphasis on a single national literature or, in occasional cases, two national literatures. The reading list covers chiefly the major literary texts of this period but may also include some studies of intellectual backgrounds and modern critical discussions of the period. Students must demonstrate a grasp of how to discuss and define this period as well as the concept of periods in general. This examination is not to be on the dissertation topic, on a single genre, or on current criticism but rather on a multiplicity of texts from the period. Students whose course work combines an ancient with a modern literature have the option of dividing the period sections into two wholly separate periods.

Qualifying Procedures — The qualification procedures for students in Comparative Literature take place during the quarter in which the student takes the first Ph.D. examination. Ordinarily this is the beginning of the second year, but students who enter with a year of graduate work elsewhere must take the examination no later than the third quarter of the first year. Any student may elect to take the examination during the third quarter of the first year.

Students are judged qualified to proceed to the Ph.D. on the basis of the first part of Ph.D. examination as well as other aspects of their work (for example, performance in courses, ability to do original research) that predict strong promise for their dissertations and future careers as scholars and critics. As soon as the student has completed the qualifying procedures, the chair recommends him or her for admission to candidacy for the Ph.D. At this time the student is also recommended for the Master of Arts degree in Comparative Literature if he or she has completed 36 units of work at Stanford and has not already completed an A.M. before entering the program.

Colloquium — The colloquium normally takes place in the quarter following the University oral examination. The colloquium lasts one hour, begins with a brief introduction to the dissertation prospectus by the student lasting no more than five minutes, and consists of a discussion of the prospectus by the student and the three readers of the dissertation. At the end of the hour the faculty readers vote on the outcome of the colloquium. If the outcome is favorable (by majority vote), the student is free to proceed with work on the dissertation. If the proposal is found to be unsatisfactory (by majority vote), the dissertation readers may ask the student to revise and resubmit the dissertation prospectus and schedule a second colloquium.

The prospectus must be prepared in close consultation with the dissertation adviser during the months preceding the colloquium. It must be submitted in its final form to the readers no later than one week before the colloquium. A prospectus should not exceed ten double spaced pages, in addition to which it should include a working
bibliography of primary and secondary sources. It should offer a synthetic overview of the dissertation, describe its methodology and the project's relation to prior scholarship on the topic, and lay out a complete chapter by chapter plan.

It is the student's responsibility to schedule the colloquium no later than the first half of the quarter after that quarter in which the student passed the University Oral Examination. The student should arrange the date and time in consultation with the department administrator and with the three examiners. The department administrator schedules an appropriate room for the colloquium.

Members of the dissertation reading committee ordinarily are drawn from the University oral examination committee, but need not be the same.

**Ph.D. Minor**

This minor is designed for students working toward the Ph.D. in the various foreign language departments. Students working toward the Ph.D. in English are directed to the program in English and Comparative Literature described among the Department of English offerings. Students must have:

1. A knowledge of at least two foreign languages, one of them sufficient to qualify for graduate-level courses in that language, the second sufficient to read a major author in the original language.

2. A minimum of six graduate courses, of which three must be in the department of the second language and three in the Department of Comparative Literature, the latter to include a seminar in literary theory or criticism. At least two of the three courses in comparative literature should originate in a department other than the one in which the student is completing the degree. Except for students in the Asian languages, students must choose a second literature outside the department of their major literature.

**COURSES**

**Core**

These courses are aimed at freshmen and sophomores who are non-majors (and/or potential majors) and provide an entry point to the discipline of Comparative Literature.

All majors are required, as soon as possible after declaration, to successfully complete CL 199. During the senior year, majors enroll in CL 393.

101. Seminar on Literature and the Institution of Literary Study — How the concept of the institution of "literature" is specific to Western culture. Historical origins and transformations. Its relation to other fields of aesthetic experience. Possible equivalents in non-Western cultures. When and why did literary studies become an academic discipline? Why do/should we interpret "literary texts?" Do literature and literary studies have a future?

5 units, Win (White) TTh 11-12:30

142. Ethnic Memory and Cultural Nationalism — Historical revisionism, formations of cultural nationalisms and their problematics in contemporary world. Cultural nationalism as a social and political phenomenon. Thinking through the causes of and possible alternatives to cultural nationalism, the relations of the person and political, and Third World pedagogies. Theoretical and conceptual materials concentrating on Asian-American examples.

5 units, Spr (Palumbo-Liu) MWF 10-11

199. Senior Seminar on Literary Theory — For advanced students of Comparative Literature, providing in-depth study of the evolution of modern literary theory and contemporary theoretical perspectives regarding the study of literary artifacts.

**Comparative Literature and Postmodern Theory: Appropriations, Contestations, Discontents** — Strands of postmodern theory, including poststructuralism and deconstruction, and their impact on the study of comparative literature. The status of postmodern theory with respect to issues of race and gender and to the fields of feminist theory, gender, and cultural studies. The phenomenon of recent critical resistance to theory and to the role literary theory has played in ideas of canon formation and literary value.

5 units, Spr (Wahl) TTh 11:15-12:30
201. Epic and Empire — Virgil’s *Aeneid* and Roman imperialism: Homeric and epic, and the intertwining of empire and epic that followed Virgil and the disintegration of Rome. The Crusades and Italian epic-romance through Camões’ Portuguese epic of Vasco de Gama. The English epics of Spenser and Milton and the American motif of empire’s “westering.” Conrad’s *Heart of Darkness* and the film *Apocalypse Now.*

5 units, Spr (Parker) Th 3:15-6:05

UNDERGRADUATE/GRADUATE

141. Self as Other: Interpellating Minority Subjectivities — The formation of minority subjectivities: how do minorities come to see themselves? How does one fit into assumptions of universal aesthetics? Topics: cosmetic surgery, ethnic autobiography, visual representations, cultural politics of postmodern aesthetics. Theoretical and conceptual materials concentrating on Asian-American examples.

5 units, Win (Palumbo-Liu) MW 11-12:30

212. The Bible in World Culture — Extensive readings in the Old and New Testaments as foundational to a range of literatures (European, African, and American), to the history of art and music (Handel to reggae), and to political movements (the rhetoric of conservatism and divine right to anti-slavery narratives and liberation politics).

5 units, Spr (Parker) W 3:15-6:05

230. Comparative Literature and Minority Discourse — The formation of comparative literature as a discipline in the late 18th and 19th centuries as linked to the redefinition of the nation state; comparison to modern and postmodern emergence of minority discourses as a field that rethinks issues of nation, majority culture, universalisms.

5 units, Spr (Parker) WM 3:15-6:05

243E. Louis Ferdinand Céline, or: The Violence of Literature — (Same as French and Italian 243E.) Céline’s texts, early 1930s-60s, are a literary repertoire of the aggressive and violent experiences of the 20th century: war technology and labor in industrial production, colonialism, new diseases, and the miseries of medicine and social welfare. Not a humanist, Céline belongs to those European intellectuals who supported Fascist ideology and politics, and who never publicly renounced adherence. Content and perspective make him an important hard-to-beat author. Texts in translation. In English

3-5 units, Win (Gumbrecht) T 3:15-6:05


3-5 units, Aut (Mudimbe) MW 1:15-2:30


3-5 units, Spr (Mudimbe) not given 1995-96

253E. Diversity of Knowledges and the Unity of Science — (Same as French and Italian 253E.) An international pluridisciplinary seminar using immigration and diasporas as concrete case studies. Televised and distributed by SCOLA. Each Friday different speakers are featured.

3-5 units, Spr (Mudimbe)

260E. Boccaccio: Minor Works — (Same as French and Italian 260E.) Intensive reading of Boccaccio’s poetry and prose writing, emphasizing his evolving conception of antiquity and of the world of arts and letters. Topics: Boccaccio and classical mythology, *The De Claris Mulieribus* and *Corbaccio* and contemporary theoretical approaches to Boccaccio’s texts.

4 units, Spr (Schnapp)

262. Colloquium: Dissident Sexualities — The ways contemporary cultural criticism has developed tools for theorizing and historicizing the category of sexuality. Recent, rapid developments in gay and lesbian studies in the last ten years. The idea of “sexual dissidence,” how and why sexual identity and identification have such a powerful impact on 20th-century notions of selfhood in the industrialized West. Influential theoretical work in the field and contemporary representations of “dissident sexualities” from novels, video footage, Hollywood and independent cinema, newspapers, and popular magazines.

3-5 units, Spr (Schnapp)

264. Mini-Seminar: The Child of Three Mothers — The Morphology of Grammars and the Roots of the Concept of “Root” — (Two sessions November 20 and 27.) Grammars, like all technical handbooks, are also a literary genre that evolves over time. The modern history of grammatical genre against the backdrop of the three traditions that gave rise to modern grammar: the ancient Greek and Roman, the ancient Indian, and the Arab and Hebrew traditions. Grammar is made up of phonology, morphology, and syntax; the way grammars are organized in different linguistic traditions, and the origin of the key grammatical terms.

1-2 units, Aut (Gambarara) M 3:15-6:05
300. Seminar: Historical Consciousness — The forms, modes, and genres of historical consciousness (the sense of existing in a condition of historicity), the problem of historical representation in discourse, film, painting, and fiction (the "historical" novel), and the crisis of historicism and its relation to modernism in the arts and human sciences. Readings from Herodotus, Vico, Hegel, Nietzsche, Marx, Michelet, Scott, Balzac, Auerbach.

5 units, Win (White) T 3:15-6:05

304B. Colloquium: Agency/Sex/Gender — Aphra Behn to George Sand — (Same as English 304B, French and Italian 304E.) Readings of literary and philosophical texts from England and France between the late 17th and the early 19th centuries. The emergence of the notion of agency. The (pre)history of the sex/gender distinction. How do concepts of agency relate to gender and sex distinctions? Are there discursive differences (mainly between literature and philosophy) in the construction of these notions and of their interrelations?

4-5 units, Win (Bender, Gumbrecht) TTh 1:15-3:05

311. Hybridity and Diaspora — Examination and critique of these concepts as they describe contemporary social and cultural phenomena of mixedness and movement. Analysis of the use of these terms in various theoretical constructions, emphasizing their specific historical articulations and aims.

5 units, Aut (Palumbo-Liu) W 3:15-5:05

324E. Fascism and Culture — (Same as French and Italian 324E.) Interdisciplinary seminar examines fascist and right-wing modernist cultural production in art, architecture, literature, and industrial design. The cultural, intellectual, and political prehistory and history of fascism in France, Germany, Italy, and Spain, emphasizing the connections and conflicts between totalitarian politics and modernist artistic forms. Topics: the "engineering" of new human subjects and social forms; bodies and machines; rhetorics of effeminization and virility; magic realism and myth in 1920s-30s art; socialist vs. fascist modernisms; modernist iconographies of leadership, the masses, the nation-state; futurism, metaphysical painting, the '900 movement, documentarism, classicism, kitsch, the state exhibitions of the 1930s; fantasies regarding the material world and "total" art forms. Readings from LeBon, Sorel, Bataille, Le Corbusier, Marinetti, Mussolini, Bontempelli, Sombart, Junger, Benn, Hitler, Gropius, Lewis, Pound. Enrollment limited to 20.

5 units, Spr (Schnapp) W 7:15-10 p.m.

338. García Lorca’s “Poet in New York” and the Harlem Renaissance — Federico García Lorca’s collection of poems “Poeta en Nueva York” was written during a year-long stay at Columbia University in the late 1920s. Lorca’s absence from Spain was motivated by gay repression in Europe during that period. During his stay at New York, Lorca was “absorbed” into the culture of the Harlem Renaissance. “Poeta en Nueva York” as the journal of the experience of an “Other” culture by a poet who experiences himself as “Other.” In English; translations of Lorca’s text can be used.

3-5 units, Aut (Gumbrecht) Th 3:15-6:15

369. Seminar: Fragments of a Material History of Literature — (Same as French and Italian 369E, History and Philosophy of Science 270.) Introduction to literary studies from the perspective of the material practices and constraints that have shaped Western ideas concerning “literature” and literary expression. Topics: rhetoric; mnemotechnics; the history of writing instruments, machines, surfaces, and supports; paleographic analysis; oral/written communications technologies; printing and textualism; modern/postmodern permutations of “literature.” Authors: Svembro, Zumthor, Genette, Derrida.

5 units, Aut (Schnapp) T 3:15-6:05

395A. Philosophical Reading Group — Close reading of classical and contemporary texts from the Western philosophical tradition.

2-3 units, Aut, Win, Spr (Gumbrecht) Th 7:30-10 p.m.

RELATED OFFERINGS

Courses primarily of a comparative nature are listed below.

ASIAN LANGUAGES

131. Chinese Poetry in Translation

4 units, Aut (Liu)

ENGLISH

130. The Novel

3 units, Win (Bartholomew) Spr (Paulson)

141. Renaissance Drama

5 units, Win (Friedlander)

150. Poetry and Poetics

5 units, Aut (Ross)

Win (Felstiner)

150G. Poetry and Poetics

5 units, Spr (Middlebrook)

160D. Cinema and Literature

5 units, Win (Marsh)

163M. The Literature and Culture of the Crusades

5 units, Win (Heng)

164B. Imagining the Holocaust

5 units, Win (Felstiner)

165D. Women Writers of the Middle Ages

5 units, Spr (Summit)

166. Introduction to Literary Theory

5 units, Aut (Lerer)
181B. Seminar: The Other Middle Ages
5 units, Aut (Narin van Court)

181C. Seminar: Gender and the Medieval Literature of Courtly Love
5 units, Win (Summit)

293. Verse Translation Workshop
4-5 units, Aut (Di Piero)

302C. Colloquium: The Invention of the Great Book in the Renaissance
4-5 units, Spr (Orgel)

303B. Colloquium: Sexuality and Terror — Gothic and Fantastic Literature of the 18th Century
4-5 units, Spr (Castle)

304A. Colloquium: Romanticism in History
4-5 units, Aut (Lindenberger)

308H. Colloquium: American Primitivisms
4-5 units, Win (Romero)

309. Colloquium: The Boundaries of Gender
4-5 units, Aut (Orgel)

FRENCH AND ITALIAN

FRENCH SECTION

133. Literature and Society in Africa and the Caribbean — The relationship between literature and society in Francophone Africa and in the French Caribbean. Acculturation. Readings/discussions focus on social and cultural conflicts, search for identity, Negritude poetry, the integration of history and oral tradition in the written work, women’s role and status in a changing context, and writers’ social responsibility. Readings: novels by Mongo Beti, Mariama Ba, Simone Schwartz-Bart, Albert Memmi; poetry, criticism, and film. DR:2(*) or 7(2*)
3-5 units, Win (Mudimbe-Boyi)

278. Topics in French and Francophone Literature: The Discourse of (self)Representation — Diachronic and synchronic examination of theoretical issues to the study of Francophone literature from Africa and the Caribbean. The diachronic perspective presents an evolution of this literature from Négritude (and its reference to Surrealism) to Créolité, the role of French intellectuals, and of the journal Présence Africaine. The synchronic approach inscribes the broader context of “post-colonial” critique, focusing on otherness, voice and silence, construction of identity, méissage, history, and memory. Readings: Cesaire, Dadić, Maximin, Kane; texts by Glissant, Satre, Barches, Todorov.
3-5 units, Win (Mudimbe-Boyi)

ITALIAN SECTION

166E. Women’s Voices in Contemporary Italian Fiction — Introduction to women’s writing, from Sibilla Alermo’s A Woman to the narrative experiments of the last decade. Readings: Dacia Maraini, Fabrizia Ramondino, Francesca Duranti, and Rosetta Loy. Texts in translation. In English, DR:7(2)
5 units, Aut (Springer)

191E. Italian Cinema
3 units, Spr (Campani)

FRENCH AND ITALIAN

170E. Introduction to African Systems of Thought — Anthropology, ethnography, and the classical debates on ethnosciences; problems involving intellectual histories of religious and monoreligious thought; case studies in the African practices of philosophy. Discussions on texts by Franz Crahay, Marcel Griaule, Paulin Hounondji, Jahn Janheinz, Leopold Senghor, Placide Tempels. DR:2(*) or 8(3*)
4 units, Win (Mudimbe)

222E. Building, Dwelling, and Thinking: Or Thoreau, Vico, and Heidegger
3-5 units, Spr (Harrison)

223E. Women and Psychoanalysis
3-5 units, Aut (Hullot-Kentor)

225E. Pirandello, Sartre, and Beckett: Self and World in Modern Literature
4 units, Aut (Harrison)

225F. Iconomy
4 units, Win (Apostolides)

261E. Dante’s Divine Comedy — Open to all students. Intensive study of Dante’s poem in relation to the culture and history of Medieval Europe. Topics: Dante and premodern theories of autobiography; theology and poetics in the Comedy, Dante and the Natural Sciences, Dante’s Christianization of Classical Epic (Virgil, Lucan, Statius), the Comedy and Dante’s minor works.
3-5 units, Win (Schnapp)

268E. Italo Calvino in Translation
4 units, Spr (Springer)

283E. The Literature of Addiction
3-5 units, Spr (Clej)

291. Geography as Fiction and Science
3-5 units, Spr (Mudimbe)

297E. Literature and Philosophy: Perspectives of Self-Deception
3-5 units, Win (Dupuy)

335. Diderot and the Encyclopedists
4 units, Spr (Apostolides)
E. Pierre Bordieu
3-5 units (Mudimbe) not given 1995-96

**GERMAN**

171A. Feminist Media Theories
4 units, Win (Kenkel)

179A. Questioning National Identity
4 units, Spr (Hanssen)

232. German and European Baroque Drama — Plays by Bidermann, Lope de Vega, Calderón, Corneille, Rotrou, Gryphius, Lohenstein, and Webster. Foreign literature majors and comparatists read original texts in their areas of interest; open to generalists using translations.
3-5 units, Spr (Gillespie)

241-243. The history of German thought from 1750 to the present and its significance for an understanding of modern culture. Authors: Adorno, Lessing, Habermas, Heidegger, Hegel, Herder, Husserl, Marx, Nietzsche, Schiller. In English.
241. Deutsche Geistesgeschichte I
3-5 units, Aut (Kenkel)

242. Deutsche Geistesgeschichte II
3-5 units, Win (Strum)

243. Deutsche Geistesgeschichte III
3-5 units, Spr (Heins)

291K. Berlin/New York/Hollywood: German Exile Culture in America
4 units, Aut (Kenkel)

292A. The Existentialist Novel, 1910-42 — Principal readings: Rilke, Malte Laurids Brigge; Unamuno, Mist; Conrad, Victory; Kafka, The Castle; Hesse, Steppenwolf; Sartre, Nausea; Camus, The Stranger.
3-5 units, Spr (Gillespie)

**HUMANITIES**

192H. Opera and the Humanities — For students who have a prior interest in, but no exposure to opera. Introduction to opera through a study of its changing conventions and social and aesthetic fusions at various times in its history. The role of performers, opera’s shifting relationships to high and popular culture, representations of women. Operas are studies in detail; students attend at least one performance.
5 units, Aut (Lindenberger) MW 1:15-3:05

197P. Modernism and the Humanities: Symbolism — From Baudelaire to T. S. Eliot — (Same as English 100A, French and Italian 158E.)
5 units, Win (Harrison, Perloff)

**LINGUISTICS**

625A,B,C. Topics in Arabic Literature and Culture — Can be taken independently. No knowledge of Arabic required.
625A. Introduction to Contemporary Arabic Literature
4 units, Aut (Barhoum)

625B. Influences and Issues in Contemporary Arab Writers
4 units, Win (Barhoum)

625C. The Arab World through Travel Literature
4 units (Barhoum)
alternate years, given 1996-97

**MODERN THOUGHT AND LITERATURE**

214. Deviants in Literature — (Same as Psychiatry 214.)
3 units, Spr (Van Natta)

**SLAVIC LANGUAGES**

151. 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, Aut (Frank) TTh 2:15-4:05

188. Russian Poetry of the 20th Century
4 units, Spr (Timenchik) by arrangement

190. Modernism and the Humanities: Tolstoy’s Anna Karenina and the Social Thought of its Time — (Same as Humanities 197F.)
5 units, Spr (Freidin)

245. The Age of Experiment (1820-1864)
4 units, Aut (Fleishman)

246. Struggles with Authority in the Russian Novel, 1861-1922
4 units, Win (Greenleaf)

247. State and Revolution: Russian Literature in the 20th Century
4 units, Spr (Freidin)

261. Poetess: The Grammar of the Self When the Poet Is a Woman
4 units, Win (Greenleaf)

**SPANISH AND PORTUGUESE**

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, Win (Pratt)

5 units, Spr (Pratt)
Program in Cultures, Ideas, and Values (CIV)

Program Director: Paul Seaver (Professor of History)

The Cultures, Ideas, and Values requirement is part of the system of Distribution Requirements instituted in 1980-81. Entering students must complete a three-quarter sequence, or track, expressly designed to introduce them to major works and historical movements in our heritage. Although the nine current tracks that constitute the CIV program are sponsored by different departments and programs, they share common readings, ensuring that all students are exposed to certain great works.

The sequences have different formats, but in addition to the common readings they share another important feature. Each sequence provides at least two hours per week of small group instruction with an experienced teacher.

Students are encouraged to fulfill the CIV requirement during the freshman year; however, some students may choose to defer it. Since the sequences do not all proceed at the same pace or cover the material in the same order, students must complete one entire sequence to satisfy the CIV portion of the Distribution Requirements. The following courses are available in 1995-96 and are organized to accommodate all entering freshmen and transfer students. Every effort is made to assign students to the specific courses they elect, but it is not possible to place all students in the courses they list as first choice.

Tracks

Structured Liberal Education

Track Chair: Mark Mancall (Professor of History)

The program in Structured Liberal Education is also designated as a CIV sequence. For details, see the “Program in Structured Liberal Education” section of this bulletin.

“GREAT WORKS”

Track Coordinator: Cheryl Ross

This sequence focuses on works of literature, religion, philosophy, and political theory from European and non-European traditions. Canon formation is a major theme. Students learn about the different historical, political, and cultural processes that constitute “great works.” A one-hour weekly lecture given by an expert in the field introduces the week’s reading. The texts are explored in depth in four hours of weekly discussion seminars, guided by scholars from a variety of disciplinary backgrounds.

1. Ancient and Classical Cultures — Writings from Hebrew, Greek, Roman, and early Christian cultures, juxtaposed with major works of ancient China. DR:1 (three-quarter sequence)
   5 units, Aut (Staff)

2. From the Middle Ages to the European Enlightenment — Literary, religious, philosophical, and political writings of the Medieval, Renaissance, Reformation, and Enlightenment periods in Europe, coupled with writings of medieval Islam. DR:1 (three-quarter sequence)
   5 units, Win (Staff)

3. From the Romantic Period to the Present — Works of political and social theory, literature, and philosophy from the late 18th through the 20th centuries, concluding with contemporary 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 anthropology, cultural studies, history, and literature, this track takes as its subject matter the multiple cultural strands that intersect and interact in the Americas in the context of migration, commercial contact, economic expansion, conquest, colonization, slavery, and immigration. The courses use a wide range of readings in history, literature, mythology, philosophy, art, autobiography, and film from European, Latin American, and North American culture. Organized thematically rather than in a chronological sequence, the courses explore such questions as how groups apply and adjust their interpretive systems when they come into contact with each other; how groups in contact borrow and lend knowledge, wisdom, and everyday ways of life; how relations of power and inequality are expressed in cultural terms; and how art reproduces and challenges a culture’s assumptions about itself. Students are encouraged to think critically about differing concepts of culture rather than assuming any one view. Two lectures plus three hours of small group discussion per week.

4. Writing the “New World” — Early European texts reflecting the crisis created in Europe’s cosmo-vision by its discovery of the Americas; early indigenous texts from Spanish America expressing the shock of contact and the effect of the European invasion here; the negotiation of culture, power, and meaning in the colonial Caribbean; models of liberation and decolonization; contemporary representations of American intercultural society. DR:1 (three-quarter sequence)
   5 units, Aut (Pratt) lecture TTh 10
5. Culture, Expression, and the Self — Culture as that which defines and constructs "selves"; differing conceptions of the self and the self in history as expressed in fiction, social and psychological theory, autobiography, and oral history from contrasting cultural traditions; different modes of representing selfhood across cultures; ways in which concepts of selfhood are put into crisis and transformed by historical conflicts, e.g., colonialism, slavery, immigration. DR:1 (three-quarter sequence)

5 units, Win (Rosaldo) lecture TTh 10

6. Constructing the Human — What does it mean to be human? American and European narrative, philosophical, and scientific texts are used to examine how definitions of humanness have changed between 1720-1920. Why our times are still embroiled in arguments concerning what it means to be human. The roles played by law, biological thinking, and by categories such as race, gender, nationality, and class in defining the human. DR:1 (three-quarter sequence)

5 units, Win (Rosaldo) lecture TTh 10

EUROPE: FROM ANTIQUITY TO THE PRESENT

Track Chair: Carolyn Lougee (Professor of History)

(Enroll in History 1,2,3.) The sequence examines works of literature, philosophy, and art in their social, political, and economic settings. The focus is on the origins and evolution of medieval Europe, the relationship between European and other cultures, the Middle Ages and the Renaissance, the consolidation of the European state system, the intellectual and social innovations that emerged in the Enlightenment and in modern industrial societies, the evolution of democracies, and the global consequences of European and American developments. Students meet three hours a week with lecturers from the regular History faculty and two hours a week in small discussion sections led by postdoctoral fellows. Two sections of History 2 and 3 fulfill both the CIV requirement and the University Writing Requirement. Students in those sections meet for an additional two hours of writing instruction per week and receive 3 additional units of credit. DR:1 (three-quarter sequence)

5 units, Aut, Win, Spr, MTW 9 plus section

LITNERY AND THE ARTS

Track Chair: David Riggs (Professor of English)

(Enroll in English 7,8,9.) A Cultures, Ideas, and Values (CIV) sequence paired with special sections of Writing and Critical Thinking. The sequence emphasizes literature, writing, and the creative imagination. Lectures explore literature in its cultural context and include sessions on art, architecture, music, and drama, moving chronologically from antiquity to the present and setting works in historical, intellectual, and generic perspective. Students generally meet three times a week for lectures, and three times weekly to discuss texts and work on writing. Seminar instructors are experienced writing teachers, and student essays receive close attention. Writing seminars use a careful reading of the CIV texts to help students understand the process of writing and to improve their own writing. Students must complete all 15 units of the 7, 8, and 9 sequence to fulfill the CIV requirement. Each student must enroll concurrently in the writing section, if any, paired with their CIV assignment for the quarter. Students who scored 4 or 5 on an English AP exam may fulfill the University's Writing Requirement with a 4-unit Writing and Critical Thinking sequence. Others must complete a 6-unit sequence of writing sections. Depending on writing section assignment and AP status, students in the three-quarter 7, 8, and 9 sequence enroll in a total of 5 to 8 units of Literature and the Arts course work each quarter to fulfill both the University's CIV and Writing requirements.

7,7A. Antiquity and the Middle Ages — From Gilgamesh and the Hebrew Bible to the dawn of the Renaissance, covering works including Homer, classical sculpture, Plato, Virgil, Roman architecture, Confucius, the New Testament, Sung landscape painting, Marie de France, the Popol Vuh, Giotto, and Chaucer. Writing instruction concentrates on critical thinking, organization, and technical proficiency. DR:1 (three-quarter sequence)

5-8 units, Aut (Steidle, Staff) lectures
plus sections and workshops

8,8A,8B,8C. Renaissance and Enlightenment — Readings from the Renaissance to the Enlightenment, including works by Machiavelli, More, painters of the Italian and the Northern Renaissance, Bach, Shakespeare, Donne, Milton, Defoe, Swift, Mozart, Rousseau, Mary Wollstonecraft, Paine, Jefferson, and Franklin. Writing instruction concentrates on style and diction and on preparing and writing a research paper. DR:1 (three-quarter sequence)

5-8 units Win (Riggs, Staff) lectures
plus sections and workshops

9,9B,9C. The Modern World — Thought and literature from the French Revolution to contemporary times, including works by Romantic, Victorian, Modernist, and Postcolonial writers in English; selections from Marx and Freud; art from European and African tradi-
LITERATURE AND THE HISTORY OF IDEAS

Track Chair: Paul Robinson (Professor of History)
(Enroll in Humanities 61, 62, 63.) This interdisciplinary sequence, offered by Humanities Special Programs, has been taught at Stanford continuously for more than 40 years. It emphasizes the interconnection of literature, the arts, philosophy, and social thought from the ancient to the contemporary world. Also examined are non-European cultural traditions. Three lectures per week by faculty from various departments plus two-hour discussion seminar per week led by postdoctoral lecturers or advanced doctoral candidates in the Humanities Program. DR: 1 (three-quarter sequence)

5-8 units, Spr (Trainer, Staff) lectures plus sections and workshops

MYTH AND MODERNITY

Track Chair: Russell A. Berman (Professor of German Studies and Comparative Literature)
(Enroll in German Studies 7A, 8A, 9A.) The sequence examines the tension between mythic traditions and critical reason, introducing fundamental problems in cultural interpretation. The material is from German culture, with appropriate comparisons to other contexts. Texts are drawn from literature, philosophy, and the arts, including film and music. May be counted toward a major in German. One lecture per week and two two-hour discussion sections.

7A. Reason and Revolution — The Enlightenment in Germany, with reference to reason and its limits, the rhetoric of revolution, and romantic subjectivity. Works by Kant, Goethe, Beethoven, Marx, and Nietzsche. DR: 1 (three-quarter sequence)

5 units, Aut (McCall, Staff) lecture MWF 11

8A. Logos — The problem of the Enlightenment as conceptual thought between reason and terror, the costs of progress and generational conflict, knowledge and violence, the discontent with theory. Readings from Plato, Sophocles, Freud, Mann, and Kafka. DR: 1 (three-quarter sequence)

5 units, Win (Heins) T 11 plus section

9A. Rationalization and Myth — The relation between rationalization and the return of myth in the 20th century, with reference to mass culture and technology, the Holocaust, and the possibility of resistance. Works from Brecht, Mann, Hesse, Freud, Adorno, Arendt. DR: 1 (three-quarter sequence)

5 units, Spr (Kenkel) T 11 plus section

7G, 8G, 9G. — Optional section for students in Myth and Modernity who are able to work with original readings in German.

7G. 1 unit, Aut (Heins)
8G. 1 unit, Win (Heins)
9G. 1 unit, Spr (Heins)

ORIGINS, ENCOUNTERS, AND IDENTITIES

Track Chair: George Collier

8, 9, 10. Origins, Encounters, Identities — (Enroll in Anthropology 8, 9, 10.) How culture, language, and civilization have arisen, how peoples have understood and preserved insights from their past, how they have interacted in the context of imperial and colonial expansion, and how they have understood and construed nature, humankind, and their place within the cosmos as groups and individuals. Meets two hours per week in lectures and three hours per week in small group discussion. Ten units are applicable to the major in Anthropology.

8. Origins: Prehistory, Myth, and the Notion of the Primitive — Approaches to inferring human origins and interpreting people's explanations of their own and others' origins. Physical, linguistic, and comparative cultural evidence about the evolution and dispersion of humans in relation to the origins of Old and New World civilizations. Myths and the narratives of origin, including evolutionary theory, in relation to the way peoples think about themselves and others. The intellectual accomplishments of supposedly "primitive" and "advanced" cultures, asking whether their cognitive models of time, space, and the cosmos justify such differentiation. DR: 1 (three-quarter sequence)

5 units, Aut (Delaney)

9. Encounters: The Anthropology of Contact and Conflict — The conquest of the Americas in the context of the expansion of Europe, beginning with the Iberian engagement with New Spain. How the Euro-American encounter resulting from the expansion of Euro-American identities of indigenous people while forging uniquely American identities of American-born Europeans (Creoles) and persons of mixed descent (Spanish, African, Amerindian). How the meanings of encounters changed from those of the Renaissance during the Enlightenment and under 19th-century liberalism, and in the legacy and experience of California's populations. DR: 1 (three-quarter sequence)

5 units, Win (G. Collier)
10. Identities: The Self, Belonging, and Destiny — European and U.S. ideas about the identities of individuals and the social groups to which they belong. Themes: the discovery and salvation of the self through love (romantic love and love of God), the making of the self through work, the meaning of “citizenship” and national identity, the role of property in shaping identity, the concept of the self as property, and the idea of the authentic self as a stable, internal essence. The different ways women and men from various racial, ethnic, and class groups experience and negotiate their identities. DR:1 (three-quarter sequence)
5 units, Spr (J. Collier, Yanagisako)

PHILOSOPHY AND HUMAN EXISTENCE

Track Chair: P. J. Ivanhoe (Assistant Professor of Philosophy and Religious Studies)
(Enroll in Philosophy 5A,B,C.) The sequence, developed by the Department of Philosophy and the School of Education, examines some of the philosophical roots of our culture. Each week there are two large-group lectures by regular faculty and two 90-minute discussion seminars. The aim is to encourage students to rethink some of the fundamental assumptions, prejudices, and values that have shaped them. Themes include the nature of morality, justice, gender, race, freedom, ideology, and scientific knowledge. Autumn Quarter: the classical foundations of Chinese and Greek philosophic traditions. Winter Quarter: the promise and limits of rational and scientific understanding, and the philosophic basis of modern liberal democratic society. Spring Quarter: 19th- and 20th-century conceptions of the problems and possibilities of human life in light of the increasing intellectual dominance of science. Encourages students to think critically, and stresses the ability to analyze arguments carefully and to articulate those analyses in writing. DR:1 (three-quarter sequence)
5 units, Aut, Win, Spr, MW9
plus two 90-minute discussions
Students pursuing Senior Projects should consult with both the Department of Drama undergraduate adviser and a faculty adviser in the project's specialty area. These consultations should take place early in the junior year. Students must petition approval of Senior Projects through the Department of Drama undergraduate adviser. Projects are typically approved by the department faculty at the end of Spring Quarter of the junior year or the end of Autumn Quarter of the senior year.

The student proposal should include an outline of the courses the student has taken and grades received in the area requirements, and should describe the courses in which they plan to enroll as part of the project. It should describe in detail the purpose and methods involved in the project; a bibliography if appropriate; and a one-to-two page abstract of the associated essay if an essay is part of the project. For a Senior Project to be approved, students must have taken prerequisite Drama courses in certain areas:

1. Acting:
   a) The student must have completed six courses in acting, including 120A, B and one movement class.
   b) The student must have completed at least 2 units of 29 and acted in at least two department productions.
   c) Approved Senior Projects in Acting: students usually perform major roles in department productions produced in the senior year. If no suitable production is available, the student may design an appropriate project or performance.

2. Directing:
   a) The student must have completed three courses in acting as well as 170, Directing, and 134, Stage Management.
   b) The student must have completed at least 4 units of 29 or 39A, 39B, or 39C, thereby participating in some aspect of at least two department productions.
   c) Approved Senior Projects in Directing: the student is assisted in securing a production slot somewhere on campus during his or her senior year. The student must submit for approval a production plan that includes play selection, budget, schedule, staff assignments, and a brief statement of concept and casting procedures. An integral part of the directing project is to administer all aspects of the production. To properly prepare this production plan, the student should consult early and frequently with the Department of Drama technical director. The department supplies materials, supervision, and staff as available to assist the production. In addition to directing the production, the student must submit a copy of the prompt book to the adviser.

3. Design or Technical Production (D/TP):
   a) The student must have completed three courses in Design or Technical Production: 30, 3S, and a 130-level course in the project's specific area.
   b) The student must have completed at least 4 units of 39A, 39B, or 39C and participated in some technical or design aspect of at least two department productions.
   c) Approved Senior Projects in Design or Technical Production: on recommendation of the production committee, the student is assigned design or production responsibility (lighting design, scenery design, costume design, or stage management) for a major Department of Drama production produced in the senior year. If no suitable production in the main season is available, the student may design a project with the assistance of the Design and Technical Production faculty.

4. Dramatic Literature, Criticism, or Theater History:
   a) The student must have taken three courses in dramatic literature at the 100 level, one of which may be from another department: Drama 160 or 161, theater history; and Drama 151, 152, and 153.
   b) Approved Senior Projects in Dramatic Literature, Criticism, or Theater History: the student must submit a research proposal with the endorsement of an adviser from the Drama faculty. The completed senior essay must be submitted to the adviser no later than the first week of the final quarter before graduation.

HONORS PROGRAMS

DRAMA

For a limited number of students, the department confers the degree of Bachelor of Arts with departmental honors in Drama. To be considered for departmental honors, students must meet the following requirements:

1. The student must have fulfilled the requirements for the Drama major.
2. The student must be a Drama major in good standing with an average letter grade indicator (LGI) of 'B+' including all the student's work in Drama.
3. The student must have completed prerequisite courses in the Senior Project's area of specialty with an LGI of 'A-' or better.
4. The student must have completed a Senior Project that the Department of Drama considers outstanding.
5. Honors are awarded on the basis of both the Senior Project and the student's entire work in the Department of Drama.
HUMANITIES
An honors program in Humanities is available for Drama majors who wish to supplement their major with related and carefully guided studies. See the "Humanities Special Programs" section of this bulletin for a description of the honors program. Students who enroll in it may offer Humanities 160 and two seminars from 190-198 in fulfillment of the departmental elective requirement.

GRADUATE PROGRAMS

DOCTOR OF PHILOSOPHY
All graduate study in the Department of Drama leads to the Ph.D. degree. Students in the graduate program are meant to integrate practical theater work with critical and historical study of dramatic literature and theory. All candidates are expected to function both as scholars and as artists. The curriculum offers practical concentration in directing. At the same time, each candidate studies theory, aesthetics, history, and literature to develop a thorough knowledge of the field of drama that leads to original and significant scholarly work. The typical course of study is outlined below under "Units and Course Requirements," but, in consultation with a faculty adviser, students may design a program that integrates practical and critical or theoretical aspects in a way suitable to his or her own background and submit that plan to the department's Graduate Studies Committee during the first year of study.

University regulations regarding this degree are discussed in the "Graduate Degrees" section of this bulletin. The following department requirements are in addition to the University's basic requirements for the doctorate.

UNITS AND COURSE REQUIREMENTS
1. A minimum of 72 units of graduate courses and seminars in support of the degree in addition to the doctoral dissertation.
2. The sequence in Dramatic Criticism and Critical Theory (300, 301).
3. A minimum of five additional graduate seminars in dramatic literature, theater history, directing, or aesthetic theory. One of them must be in theater history, one in directing, and one in dramatic literature in the Department of Drama.

LANGUAGE REQUIREMENT
The candidate must demonstrate reading knowledge of one foreign language in which there is a major body of dramatic literature. The language requirement may be fulfilled in any of the following ways:
1. Achievement of a sufficiently high score (70th percentile) on the foreign language examination prepared by the Educational Testing Service (ETS). Latin and Greek are not tested by ETS.
2. A reading examination given each quarter by the various language departments, except for Latin and Greek.
3. Passage with an LGI of ‘B’ or higher of a course in literature numbered 100 or higher in a foreign language department at Stanford.

The language requirement must be met before the student can be advanced to candidacy.

TEACHING REQUIREMENT
Five quarters of supervised teaching at half time are a required part of the Ph.D. program. The requirement is normally met by teaching three courses during the second year and two courses during the third year.

COMPREHENSIVE EXAMINATIONS
Candidates must complete three examinations, one by the end of each of the first three years of study. Each student is to submit a critical bibliography to his or her adviser for approval the quarter before the quarter in which the examination is taken.

Students are urged to take examinations as early in the quarter as possible. Examinations play an important role in the annual review of a student's progress toward the degree. The first examination must be taken by the end of the first year of residence; the second examination must be taken by the end of the second year of residence (and before advancement to candidacy); the third examination must be taken by the end of the third year of residence (and before the submission of the dissertation prospectus).

Examinations are offered annually in each of the following periods of dramatic literature:
- Classical
- Medieval and Renaissance
- Neoclassical
- Romantic and Early Realistic
- Modern, 1870-1956
- Contemporary, 1956 to the present

Students are required to take three examinations in different historical periods chosen in consultation with an adviser from the Graduate Studies Committee.

APPLICATION FOR CANDIDACY
By the end of the second year of residence, the following requirements or appropriate equivalents must be completed:
1. Dramatic Criticism and Critical Theory sequence (300, 301), four seminars (including one in the Department of Drama), and the directing workshop series (370-374)
2. A foreign language
3. At least two examinations

Based on its evaluation of the student’s progress, the Graduate Studies Committee certifies the student’s qualifications for candidacy. Upon favorable action, the student files formal application for candidacy, as prescribed by the University, by the end of Summer Quarter of the second year.

UNIVERSITY ORAL EXAMINATION

The dissertation prospectus must be approved by the candidate’s adviser and by the departmental Graduate Studies Committee by the end of Spring Quarter of the third year. A University Oral examination is to be taken during the fourth year.

DISSERTATION

Normally, the Ph.D. program is completed in four years. The first year should be devoted to full-time graduate study, the second and third years to graduate study and teaching, the fourth year to writing the dissertation. Following formal admission to candidacy, the dissertation must be completed and approved within five years from the quarter in which candidacy is granted. A candidate taking more than five years is required to reinstate candidacy by re-passing the written examinations on dramatic literature.

APPLICATION AND FELLOWSHIPS

Applicants for the Ph.D. program may write directly to the Department of Drama for information and to the Graduate Admissions Office (Old Union, Stanford, CA 94305-3005) for an application. In addition to the required statement of purpose, all applicants must submit a statement detailing their practical theater experience and a sample of their written critical work. An interview, while not required, is recommended. Interviews are best scheduled after January 10. Graduate students in the Department of Drama begin study in the Autumn Quarter of each academic year; there are no mid-year admissions. All graduate students must be degree candidates. All admissions materials must be submitted to the Department of Drama, Memorial Auditorium m144, Stanford, CA 94305-5010 by January 1, 1996.

The Department of Drama awards a number of fellowships to students in the Ph.D. program.

FOR MORE INFORMATION

Please write to the Department of Drama, Memorial Auditorium, m144, Stanford, CA 94305-5010 or telephone (415) 723-2576. The FAX number is (415) 723-0843. Email is et.jiffsorysthe.stanford.edu.

JOINT Ph.D. IN DRAMA AND HUMANITIES

The Department of Drama participates in the Graduate Program in Humanities (GPH) leading to a joint Ph.D. degree in Drama and Humanities. For a description of that program, see the “Humanities Special Programs” section of this bulletin.

COURSES

A special brochure is available providing full details of courses given in the Summer Quarter.

INTRODUCTORY

2. Introduction to Theater — Lecture introducing students to the theater and various specialties of the discipline that contribute to the final theatrical event. DR:7(2)

3 units, Win (Eddelman)

20. Acting: An Introduction — Theater games and physical exercises in concentration, attention, playing an objective, voice, movement, stage terminology, characterization, performing a monologue, and rehearsal techniques. Provides an experiential overview of actor training and prepares actors for advanced courses. Enrollment limited.

2 units, Aut, Win, Spr (Staff)

27. Musical Theater Workshop — (Enroll in Dance 65.)

2 units, Win (Cashion)

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)

29. Acting in Performance — Students cast in department productions receive credit for their participation as actors; 1-2 units for Graduate Directing Workshop projects and 1-3 units for major productions (units determined by instructor). May be repeated. Prerequisite: consent of instructor.

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

30. Introduction to Theatrical Design — Lecture/lab introducing basic skills of visual communication used in stage productions. Design and construction methods for stage scenery, costumes, and lighting.

5 units, Spr (Stewart, Strayer)

31. Stage Management Techniques — Survey lecture introducing the production process and the
35. Selected Topics in Tech/Design — Hands-on lab in the practical skills needed in the production of theater.

1-3 units any quarter (Staff) by arrangement

39A, B, C. Theater Performance: Crew — Participation in the design and technical areas of department productions. Students commit to a specific show and receive credit for preparation and construction as a member of “running crew” in a specific area. Majors must take 2 units in each area.

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

39A. Scenery and/or Property
39B. Lighting and/or Sound
39C. Costumes and/or Make-up

53. Greek Tragedy — (Enroll in Classics/Greek 12.) DR:7(2)
3-5 units, Win (McCall)

59. Shakespeare — Survey of representative comedies, histories, and tragedies. DR:7(2)
3 units, Win (Lyons)

65. American Musical Theater — Survey of the development of the American musical theater (1850s to the present) as a unique and indigenous art form and as an expression of cultural changes in American society. Slides, recordings, and films. DR:3
3 units, Aut, Win (Eddelman)

INTERMEDIATE

Primarily for the major but open to all undergraduates who have the necessary prerequisites.

103. Improvising — Improvisational theater techniques that teach spontaneity, cooperation, teambuilding, and rapid problem solving. Emphasizes common sense, attention to reality, and helping your partner, based on TheatreSports by Keith Johnstone. Required readings, written papers, and attendance at performances of improvisational theater. Enrollment limited.

3 units, Aut, Spr (Ryan) MWF 10-11:50

113. Group Communication — Focuses on interpersonal processes of communication as they relate to inter-group experience.

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

120A, B. Acting: The Fundamentals — For the student who intends to begin serious actor training. First quarter emphasizes technique in playing an objective. Working improvisationally, the actor learns to enter the stage for a purpose and play an objective in the face of obstacles. Physical and vocal warmups. Second quarter: actor learns to approach a realistic text, moving from a basic knowledge of action and intention to bringing the text alive. Researching a role, developing a character’s biography, and playing truthfully. Basic Method exercises are balanced with kinetic work. T’ai Chi Chuan is taught as the warmup. Read plays and attend performances. Two quarters must be taken in sequence.

120A. 3 units, Aut (Ryan)
120B. Prerequisite: 120A or consent of instructor.

3 units, Win (Ryan)

121. Scene Work — For actors who complete substantial scene work with graduate directors in the graduate workshop.

1-2 units, any quarter (Staff)

125A. Acting Techniques: The Monologue — Solo work in acting involves special techniques; designed to meet the needs of those students who plan to seek the Drama Department’s nomination, or are preparing for, the URTA and other graduate training program auditions. Emphasis is on finding and rehearsing suitable monologues and developing a “portfolio” of performance work. Advice for cold readings and preparing a resume.

3 units, Aut (Ryan)

125B. Acting Techniques: The Actor and Director — Approaches to the actor/director relationship.

3 units, Win (Smith)

125C. Acting Techniques: “Playing Your Fantasy Role” — Students select a favorite role and work on it as a showcase. Class functions as a mini repertory company with participants playing supportive roles in one another’s projects. Emphasis is on stretching personal boundaries. Ideally suited as a crucible for Senior Projects. Prerequisite: 120A or B, or consent of instructor.

3 units, Spr (Ryan)


3 units, Win (Staff)

125V. Acting Techniques: The Human Voice — Working on acting problems related to the areas of voice and speech.

3 units, Aut (Staff)

127A. Dance History and Philosophy — (Enroll in Dance 160A.) DR:7(2)
3-4 units, Win (Ross)

127B. Dance and Live Art in the 20th Century — (Enroll in Dance 160B.) DR:7(2)
3-4 units, Spr (Ross)

129A. Acting Workshop: Skills for the Contemporary Actor — From classical tragedy to postmodern farce. Introducing the body to the brain.

3 units, Aut (Staff)

129B. Acting Workshop: Language and Performance — A.k.a. “Shakespeare On Your Feet” — Language-based acting approach designed to give actors tools for working in Shakespeare. Linklater voice exercises, scansion, actor-oriented text analy-
sis, and cold-reading techniques for verse. Prerequisite: previous acting course or consent of instructor.

3 units, Win (Staff)

129C. Interdisciplinary Acting Workshop — Students develop through collaboration several experimental performances. For those who wish to explore the creative process with others from varying disciplines, e.g. dance, art, communication, engineering, computer science, and English.

3 units, Spr (Farabough)

131. Lighting Design — Lecture/lab dealing with all practical and aesthetic aspects of lighting: electricity, light sources, color instrumentation, control, drafting, plotting and the aesthetic principles of lighting design, interpretation, and concept. Prerequisite: 30 or consent of instructor.

3 units, Spr (Staff)

132. Costume Design — Visual analysis of historical styles of costume design interpreted for the modern theater and developed by the student in various presentational media. Prerequisite: 30 or consent of instructor.

3 units, Win (Staff)

133. Stage Scenery Design — Creations of increasing complexity involving text analysis, historical and artistic style, visual research, spatial organization, drafting, sketching, model building, and director-designer collaboration. Prerequisite: 30, or consent of instructor.

3 units, Aut (Staff)

134. Stage Management Project — For students stage managing a Department of Drama production.

1-5 units, any quarter (Stewart)

135. Project in Theatrical Production — Assistant directing, stage design, costume design, lighting design, sound design, technical production, stage managing, or other work in connection with Department of Drama productions. Prerequisite: consent of instructor.

1-5 units, any quarter (Staff) by arrangement

140. Playwriting — Introduction to the essentials of playwriting through exercises leading to the completion of a one-act play.

5 units, Spr (Staff)

145. A Search for the American Character — The American character through an interview process of individuals of varying social, ethnic, racial, and gender backgrounds. Final project is a performance piece or an essay.

5 units, Win (Smith)

151. Performance and the Body Politic — Three historical moments in which theatrical performance, as a civic event, brought the citizens of a community together in the formation, reinforcement, or examination of a system of belief that was integral to the religious, political, and social organization of that community. Topics: festival performances of tragedy in 5th-century Athens, the Corpus Christi cycle plays of medieval Britain, and the contemporary traveling Yoruba drama of Nigeria based on traditional modes of African performance. The processes in which festival production incorporate, revise, and extend material from myth (or institutionalized systems of belief) to enact ideologically shaped relationships among the individual, the state, and the cosmos. DR:7(2)

4 units, Win (Rayner)

152. Performance and the Body — How drama has represented the human body and how the body on stage reveals assumptions, norms, ideals, politics, and dissension in a culture. Using texts, performance accounts, and non-dramatic readings, compares how the body has been used as an instrument, image, and metaphor. Readings from Euripides, Sophocles, Plato, Theophrastus, Shakespeare, Rousseau, Nietzsche, Artaud, Büchner, Kleist, Bakhtin, Wilson. DR:7(2)

4 units, Win (Elam)

153. Performance and the Mind — The ways in which theatrical performance has constructed images of the human mind within schemes of moral choice, rationality, inspiration or ecstasy, or madness. Relating the staged representation of the mind to the philosophical concepts of the self that operated at the moment of original production. Plays: Sophocles' Ajax, Euripides' Hippolytus and Herakles, Marlowe's Dr. Faustus, Shakespeare's King Lear, John Webster's Duchess of Malfi, Ibsen's Hedda Gabler, Pirandello's Enrico IV, Brecht's A Man's A Man and The Measures Taken, Beckett's Not I and Rockaby, and Heiner Müller's Hamletmachine. DR:7(2)

4 units, Spr (Lyons, Rehm)

154A. Early 20th-Century American Drama — American theater from the early 20th century to the 1960s, focusing on plays by O'Neill, Williams, and Miller. DR:3

4 units, Win (Elam)

154B. Late 20th-Century American Drama — American drama and theater from the 1960s to the present, focusing on elements of theater history and design and the plays of Shepard, Mamet, Kushner, and others. DR:3

4 units, Spr (Eddelman)

155. Black Drama — The dramaturgy, i.e., thematic issues, styles, and aesthetics, of black playwrights in the U.S., the Caribbean, and Africa.

4 units, Spr (Elam)

156. Contemporary Ethnic Drama — Contemporary plays by playwrights of color (Asian-American, African-American, Latino-American), analyzing and identifying the diversity of cultural experiences as evidenced in these plays.

4 units (Elam) alternate years, given 1996-97
156C. Chicano Theater — The history of Chicano/a theater and the continuing genesis of genre.
4 units, Spr (Staff)

158F. Contemporary French Theater — 20th-century French theater, including authors Anouilh, Claudel, Sartre, Camus, Artaud, Genet, Beckett, Ionesco, Duras and stage directors Antoine, Copeau, Planchnon, and Chereau.
4 units, Spr (Apostolidès)

158G. Contemporary German Theater — German drama after Brecht, including playwrights such as Handke, Kroetz, and Müller.
4 units, Aut (Weber)

158I. Iconomy — An emerging research field exploring the different meanings of the word “image” as it relates to concrete images in mental, intellectual, and practical activities, and in pinpointing the similarities among them.
4 units, Win (Apostolidès)

158O. The Plays of O'Neill — An intensive look at one of America's greatest playwrights.
3-4 units, Aut (Staff)

159A,B,C. Shakespeare — (Enroll in English 173A,B,C.) DR:7f(2)
159A. 5 units, Aut (Rebholz)
159B. 5 units, Win (Parker)
159C. 5 units, Spr (Orgel)

170. Introduction to Directing — Prerequisite: consent of instructor.
4 units, Aut (Kuftinec)

171. Undergraduate Theater Workshop — Undergraduate directors present one-act plays in workshop performances. Credit available for actors as well as directors. Prerequisite: consent of instructor or 170.
1-4 units, Win (Staff)

180C. Sophomore Seminar: Drama of August Wilson — For sophomores only. The plays of one of America's most prominent contemporary playwrights.
4 units, Win (Elam)

180D. Sophomore Seminar: Concept of Modernity: Theater, Arts, Culture, and Politics — The concept of modernity as it applies to continental European culture between WWI and WWII. Some aspects of American culture. Prerequisite: consent of instructor.
3-4 units, Spr (Eddelman, Weber) W 1:15-4:05

200. Senior Project — See “Undergraduate Programs” for description.
1-5 units, any quarter (Staff) by arrangement

203. Advanced Improvisation — By audition only. Become members of the Stanford Improvisers (SIMPS) group. Prerequisite: 103.
3 units, Win (Ryan)

213. Stanford Improv Ensemble — For members of the improvisation troupe only. Special project work. By audition only. Prerequisite: 103.
1-2 units, Aut, Spr (Ryan) by arrangement

220A,B. The Actor's Studio — Aimed at the serious student of acting committed to the discipline of the craft and willing to meet the challenges of performance from the perspective of the literate actor. Advanced work in voice, movement, text, acting styles, verse, and language, with guest teachers. Taken in sequence; both quarters required. Prerequisites: audition, consent of instructor.
alternate years, given 1996-97

231. Advanced Lighting Design — Individually structured class in lighting mechanics and design resolved through experimentation, discussions, and written reports. Prerequisite: 131 or consent of instructor.
1-5 units, any quarter (Staff) by arrangement

232. Advanced Costume Design — Individually structured tutorial for costume designers. Prerequisite: 132 or consent of instructor.
1-5 units, any quarter (Staff) by arrangement

233. Advanced Scenery Design — Fast-paced, individually structured workshop. Prerequisite: 133 or consent of instructor.
1-5 units, any quarter (Staff) by arrangement

235. Project in Theatrical Production — See 135.
1-5 units, any quarter (Staff)

4 units, Aut (Elam, Rehm)

252. Performance and the Body — See 152.
4 units, Win (Rayner)
   4 units, Spr (Lyons, Rehm)
254A. Early 20th-Century American Drama —
   See 154A.
   4 units, Win (Elam)
254B. Late 20th-Century American Drama —
   See 154B.
   4 units, Spr (Eddelman)
255. Black Drama — See 155.
   4 units, Spr (Elam)
258F. Contemporary French Theater — See 158F.
   4 units, Spr (Apostolides)
258G. Contemporary German Theater — See 158G.
   4 units, Aut (Weber)
2581. Iconomy — See 1581.
   4 units, Win (Apostolides)
258O. The Plays of O'Neill — An intensive look at
   one of America's greatest playwrights.
   4 units, Aut (Staff)
290. Special Research — Individual project on the
   work of a playwright, period, or genre.
   1-5 units, any quarter (Staff) by arrangement

GRADUATE

For graduates; open to advanced undergraduates
with consent of instructor.
300. Performance Theory — Readings on tensions
   between text and performance analysis in dramatic
   theory and the history of criticism. Readings from
   Plato, Aristotle, and their persistence in contemporary
   issues of representation and reality, formali-
   sm and ideology, art and politics.
   3-5 units, Aut (Lyons)
301. From Theory to Criticism — Seminar addresses
   the relationship between aesthetic theory
   and practical criticism by examining selected works
   of recent scholarship in 5th-century Athenian trag-
   edy, Shakespeare, and Beckett that display the rela-
   tive impact of poststructuralism, cultural material-
   ism, postmodernist theory, feminism(s), or psycho-
   analytic aesthetic theory.
   3-5 units, Win (Lyons)
302. Practical Criticism — Workshop on the prac-
   tical side of the profession: preparing a dissertation
   prospectus, writing research grant proposals, and
   revising and placing journal articles.
   3 units, any quarter (Lyons) by arrangement
353. Seminar: Haunted Memories — Theatrical
   and filmic media as constructions of memory of
   personal and historical pasts. Combines theoretical
   texts (Bergson, Deleuze) with drama and film.
   3-5 units, Aut (Rayner)
360. Seminar: Topics in Theater History — Clas-
   sical Greece to the Beginning of the 19th Cen-
   tury — The stylistic evolution of theaters and stag-
   ing from the classical period to the early develop-
   ment of Romanticism. Emphasis is on the ways
   theaters and staging reflect their own cultural and
   spatial environments.
   3-5 units (Eddelman)
   alternate years, given 1996-97
361. Seminar: Topics in Theater History — 1800
   to the 1970s — Emphasis is on innovation and ex-
   perimentation as it developed in European and
   American theater, focusing on the aesthetic theories
   behind early Realism, Naturalism, Appia, Craig, the
   "isms," and scenography created by artists.
   3-5 units, Win (Eddelman)
370-374. Graduate Directing Workshop — The
   core curriculum for graduate students in directing.
   Prerequisite: consent of instructor.
370. Concepts of Directing — The basic di-
   rectorial definitions of time, space, movement,
   and the performer/spectator relationship. Ex-
   perimentation with texts chosen from literary
   and other sources, including works from the
   realistic tradition in drama, using a multi-form
   performance space.
   5 units, Win (Weber)
371. Design for Directors — Introduction to
   the concepts of stage, costume, and light de-
   sign. Creative procedures, e.g., designing
   groundplans and elevations, building a model,
   sketching and swatching of costumes, and prac-
   tical work in the lighting-lab.
   3 units, Aut (Eddelman)
372. Projects in Directing — Theatrical text
   and its transformation into performance. Tex-
   tual analysis, research, evolution of a direc-
   torial concept, and its investigation in scene-
   work with actors. Students design and stag
   the production of a short play in a multi-form
   space. Public performance.
   5 units, Spr (Weber)
373. Directing the Actor — Approaches to the
   actor/director relationship, the application of
   recent theories of language acquisition and use
   to acting problems. The development of exer-
   cises and rehearsal strategies that relate speech
   in the theater to contemporary notions of lan-
   guage use.
   3 units, Win (Smith)
374. Graduate Directors’ Performance
   Project — Production of a full-length play se-
   lected in consultation with faculty. Project is
   designed by graduate students, sometimes in
   collaboration with undergraduate design stu-
   dents, under the supervision of design faculty.
   Four to five weeks rehearsal. Public perfor-
   mance.
   3-5 units, any quarter (Weber)
   by arrangement
375. Seminar: Directing and Dramaturgy — Dis-
   cussion/application of dramaturgy, directorial meth-
ods, and visual concepts in plays from the Elizabethan tradition to Post-Modernist texts. Work on the text is tested in the staging of scenes.

3-5 units, Aut (Weber)

376. Graduate Directors’ Dramaturgy Project — Serving as a dramaturg on any department production. Work includes research on the production’s text source, the writing of program notes, and the compilation and editing of the playbill. Possible adapting/editing of the performance text, and translating text from a foreign language.

2 units, any quarter (Weber) by arrangement

377. Graduate Directors’ Staged Reading Project — Presentation of a new or newly adapted work for the stage, in a mode employed in the professional theater for the development of new plays. Two to four rehearsals. Public performance.

2 units, any quarter (Weber) by arrangement

390. Tutorial

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

399. Dissertation Research

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

OVERSEAS STUDIES

These courses are approved for the Drama major and taught at the campus indicated. Students should discuss with their major advisers which courses which 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.

101A. German Theater — Berlin.

4-5 units, Spr (Kramer)

158D. Drama in Britain Today — (Same as Overseas Studies 254Z, English 254Z.) Oxford.

4 units, Aut (Mateer)


4 units, Spr (Mateer)

158S. Theater and Society — Santiago.

5 units, Aut (Hurtado)

EAST ASIAN STUDIES

Director: to be announced
Assistant Director: Theodore N. Foss
Affiliated Faculty:
Art: John D. La Plante (emeritus), Michael Sullivan (emeritus), Melinda Takeuchi, Richard Vinograd
Comparative Literature: David Palumbo-Liu
Economics: Masahiko Aoki, John J. Gurlay (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, Ellen Neskar, Lyman P. Van Slyke (emeritus)
Law: Victor Hao Li
Linguistics: Peter Sells
Philosophy: Philip J. Ivanhoe, David S. Nivison (emeritus)
Political Science: Nobutaka Ike (emeritus), John W. Lewis, Robert North (emeritus), Daniel Okimoto, Kurt Steiner (emeritus), Robert E. Ward (emeritus)
Religious Studies: Carl Bielefeldt, Bernard Faure, Philip J. Ivanhoe, David S. Nivison (emeritus), Lee H. Yearley

In addition, a number of other Stanford faculty have some teaching or research interests related to East Asia: Takeshi Amemiya (Economics), Barton Bernstein (History), Henri-Claude de Bettignies (Business), Walter P. Falcon (Food Research), William B. Gould (Law), Thomas Metzger (Hoover Institution), David Montgomery (Business), Ramon Myers (Hoover Institution), Evan Porous (Business), Sylvia Yanagisako (Anthropology), Pan A. Yotopoulos (Food Research)

The Center for East Asian Studies (CEAS) coordinates all University instructional, research, and special activities related to China and Japan. Faculty and students who share a common interest in the study of East Asia are brought together by the center from a broad range of academic concerns covering nearly every discipline and historical period. In addition to supporting a wide variety of academic and extra-curricular activities on the Stanford campus, the center is also involved in programs that link the University’s resources on China and Japan with civic groups, secondary schools, and local colleges in the San Francisco Bay Area. As a National Resource Center designated by the Department of Education, Title VI, CEAS sponsors programs that provide opportunities for East Asian Studies faculty and students to meet and work with one another. Further information may be obtained from the Center for East Asian Studies, Room 14, Littlefield Center, Stanford University, Stanford, California 94305; telephone 415-723-3362, 723-3363.
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

4. Senior Essay: completion of a paper of approximately 7,500 words to be submitted as a senior essay in East Asian Studies. Insofar as possible, the essay should integrate the substantive concentration. It may be written for one of the courses offered as part of that concentration or in connection with directed individual study, which may be credited toward the substantive concentration.

HONORS PROGRAM

Majors with an LGI of 3.25 or better in all courses related to East Asia may apply for the honors program no later than the end of the junior year. Application entails submitting an honors prospectus to the student’s adviser for approval. Admission is granted by the subcommittee on the A.B. program, acting on the adviser’s recommendation.

Honors requirements are satisfactory completion of (1) an honors thesis of high quality of approximately 10,000 words to be submitted in lieu of the senior essay otherwise required for the major, (2) 5 to 10 units of directed individual study in connection with the thesis project, and (3) one advanced level colloquium or seminar treating China, Japan, or both.

COTERMINAL DEGREE

The center admits a limited number of Stanford undergraduates to work for a coterminal A.M. degree in East Asian Studies. While the coterminal degree plan permits admission to a graduate program as early as the eighth quarter and no later than the end of the eleventh quarter of undergraduate study at Stanford, the center accepts A.M. applications only once a year. Therefore, applications must be submitted by January 1. Applicants are expected to meet the same general standards as those seeking admission to the A.M. program: they must submit a written statement of purpose; a Stanford transcript; three letters of recommendation, at least two of which should be from members of the department of concentration; and scores from the General Test of the Graduate Record Exam. In addition, applicants must provide a list of courses they intend to take to fulfill degree requirements. The decision on admission rests with the A.M. Admissions Committee of the Center for East Asian Studies. Students must meet all requirements for both A.B. and A.M. degrees. They must complete a total of 15 full-time quarters (or the equivalent), or three full quarters after completing 180 units for a total of 217 units.
EAST ASIAN STUDIES
THEME HOUSE
EAST House, on campus at Governor's Corner, is an undergraduate residence that houses 60 students and offers them a wide variety of opportunities to expand their knowledge, understanding, and appreciation of Asia. A member of the East Asian faculty serves as resident fellow of EAST House. Assignment is made through the regular undergraduate housing draw.

KYOTO CENTER FOR JAPANESE STUDIES
Students interested in the study of Japanese language, history, culture, and social organization can apply to the Kyoto Center for Japanese Studies, a September-to-April program managed by Stanford that includes students from eight other American universities. Every Spring Quarter, the Stanford Center in Technology and Innovation, also at the Kyoto Center, offers an academic quarter focused on Japanese organizations and the political economy of research, development, and production of high technology and advanced industries. An internship in a Japanese firm, laboratory, or agency follows the training program. For information about Kyoto, contact the Overseas Studies office at Sweet Hall, telephone 415-723-3558.

GRADUATE PROGRAMS
MASTER OF ARTS

The A.M. Program in East Asian Studies is designed both for students who plan to complete a Ph.D. but who have not yet decided on the particular discipline in which they prefer to work and for students who wish to gain a strong background in East Asian Studies in connection with a career in nonacademic fields such as business, law, education, journalism, or government service. However, career-oriented students should realize that a master’s degree in East Asian Studies alone may often provide insufficient preparation for work in many professions, and they are advised to plan for additional professional training.

The master’s degree program allows a great deal of flexibility in combining language training, interdisciplinary area studies, and a disciplinary concentration. The director of the center assigns faculty advisers to all students. Members of the staff and faculty are available for academic and career planning. The A.M. program is normally completed in two academic years, but students can shorten this time by receiving credit for prior language work or by attending summer sessions. Because of the limited availability of the center’s financial resources, students admitted to this program with aid are urged to complete the degree requirements in less than two years if their background makes it possible.

Applicants must submit scores for the General Test of the Graduate Record Examination. Foreign applicants are also required to take the Test of English as a Foreign Language. Applications for admission and financial aid may be obtained by writing to Graduate Admissions, Old Union, Stanford University, Stanford, California 94305-3005. The deadline for completed applications for admission and financial aid is January 1.

The basic requirements for the A.M. degree in East Asian Studies are as follows:

Language Requirement — Students must complete the equivalent of Stanford’s first three years of language training in either Chinese, Japanese, or Korean. Students entering the program without any language preparation should complete 30 units of Chinese, Japanese, or Korean, (first- and second-year) within the first year of residence at Stanford. This will necessitate completing a summer language program. Language courses taken at Stanford must be for letter grades.

The language requirement may be satisfied in part or in full by placing into an appropriate Stanford language class through the language proficiency exam given by the Department of Asian Languages. Students who fulfill this minimum three-year language requirement before completing other requirements are encouraged to continue language study, or take courses in which Chinese or Japanese are used, for as long as they are in the program. Graduate language courses may be applied to the Area Studies requirement discussed below.

Area Studies Requirement — Students must complete the 1-unit core course, East Asian Studies 330, and an additional nine courses numbered 100 or above related to East Asia and totaling at least 37 units beyond the courses used to fulfill the third-year-level language requirement. (Chinese and Japanese language courses numbered 100-199 are considered to be at the third-year level and do not count toward the courses required for the degree.) The nine courses must be 3 or more units and be taken for a letter grade. At least 18 units must be designated primarily for graduate students (typically at the 200 level).

An integral part of the program is training in research and a demonstration of research ability in a discipline. Three courses, one of which must be a seminar, colloquium, or advanced course in which a research paper on China or Japan is written, must be within a single department. A master’s paper, representing a substantial piece of research, should be filed with the center’s programs office as part of the graduation requirements. With the adviser’s approval, the master’s paper requirement may be satisfied by using a research paper...
written for an advanced course. The six additional area courses may be taken in departments of the students' choosing. Some theory-oriented or methodological courses may be used to meet part of these requirements provided they are demonstrably useful for understanding East Asian problems. Except in unusual circumstances, credit toward the Area Studies requirement is not given for courses taken before entering the A.M. program. Students in this program may, however, take courses for exchange credit at the University of California, Berkeley with the approval of their adviser. In any case, Stanford University requires the payment of a full three quarters of tuition for a University degree to be granted.

JOINT DEGREE PROGRAMS

EAST ASIAN STUDIES AND LAW
This joint program grants an A.M. degree in East Asian Studies and a Doctor of Jurisprudence (J.D.) degree. It is designed to train students interested in a career in teaching, research, or the practice of law related to East Asian legal affairs. Students must apply separately to the East Asian Studies A.M. program and to the Stanford School of Law and be accepted by both. Completing this combined course of study requires approximately four academic years, depending on the student’s background and level of training in Chinese or Japanese.

EAST ASIAN STUDIES AND EDUCATION
This joint program grants an A.M. degree in East Asian Studies and a secondary school teaching credential in social studies. To be eligible for this program, students should apply to the A.M. program in East Asian Studies and then apply to the Stanford Teacher Education Program during the first year at Stanford. Completing the joint program requires at least two years, including one summer session when beginning the education component of the program.

EAST ASIAN STUDIES AND BUSINESS
This joint program grants an A.M. degree in East Asian Studies and a Master of Business Administration. Students must apply separately to the East Asian Studies A.M. program and the Graduate School of Business and be accepted by both. Completing this combined course of study requires approximately three academic years (perhaps including summer sessions), depending on the student’s background and level of training in Chinese or Japanese language.

RELATED PROGRAMS
Qualified graduate students may apply for A.M. degrees within the Food Research Institute and the School of Medicine.

EAST ASIAN STUDIES AND FOOD RESEARCH
An A.M. degree may be awarded by the Food Research Institute to students who complete 25 units of work in the institute with a letter grade indicator (LGI) of ‘B’ or better and at least 45 units of approved work in courses numbered 100 or above with a grade of ‘B’ or better. Course work is designed at the outset of the program to equip students with specific skills and is not encouraged for those desiring a Ph.D. from the Food Research Institute. Applications should be made to Chair, Graduate Instruction Committee, Food Research Institute, Encina Hall Stanford, CA 94305.

EAST ASIAN STUDIES AND HEALTH SERVICES RESEARCH
The M.S. degree in Health Services Research (HSR) is an interdisciplinary program training students in research and analytic skills for careers in the growing health industry as innovative health planners, system analysts, and policymakers. Students concluding the first year of graduate study at Stanford are eligible to apply for the degree, which is granted by the Department of Health Research and Policy in the School of Medicine. The degree may be pursued concurrently with the second and subsequent years of graduate study and is awarded on completion of 45 units of course work. This work is to be split approximately equally between research workshops and formal courses relevant to the health sector. Each student’s program is planned to meet individual interests in health services in addition to fulfilling HSR core requirements. For more information, apply to the Program Administrator, Division of Health Services Research, Health Research and Policy Building, Stanford, CA 94305.

GRADUATE OVERSEAS PROGRAM
Stanford is the administrative home for the Inter-University Language programs in Taipei and Yokohama. For further information, see the “Institute for International Studies” section of this bulletin.

DOCTORAL PROGRAMS
Stanford does not offer a Ph.D. in East Asian Studies. However, there are more than 100 doctoral students with a specialization on China or Japan within various departments and schools of the University. The departments that offer an East Asian concentration are: Anthropology, Art, Asian Languages, Comparative Literature, Economics, History, Linguistics, Philosophy, Political Science, and Religious Studies. It is also possible to specialize in East Asia within some of the doc-
toral programs of the professional schools of Business, Education, and Law, and the Food Research Institute. Inquiries should be directed to the individual department or school concerned.

FINANCIAL AID

Students in A.M. or Ph.D. programs who plan to do work in Chinese or Japanese language, or language-related area courses, may be eligible for Foreign Language and Area Studies (FLAS) fellowships and are encouraged to apply for them at the time of application to Stanford. Recipients of FLAS fellowships must be American citizens or permanent residents. For further information, contact FLAS Grant Administrator Building 1, Second Floor, Stanford, California 94305-2070.

COURSES

The courses listed below deal primarily with China, Japan, and/or Korea. Many other theoretical and methodological courses within the various departments at Stanford are taught by faculty who are East Asian specialists; these courses often have a substantial East Asian component and may be found under the department listings in this bulletin.

14. Introduction to Chinese Society — (Same as Anthropology 114.)
5 units, Spr (Wolf) MWF 3:15

330. Core Seminar: Issues and Approaches in East Asian Studies
1 unit, Aut (Staff) M 3:15

AFFILIATED DEPARTMENT OFFERINGS

ANTHROPOLOGY

14. Cultures in Crisis
5 units

117. Society in Traditional China
5 units (Gates) not given 1995-96

121. Japanese Society and Culture
5 units

123. Japanese Economic Organization
5 units

125. Japanese Woman through Novels
5 units

258. Ideology and Cultural Nationalism
5 units

ART

2. Ideas and Forms in Asian Art
5 units, Win (Vinograd)

126A/226A. Introduction to the Study of Chinese Painting
4 units (Vinograd) not given 1995-96

126B/226B. Early Chinese Pictorial Art
4 units (Vinograd) not given 1995-96

126C/226C. Artists and Systems in Later Chinese Painting
4 units (Vinograd) not given 1995-96

126E/226E. Across Cultures: Encounters of Eastern and Western Art
4 units (Vinograd) not given 1995-96

129/229. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868
4 units (Takeuchi) not given 1995-96

129A/229A. Painting in Late Medieval and Early Modern Japan, 1500-1868
4 units, Spr (Takeuchi)

227/227A. Seminar: Painting and Theory in the Sung Dynasty
4 units (Vinograd) not given 1995-96

227B. Seminar: Studies on 18th- and 19th-Century Chinese Painting
4 units (Vinograd) not given 1995-96

229D. Seminar: Problems in Japanese Painting
4 units (Takeuchi) not given 1995-96

229E. Colloquium: "Pictures of the Floating World"—Images from Japanese Popular Culture
4 units (Takeuchi) not given 1995-96

229G. Colloquium: Women and Gender in Japanese Art
4 units (Takeuchi) not given 1995-96

ASIAN LANGUAGES

51/151. Japanese Business Culture
3 units, Win (Dasher)

91. Traditional East Asian Civilization: China
5 units, Aut (Saussy) MWF 10

92. Traditional East Asian Civilization: Japan
5 units, Win (Staff) MWThF 2:15

131. Chinese Poetry in Translation
4 units, Aut (Liu) TTh 1:15-2:30

132. Chinese Fiction in Translation
4 units, Win (Kelley)

133. Modern and Contemporary Chinese Literature in Translation
4 units, Spr (Lyell) MWF 2:15

135. Japanese Drama in Translation
4 units (Matisoff) not given 1995-96

136. Japanese Poetry in Translation
4 units (Staff) not given 1995-96

137. Japanese Fiction in Translation
4 units, Win (Yodo) WF 1:15-2:30

138. Modern Japanese Literature in Translation
4 units, Spr (Staff) MWF 1:15
141. Chinese Mythology  
4 units, Win (Liu) TTh 2:15-3:30

181. Japanese Women Writers  
4 units (Matisoff) not given 1995-96

195. Modern Intellectuals in Japanese Literature  
3 units, Aut (Ueda) M 2:15-4:05

CHINESE  
First-time registrants in a first- or second-year course must take a placement test if they have had any training in Chinese before entering Stanford.

1,2,3. First-Year Modern Chinese  
5 units, Aut, Win, Spr (Shou)  
MTWThF 10, 11, or 1:15

1B,2B,3B. First-Year Modern Chinese for Bilingual Students  
3 units, Aut, Win, Spr (Rozelle, Yu)  
MTWThF 10, 11, 1:15, or 2:15

5. Intensive First-Year Modern Chinese  
8 units, Sum (Rozelle) MTWThF 8-12

6,7,8. Beginning Conversational Chinese  
2 units, Aut, Win, Spr (Rozelle) TTh 2:15

21,22,23. Second-Year Modern Chinese  
5 units, Aut, Win, Spr (Y. Wang)  
MTWThF 9 or 10

21B,22B,23B. Second-Year Modern Chinese for Bilingual Students  
3 units, Aut, Win, Spr (Y. Wang)  
MTWThF 12 or 2:15

25. Intensive Second-Year Modern Chinese  
8 units, Sum (Staff) MTWThF 8-12

27,28,29. Intermediate Chinese Conversation  
2 units, Aut, Win, Spr (Shou) TTh 2:15

51. Chinese Calligraphy  
1-2 units, Win, Spr (Chuang) TTh 2:15

CHINESE/ADVANCED  

101,102,103. Third-Year (Modern) Chinese  
5 units, Aut, Win, Spr (Yu) MTWThF 10

105. Intensive Modern Chinese  
8 units, Sum (Staff) MTWThF 9-12

121,122,123. Advanced Chinese Conversation  
2 units, Aut, Win, Spr (Chuang) W 2:15-4:05

131,132,133. Business and Legal Chinese  
3 units, Aut, (Q. P. Wang) by arrangement  
Win, Spr (Staff) by arrangement

CHINESE/GRADUATE  

200. Directed Reading in Chinese  
units by arrangement, Aut, Win, Spr (Staff) by arrangement

201. Proseminar  
3 units, Win (Dien) W 2:15-4:05

211,212,213. Advanced Modern Chinese  
5 units, Aut, Win, Spr (Chuang) by arrangement

221,222,223. Advanced Classical Chinese  

221. Philosophical Texts  
5 units (Staff) not given 1995-96

222. Historical Narration  
5 units, Win (Saussy) TTh 11-12:15

223. Literary Essays  
5 units, Spr (Liu) TTh 2:15-3:05

241,242,243. Modern Chinese Literature  

241. The Short Story  
5 units (Lyell) not given 1995-96

242. Essay  
5 units, Spr (Chuang) MWF 10

243. The Novel  
5 units, Win (Lyell) MWF 14

261. Shih-ching  
4 units, Spr (Saussy) MWF 1:15

263. Lyric (shih) I  
4 units (Liu) not given 1995-96

264. Lyric (shih) II  
4 units (Liu) not given 1995-96

266. Chinese Tz’u Poetry (Song Lyrics)  
4 units, Aut (Liu) W 3:15-5:05

271. Traditional Chinese Fiction  
4 units, not given 1995-96

273. Chinese Drama  
4 units (J. Wang) not given 1995-96

291. The Structure of Modern Chinese  
4 units (Sun) not given 1995-96

292. The History of Chinese  
4 units, Spr (Sun) by arrangement

334. Seminar in Modern Chinese Literature  
5 units, Spr (Lyell) MW 2:15-3:30

361. Seminar on Tz’u Poetry of the Tang and Song  
5 units, not given 1995-96

371. Seminar in Chinese Literary Criticism  
5 units, Spr (Saussy) by arrangement

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 (Busbin, Staff)  
MTWThF 9, 10, 11, or 1:15

5. Intensive First-Year Modern Japanese  
12 units, Sum (Staff) MTWThF 8-12

3 units, Aut, Win, Spr (Kubo)  
MTWThF 9, 11, or 1:15
17/117, 18/118, 19/119. Second-Year Japanese for Professionals
3 units, Aut, Win, (Yagi) MWF 9 or 10
Spr (Yagi) MWF 10
21,22,23. Second-Year Modern Japanese
5 units, Aut, Win, Spr (Nebrig, Staff)
MTWThF 9, 11, or 1:15
25. Intensive Second-Year Modern Japanese
12 units, Sum (Staff) MTWThF 8-12
27,28,29. Intermediate Japanese Conversation
2 units, Aut, Win, Spr (Kubo) TTh 2:15
30/130. Reading Technical Japanese
1-3 units, Sum (Dashier)
JAPANESE/ADVANCED
101,102,103. Third-Year Modern Japanese
5 units, Aut (Arao) 11-12:20 or 12:45-2:05
Win, Spr (Arao) MWF 11-12:20
105. Intensive Third-Year Modern Japanese
12 units, Sum (Staff) MTWThF 9-12
3 units, Aut, Win, Spr (Yagi) TTh 11-12:20
114. Japanese for Business
3 units, Sum (Staff) TTh 4-6
121,122,123. Advanced Japanese Conversation
2 units, Aut, Win, Spr (Kubo) TTh 1:15
JAPANESE/GRADUATE
200. Directed Reading in Japanese
units by arrangement, Aut, Win, Spr (Staff) by arrangement
201. Proseminar
5 units, Aut (Hare)
208. Teaching Asian Languages
2 units, Win (Staff) by arrangement
211,212,213. Advanced Modern Japanese
5 units, Aut, Win (Matsumoto) TTh 11-12:15
Spr (Kubo) TTh 11-12:15
246. Introduction to Classical Japanese
5 units, Aut (Hare) MWF 10
247,248. Readings in Classical Japanese
247. 5 units, Spr (Staff) by arrangement
248. 5 units, not given 1995-96
250. Introduction to Kambun
4 units (Ueda) not given 1995-96
256. Readings in Japanese Culture
4 units (Staff) not given 1995-96
258. Japanese Buddhist Texts—(Same as Religious Studies 258.)
5 units (Bielefeldt) not given 1995-96
260. Japanese Poetry and Poetics
4 units, Spr (Hare)
275. Canons and Conventions in Traditional Japanese Literature
4 units (Hare) not given 1995-96
277. The Structure of Japanese
4 units, Spr (Matsumoto)
280. Medieval Japanese Narrative and Dramatic Literature
4 units (Matisoff) not given 1995-96
281. Japanese Pragmatics
4 units (Matsumoto) not given 1995-96
294. Major Haiku Poets
4 units (Ueda) not given 1995-96
296. Readings in Modern Japanese Literature
4 units, Aut (Ueda) WF 11-12:15
297. Images of Women in Modern Japanese Literature
4 units (Ueda) not given 1995-96
298. Translation Workshop
4 units (Ueda) not given 1995-96
330. Seminar in Heian Fiction
5 units (Hare) not given 1995-96
333. Seminar in Japanese Classical Drama
5 units (Hare) not given 1995-96
396. Seminar in Modern Japanese Literature
5 units (Ueda) not given 1995-96
KOREAN
1,2,3. First-Year Modern Korean
5 units, Aut, Win, Spr (Cho) MTWThF 1:15
21,22,23. Second-Year Modern Korean
5 units, Aut, Win, Spr (Cho) MTWThF 2:15
101,102,103. Third-Year Modern Korean
3 units, Aut, Win, Spr (Cho) by arrangement
200. Directed Reading in Korean
units by arrangement, Aut, Win, Spr (Cho) by arrangement
271. The Structure of Korean
4 units, Win (Cho) by arrangement
ECONOMICS
121. The Economies of Greater China and the World—(Same as Food Research 148/248.)
5 units, Spr (Rozelle) TTh 1:15-3:05
124. The Japanese Economy
5 units, Win (Aoki)
126. Comparative Economic Institutions: The Economics of Transition
5 units, not given 1995-96
131. The Development of the Korean Economy
5 units, Win (Soon)
134. Development of the Newly Industrialized Economies
5 units, not given 1995-96
220. Marxian Economic Theory
5 units, not given 1995-96

293. Reform and Transition in Socialist Economies
5 units, not given 1995-96

EDUCATION

161. Introduction to Teaching and Learning in Asia
3 units, Spr (Herring) by arrangement

274. Learning, Teaching, and Schooling in Japanese Society
4 units (Rohlen) not given 1995-96

306C. Cultural Approaches to Education and Development
3-5 units (McDermott) given 1996-97

HISTORY

159. Introduction to Asian American History
4-5 units, Win (Chang) MTWTh 10

192A. Chinese History from Earliest Times to the 9th Century — (Same as Asian Languages 156.)
5 units, Win (Neskar) MTWThF 11

192B. Chinese History from the Mongols to the 19th Century
5 units, Aut (Kahn) MTWThF 11

192C. Modern China, 19th and 20th Century
5 units, Spr (Hayford)

194A. Early and Medieval Japan to 1500
5 units (Mass) not given 1995-96

194B. Late Medieval and Early Modern Japan
5 units, Aut (Eskildsen) MTWThF 10

194C. History of Japan, the 19th Century
5 units, Win (Duus, Eskildsen) MTWTh 1:15

194D. The Rise of Modern Japan
5 units, Spr (Duus) MTWThF 1:15

265S. Undergraduate Research Seminar: Asian-American History — (Same as History 465.)
5 units (Chang) not given 1995-96

290. Undergraduate Colloquium: United States and Japan
5 units (Duus) not given 1995-96

291. Undergraduate Colloquium: The Institutions of Medieval Japan
5 units (Mass) not given 1995-96

290. Graduate Colloquium: United States and Japan
4-5 units (Duus) not given 1995-96

390A. Graduate Colloquium: Topics in Middle-Period Chinese History
4-5 units, Spr (Neskar) W 1:15-3:05

390C. Graduate Colloquium: Topics in Late Traditional and Modern Chinese History
4-5 units, Spr (Hayford)

392. Graduate Colloquium: Postwar Japan
4-5 units (Duus) not given 1995-96

395A. Graduate Colloquium: Early and Medieval Japan
4-5 units (Mass) not given 1995-96

395B. Graduate Colloquium: Late Medieval and Early Modern Japan
4-5 units (Ketelaar) not given 1995-96

395C. Graduate Colloquium: Modern Japan
4-5 units, Spr (Duus) Th 3:15-5:05

399. Graduate Colloquium: The Institutions of Medieval Japan
4-5 units (Mass) not given 1995-96

490A, B. Graduate Seminar: Modern Chinese History
8-10 units, not given 1995-96

493A, B. Graduate Seminar: Late Traditional Chinese History
8-10 units, Win, Spr (Kahn) T 1:15-3:05

498. Graduate Seminar: Japanese History Texts
4-5 units, Win (Mass) by arrangement

498A. Graduate Seminar: Japanese History Sources
4-5 units (Mass) not given 1995-96

PHILOSOPHY

46. Introduction to Chinese Thought — (Same as Religious Studies 55.)
4 units, not given 1995-96

211. Philosophical Texts of the Ming Dynasty — (Same as Religious Studies 211.)
5 units, not given 1995-96

POLITICAL SCIENCE

20. Issues of Comparative Politics: Power, Policy, and Industrial Development
5 units, Win (Abernethy)

125. The Rise of Industrial Asia — (Same as Economics 130.)
5 units, Aut (Lau, Okimoto, Raphael, Rohlen)

138B. Seminar: Security and Diplomacy
5 units, Spr (Lewis)
139A. Japanese Foreign Policy
5 units, Win (Okimoto)

223. Seminar: Japanese Politics
5 units, given 1996-97

RELIGIOUS STUDIES

14. Introduction to Buddhism
4 units, Win (Faure)

18. Zen Buddhism
4 units, Spr (Bielefeldt)

20. Chinese Religious Thought and Practice
4 units, Aut (Faure)

55. Introduction to Chinese Thought — (Same as Philosophy 46.)
4 units, not given 1995-96

113. Zhuang Zi — (Same as Philosophy 113/213.)
5 units, not given 1995-96

116. Japanese Buddhism
5 units (Bielefeldt) not given 1995-96

117. Syncretism and Sectarianism in Chinese Buddhism
5 units (Faure) not given 1995-96

118. Ritual in East Asian Buddhism
4 units (Faure) not given 1995-96

119A. Neo-Confucianism — (Same as Philosophy 114.)
4 units (Ivanhoe) not given 1995-96

124. Religion in Japan
5 units, Win (Faure)

136. Buddhist Yoga
4 units (Bielefeldt) not given 1995-96

150. Mahayana Buddhism
5 units, Aut (Bielefeldt)

210. Speech and Writing in the Buddhist Traditions
4 units (Faure) not given 1995-96

212. Interpreting Confucian Texts — (Same as Philosophy 212.)
5 units (Ivanhoe) not given 1995-96

221. Ch’uan/ Zen and Local Religion
5 units (Faure) not given 1995-96

230A. Zen Buddhism Seminar
5 units (Bielefeldt) not given 1995-96

256. Japanese Buddhism Seminar
4 units, Aut (Bielefeldt)

258. Japanese Buddhism Texts
5 units (Bielefeldt) not given 1995-96

319. East Asian Religions
(Bielefeldt, Faure, Ivanhoe, Yearley)
by arrangement
analysis of contemporary economic problems, and to develop in them an ability to exercise judgment in evaluating public policy. There is training for the general student as well as for those who plan careers as economists in civil service, private enterprise, teaching, or research.

The undergraduate program provides an excellent background for those going on to graduate work in the professional schools (for example, business and law) and may also be structured to prepare students for a Ph.D. program in economics. The department's curriculum is an integral part of Stanford's programs in International Relations, Public Policy, and Urban Studies, as well as the Food Research Institute.

The primary objective of the graduate program is to educate students as research economists. In the process, students also acquire the background and skills necessary for careers as university teachers and as practitioners of economics. The curriculum includes a comprehensive treatment of modern theory and empirical techniques. Currently, 20 to 25 students are admitted each year.

The faculty represent a wide spectrum of interests and conduct research on a broad range of topics. Most fields of economics are covered, including alternative economic systems, comparative institutional analysis, econometrics, economic development, economic history, industrial organization, international trade, labor, macroeconomic and microeconomic theory, mathematical economics, and public finance.

**UNDERGRADUATE PROGRAMS**

**BACHELOR OF ARTS**

Note — The department established a new curriculum for the undergraduate program beginning Autumn Quarter 1992-93. Students who declared an economics major before May 30, 1992 may remain under the old requirements for the major and honors programs or may elect to fulfill the new requirements. The old requirements for the Perspectives and Policies and the Quantitative Economics programs are found in previous versions of *Courses and Degrees* or in the department's *Information Book for Economics Majors*, available in Economics 136. For transition arrangements for continuing majors during 1995-96, or for declaring the major, see the *Information Book for Economics Majors*.

The new program consists of a single unified track. Its purpose is to teach students to think and write clearly about economic problems and policy issues, using a mathematical orientation where appropriate and applying the basic tools of economic analysis.

**COURSE WORK REQUIREMENTS**

(60 units)

1. Economics 1 (5 units).
2. Economics 180 (5 units). Students may substitute Math. 43 or an equivalent calculus course for this requirement.
3. Economics 80 (5 units). It is recommended that students satisfy this requirement before proceeding with the rest of the program.
4. Economics 51 and 52 (10 units). Requirement 2 must be completed before taking 51.
5. Two courses must be chosen from among Economics 111, 118, 140, 141, 145, 149, 150, 155, 156, 157, 162, 165, and 185, and they must be taken at Stanford in California (10 units).
6. Economics 101 is required and must be taken at Stanford in California (5 units). This course may be taken only after completing requirement 5.
7. Twenty additional units from economics courses numbered between 100 and 198, excluding 190 and 191, must be taken. At least 10 units must be chosen from courses with a prerequisite of 51, 52, or both, and taught at Stanford in California.

**OTHER REQUIREMENTS**

No courses receiving Department of Economics credit under the preceding requirements may be taken CR/NC. An average letter grade indicator (LGI) of 'C' or better must be received for all units applied toward the preceding requirements.

To use transfer credit in partial satisfaction of the requirements, the student must obtain written consent from the department's Associate Director of Undergraduate Studies, who will establish the amount of credit to be granted toward the department requirements (see the *Information Book for Economic Majors*).

The time limit for satisfactory completion of a course is determined by the instructor, but ordinarily will not exceed one year from the date an "incomplete" is given. Students are responsible for seeing that all grades of incomplete are cleared within the time limit.

**SAMPLE PROGRAMS**

Sample listings of upper-division economics electives may be examined in the department's *Information Book for Economics Majors*, available in Economics 136. Sample programs are provided for the following areas of emphasis: (1) liberal arts, (2) pre-business, (3) quantitative, (4) international, (5) political economy and regulation, and (6) preparation for graduate school in economics.
HONORS PROGRAM

The honors program offers an outstanding opportunity for independent research, creativity, and achievement. It is designed to encourage a more intensive study of economics than is required for the normal major, with course and research work of exceptional distinction. Honors students participate in an Honors Research Symposium during Spring Quarter, with some presenting their work on posters and others making oral presentations. The honors program requires:

1. Completing all requirements for the major, including Economics 102 and either 103 or 104 as electives under requirement 7 above. Another upper-division elective may be substituted for 101 (requirement 6) if desired.
2. Achieving an LGI in economics courses of at least 3.5. See details in the Information Book for Economics Majors.
3. Submitting an honors thesis of very high quality. The thesis is written under the direction of a member of the department or its affiliated faculty. Honors students may take up to 10 units of Honors Directed Reading (199D) for the purpose of completing the thesis. Units of 199D do not count toward the course requirements for the basic economics major, or in the computation of the LGI requirement for honors.

Juniors interested in the honors program are urged to attend an informational meeting scheduled by the department’s Director of the Honors Program each Winter Quarter. Prospective candidates for the honors program must submit an application to the director no later than the end of the second full week of the third quarter before graduation (typically Autumn Quarter of the senior year). Also required, later in the same quarter, is a three-page thesis prospectus that must be approved by the thesis adviser.

GRADUATE PROGRAMS

Graduate programs in economics are designed to ensure that students receive a thorough grounding in the methodology of theoretical and empirical economics, while at the same time providing specialized training in a wide variety of subfields and a broad understanding of associated institutional structures. Toward these ends, the program is arranged so that the student has little choice in the curriculum at the outset but considerable latitude later on.

Students admitted to graduate standing in the department are expected to have a strong background in college-level economics, mathematics, and statistics. Preparation ordinarily consists of a college major in economics, a year-long calculus sequence that includes multivariate analysis, a course in linear algebra, and a rigorous course in probability and statistics.

MASTER OF ARTS

The department does not admit students who plan to terminate their graduate study with the A.M. degree. Students may (but need not) elect this degree in preparation for the Ph.D. degree. A master’s option is also available to Ph.D. candidates from other departments.

Admission — Prospective students must have completed the Stanford requirements for an A.B. in Economics or approximately equivalent training. Since students are required to take some of the same courses as Ph.D. candidates, similar preparation in mathematics and statistics generally is expected. Prospective applicants should submit their credentials together with a plan of study to the Director of Graduate Studies for approval.

Requirements — A master’s program must satisfy the following criteria:

1. Completing, at Stanford, at least 45 units of credit beyond those required for the bachelor’s degree, of which at least 40 units must be in the Department of Economics. Economics courses must include 202, 210, and at least two other 200-level courses. Undergraduate courses must be numbered 105 or higher. No seminar courses numbered 300 or above can be counted.
2. Demonstrating competence in empirical methodology at the level of Economics 170. Normally, this is done by including that course in the program of study.
3. Submitting two term papers (or a thesis of sufficient quality). At least one of these papers must be deemed to represent graduate-level work. Normally, this means that it is written in connection with a 200-level course. A maximum of 10 units of credit can be earned for a thesis toward the 45-unit degree requirement.
4. An average letter grade indicator (LGI) of ‘B’ must be maintained for all master’s level work. In addition, an LGI of ‘B’ or better must be earned in each of the two graduate theory courses. All courses must be taken for a letter grade.

DOCTOR OF PHILOSOPHY

Admitted students must be adequately prepared in calculus, linear algebra, and statistics (see above). When deemed appropriate, a student may be required to complete the necessary background preparation at Stanford. All students take a common core curriculum at the outset and later branch out in the desired fields of specialization. Well-prepared students should anticipate spending, with some overlap, approximately two years in course work and another two years in seminars, independent study, and dissertation research. The goal is to complete the program in four years, although some types of research programs may require at least five years to complete. The department has
a strong commitment to guiding students through the program expeditiously.

Questions and petitions concerning the program and the admissions process should be addressed to the Director of Graduate Studies, who has responsibility for administering the graduate program.

Specific requirements are best discussed in two stages, the first consisting of requirements for admission to candidacy and the second involving further requirements for earning the degree.

Admission to Candidacy for Ph.D. — A student may apply for admission to candidacy when the following minimal requirements are met:

1. Successful results on comprehensive examinations in “Price and Allocation Theory” (the examination based on material from Economics 202, 203, 204), “Theory of Income and Economic Fluctuations” (the examination based on material from Economics 210, 211, 212), and “Econometrics,” (the examination based on material from Economics 270, 271, 272).

2. Completing the requirements in two additional fields from the list below or one such field together with a substantial amount of work toward a minor in a related department approved by the Director of Graduate Study. Advanced fields include alternative approaches to economic analysis, comparative institutional analysis, econometrics, economic development, economic history, general theory, industrial organization, international economics, labor economics, monetary theory, public finance, structure of industry, theory of choice.

(The student cannot offer both general theory and theory of choice fields to fulfill the requirement.)

Each field listed above can be satisfied by completing two courses, although students in some fields may be advised to add a third course, which can then be counted toward the distribution requirement discussed later. All courses (or comprehensive exams, when offered) must be passed with an LGI of ‘B’ or better.

3. Completing a “candidacy paper,” normally written in conjunction with one of the special fields selected above.

It is expected that the student will meet, and indeed exceed, the above standard by the beginning of the third year of residency. When this is not possible for any reason, the Director of Graduate Study should be consulted as early as possible during the second year. Once it is deemed that the above standards have been met, the student should complete the Application for Candidacy for Degree of Doctor of Philosophy. After approval, candidacy remains valid for five years (although it can be terminated earlier by the department if progress is deficient); it can be renewed or extended beyond this period only under unusual circumstances.

Further Requirements for the Ph.D. Degree

1. Additional Course Work: four other graduate level courses must be completed. One of these must be from the area of economic history unless that field has already been selected above and, in any event, these courses must be “distributed” in such a way that at least two fields not selected above are represented. In addition, if the special fields consist of econometrics together with one field from mathematical economics, the distribution courses must include at least two from outside these areas.

With the approval of the Director of Graduate Study, some of the distribution courses may be drawn from a minor subject, for those choosing that option.

2. Teaching Experience: each student must serve as a teaching assistant for at least one quarter. It is strongly recommended that this requirement be satisfied before the final year of residence.

3. Seminar Participation: each student is expected to participate in at least two all-year research seminars by the end of the fourth year of residence. Normally, participation in a seminar requires one or more oral presentations and the submission of a research paper (which, however, need not be completely separate from dissertation research).

4. Ph.D. Dissertation: the process involves selecting a topic, choosing an appropriate adviser, submitting a prospectus (signed by the adviser) outlining proposed research, selecting a three-member reading committee (usually all from the Department of Economics, although exceptions can be made under certain circumstances), passing the University oral examination at which these three faculty (and two other members of the Academic Council) ask questions about the completed research, and submitting a final draft of the work signed by all members of the reading committee. The student is advised to initiate this process as early as possible.

Ph.D. MINOR

To be recommended for the Ph.D. degree with Economics as a minor subject, a student must qualify in three fields of economics, one of which must be either “Price and Allocation Theory” or “Theory of Income and Economic Fluctuations.” Qualification in these fields is tested in the department’s comprehensive written examinations given annually. The standard of achievement in these examinations is the same for minor as for major candidates.

Joint Degree Programs

The Department of Economics and the School of Law offer a joint program leading to the Ph.D. in Economics and the J.D. degree in Law. Set
5 units, Aut (Taylor)
Win (Krugman)
Spr (Staff)

51. Economic Analysis I — (Graduate students register for 151.) The nature of economic systems. Methods of allocating economic resources. Theories of production and consumer choice. The role of markets and prices in a decentralized system. Principles of efficient and equitable allocation. Calculus is used to develop theoretical structures appropriate for doing modern applied economic analysis. Prerequisites: 1 and 180 (or Math. 43 or equivalent).
5 units, Aut (Nechyba)
Win (Topper)
Spr (Gambardella)

52. Economic Analysis II — (Graduate students register for 152.) Analysis of growth and instability in the economic system as a whole. National accounts and aggregate relationships among stocks and flows in markets for goods, labor, and financial assets. Role of macroeconomic policy in short and long runs. Prerequisite: 51.
5 units, Aut, Win (Smulders)
Spr (Jones)

80. Statistics for Social Scientists — (Same as Statistics 190.) Introduction to statistical methods relevant to the social sciences. Emphasis is on description and examples of the use of statistical techniques. Three components: probability (basic rules of probability, counting, conditional probability, Bayes’ rule, discrete and continuous probability distributions); statistical inference (point estimation, tests of hypotheses, confidence intervals, large-sample methods); and data analysis (linear regression techniques and diagnostics, time series analysis). Statistical computer packages are used for inference and data analysis parts of the course. Prerequisite: Math. 41 or equivalent. DR:4(6)
3-5 units, Aut (Romano)
Win (Amemiya)
Spr (Canellos)

90. Introduction to Accounting — (Graduate students register for 190.) Introduction to the principles and concepts underlying financial reports: the income statement, statement of financial position, the “funds” statement, and the uses of such reports. No prior accounting is assumed. Students who have taken or are now taking a college-level accounting course may not enroll.
5 units, Win (Kasznik)
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, Win (Canellos)

94. World of Finance — For sophomores. Dialogue Tutorial on the world of finance, emphasizing the operation of capital markets throughout the world. The stock markets of the modern industrialized nations, NICs (newly industrialized countries), and emerging market countries (former Third World nations). Financial institutions in the U.S. (stock markets, mutual funds, etc.) in relation to international markets. Inflation, interest rate trends, U.S.
government agencies, and the Federal Reserve Bank impact on capital markets and capital flows. Macroeconomic factors which drive capital flows on a global level.

1 units, Aut (Marotta)

99. State, Market, and Development — For sophomores only. Seminar on the development problems of Asia, Latin America, and Africa, the development thinking by economists, and the policy relationships between the public and private sector. Focuses on analytical techniques used by development economists.

5 units, Win (Meier)

100. Economic Theory in Historical Perspective — The historical development of economic theory from several perspectives. Emphasizes the progress of analytic clarification and elaboration. Also, the influence of contemporary economic and political categories with which different economists worked, and the relation of the development of economic theory to concurrent developments in political and social thought.

5 units, not given 1995-96

100B. Limits of Economic Rationality I: The Nature of the Social Bond — Confrontation of three ways to account for society in an individualistic framework: the Social Contract (Hobbes, Rousseau); the “Invisible Hand” of the market (Smith, Walras); society as a crowd (Tarde, Freud, Keynes). Comparison with the Durkheimian tradition.

3-5 units, not given 1995-96


5 units, Aut (Topper, Zimmerman)
Win (Albers, Staff)
Spr (Schaffner, Smulders)


5 units, Aut (Lau)
Win (Kochar)
Spr (Goldberger)

103. Applied Macroeconomic Analysis — Construction and use of econometric models for analyzing macroeconomic phenomena. Students complete individual projects and core material. Topics vary with the instructor. Limited enrollment. Prerequisites: 52, 102.

5 units, Aut (Staff)
Win (Horvath)

104. Applied Microeconomic Analysis — Develops skills in the empirical analysis of microeconomic theory, models, and data. Topics vary with instructor. Students complete individual projects and core material. Limited enrollment. Prerequisites: 51, 102.

5 units, Aut (McClellan)
Win (Royalty)
Spr (Schaffner)

106. The World Food Economy — (Same as Food Research 103/203.) Interrelationships among food, population, resources, and economic development. Agricultural and rural development in achieving economic and social progress in low-income nations. Emphasis on public sector decision making as it relates to food policy.

4 units, Spr (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, given 1996-97


5 units, Win (McKinnon)
Spr (Haak)


4 units, Aut (Turki) MW 9-10:30
Win (Turki) MW 9:30-10:50

113. Technology and Economic Change — (Same as Science, Technology, and Society 107.) The economic causes and consequences of technological change. The historical experience of advanced industrial countries and the more recent experience of less developed economies. Topics: origins of modern industry in the U.S. and Europe, technology and the growth of large-scale organization, latecomers to industrialization (Japan and newly industrializing countries), economic growth and slowdown in mature industrial countries, and present concerns and future prospects (the influence of technology on employment, civilian “spillover” from military R&D, and coping with rapid technological change). DR:9(S)

5 units, Spr (Rosenberg)
115. European Economic History — Economic changes and growth in Western Europe from the Medieval period to the present. Transformation of Europe from an economically and culturally backward part of the world to the center of the world economy pre-WW I. Topics: attitudes toward technology and science, demography, institutional changes, politics and military technology, and production technology.
5 units, Win (Greif)

116. American Economic History — The history of the American economy from colonial times to present, emphasizing the years between the Revolution and WW II. The application of economic analysis to historical issues. Topics: American growth record and its determinants, economics of slavery and the Civil War, industrialization in a land-abundant country; historical causes of the Great Depression, role of the family in American economic history. Term paper required. Prerequisite: 1.
5 units, Aut (Wright)

118. The Economics of Development — The economic problems and policy concerns of Third World countries. Topics: theories of economies' structural transformation during the process of economic development, inequality and poverty, agriculture and rural development, rural markets, migration, population growth, education, nutrition, and government policies. Focuses on principles, not case studies. Prerequisite: 51.
5 units, Aut (Kochar)

119. Development and Population Interactions in the Third World — (Enroll in Food Research 119/219; graduate students register for Food Research 219.)
5 units, Win (Yotopolous)

120. Socialist Economies in Transition — Privatization and restructuring in Eastern Europe and the former Soviet Union. Issues: property rights; governance of firms; methods of ownership transfer including mass and voucher privatization programs; reallocation of resources across sectors; unemployment; wage policies; and other conditions for growth and stability.
5 units, not given 1995-96

121. The Economics of Greater China and the World — (Enroll in Food Research 148/248; graduate students register for Food Research 248.)
5 units, Spr (Rozelle)

122. The Theory of Capitalist Development — Theoretical and historical analysis of the growth and development process of capitalist economies. Focus: analysis of the mechanisms, determinants, and consequences of the process; causes of its unevenness on a world scale; and the question of historical stages in capitalist development. Topics: capital accumulation, income distribution, effective demand, employment and labor supply, technological progress and structural change, international trade and investment, underdevelopment, and the role of the state. DR:9(5)
5 units, Spr (Harris)

123. Economic Development in Latin America — (Enroll in Food Research 118/218.)
5 units, Win (Reynolds)

124. The Japanese Economy — Description and analysis of contemporary economic institutions and mechanisms: work organization; structures of information, incentives, distribution, and governance at the corporate firm; industrial organization and corporate grouping; the role of financial institutions and the government. Comparison with corresponding American institutions and relevancy to developing and transforming socialist economies. Prerequisite: 51.
5 units, Win (Aoki)

125. Development Theory at Work: Can Africa Succeed? — (Enroll in Food Research 149/249; graduate students register for Food Research 249.)
5 units, Aut (Fafchamps)

126. Comparative Economic Institutions: The Economics of Transition — Problems in building new economic institutions in countries during the transition from plan to market resource allocation. Topics from economic history, economic theory, law and economics, and comparative economic systems for the purpose of understanding the creation, evolution, and consequences of alternative economic institutions. Recent experiences in Eastern Europe, Russia, and China analyzed and compared. Prerequisite: 51.
5 units, not given 1995-96

129. Planning and Analysis of Development Projects — (Enroll in Food Research 129/229; graduate students register for Food Research 229.)
5 units, Win (Gotsch)

130. The Rise of Industrial Asia — (Same as Political Science 125.) The political, economic, social, and cultural aspects of industrial development and change in Asia as a region. Consent of Director of Undergraduate Studies required for credit toward fulfillment of the requirements for an economics major.
5 units, Aut (Lau, Okimoto, Raphael, Rohlen)

131. The Development of the Korean Economy — History of the rise of S. Korea as a “Newly Industrialized Economy” from a poor, 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, Win (Soon)

133. Population Perspectives in the Third World — (Enroll in Food Research 136, Human Biology 136.)
5 units, Spr (Arthur)
134. Development of the Newly Industrialized Economies — The development experience of newly industrialized economies including Hong Kong, Singapore, S. Korea, and Taiwan. The reasons for their successful development; compares and contrasts them with one another and with other developing countries.
5 units, not given 1995-96

139D. Directed Reading and Research — (Graduate students register for 239D.)
1-10 units (Staff)

140. Financial Economics — Introduction to modern portfolio theory and corporate finance. Topics: organization of various primary and secondary markets, properties of various financial instruments, including financial futures, mutual funds, the "Capital Asset Pricing Model," the investment banking industry, and models for pricing options and other contingent claims. Prerequisites: 51, at least one course in regression analysis.
5 units, Aut (Williams)

141. Public Finance and Fiscal Policy — Effects of government expenditure, borrowing, and taxation on resource allocation, national income and employment, prices, and income distribution. Prerequisites: 51, 52.
5 units, Spr (McClellan)

5 units, Win (Staff)

5 units, Spr (Royalty)

148. Urban Economics — The economics of urban areas. Land use, urban transportation, housing and local taxation, and provision of local public services. The economics of urban problems: poverty, crime, and homelessness. Use of economic theory and basic statistical techniques to understand these issues. Class project. Prerequisites: 51, 80.
5 units, Aut (Nechyba)

5 units, Win (Milgrom)

150. Economics and Public Policy — (Enroll in Public Policy 104.)
5 units, Win (Cogan)

151. Economic Analysis I — (See 51.)

152. Economic Analysis II — (See 52.)

153. Political Economy of Institutions — Develops a systematic approach to the study of political and economic institutions, applying the basic logic of the New Economics of Organization. Topics: modern political contexts (U.S. Congress, bureaucratic decision making, and international relations). Historical instances of the role of institutions in the stability of feudalism, the rise of the West, Glorious Revolution in England (1688), the French Revolution, and the American Civil War. Prerequisites: 51, 150.
3 units, not given 1995-96

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 — (Same as Civil Engineering 175, Earth Systems 112.) Analysis of economic sources of environmental problems in a market economy and evaluation of alternative policies (regulation, taxation, marketable permits) for dealing with these problems. Regional issues (local air and water pollution, traffic congestion) and global issues (climate change, stratospheric ozone depletion). Economics of natural resource management and protection, emphasizing renewable resources; connections between population growth and the environment. Prerequisite: 51.
5 units, Spr (Gould)

156. Economics of Health and Medical Care — (Graduate students register for 256; same as Health Research and Policy 256, Medical Information Sciences 256.) Open to graduate students and undergraduates (juniors, seniors) with training in microeconomics and some background in statistics or mathematics. Empirical, institutional, and theoretical analysis of problems of health and medical care. Topics: measurement, valuation, and determin-
157. Imperfect Competition — Extends and develops the basic tools of price theory in the context of U.S. industrial market structure. The application of theoretical models and concepts to the behavior of firms and markets when the conditions of perfect competition are not satisfied. Topics: monopoly, oligopoly, monopolistic competition, concentration measures, international competition, advertising, innovation, externalities, economies of scale, and the role of information in markets. Prerequisite: 51.
5 units, Aut (McClellan)

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, not given 1995-96

159. Law and Economics — (Stanford in Washington.) Seminar on the use of microeconomics to analyze selected areas of substantive law and legal procedure. Topics: the economics of property, contracts, torts, antitrust regulation, crime, etc. Students read/discuss selections from the literature and meet with present and former federal officials, scholars, and practitioners who use economic ideas in the analysis of law and policy. Recommended: familiarity with elementary microeconomic analysis.
5 units, Aut (Bresnahan)

160. Game Theory and Economic Applications — Introduction to noncooperative game theory. Basic concepts: games in normal and extensive forms and their relations, classification of games, and various solutions such as Nash equilibrium, sub-game perfection. Theoretical discussion of concepts illustrated by examples from economics and politics. Prerequisites: 51 and one course in calculus, or consent of instructor.
5 units, Aut (Gref)

165. International Economics — Comparative advantage in production and trade among nations; trade policy; the international monetary mechanism; domestic monetary, fiscal, and exchange rate policies and their relationship to foreign trade. Prerequisites: 1, 51, 52.
5 units, Win, Spr (Krueger)

167. Economic Policies of the European Community — (Enroll in Food Research 146/246; graduate students register for Food Research 246.)
5 units (Josling) given 1996-97

170. Intermediate Econometrics I — (Same as 270.)
5 units, Aut (Wolak)

171. Intermediate Econometrics II — (Same as 271.)
5 units, Win (Goldberger)

172. Intermediate Econometrics III — (Same as 272.)
5 units, Spr (MaCurdy)

180. Mathematics for Economists — Training in areas of mathematics frequently applied to economics. Preparation for 51; for students who have had some calculus but lack a strong mathematical background. Topics: functions of several variables; partial derivatives and differentials; first- and second-order conditions for optimization; elementary matrix algebra, determinants, and characteristic roots; quadratic forms; maximization of a function of several variables subject to equality constraints. Selected applications in economics. Prerequisites: 1, Math. 41 or equivalent.
5 units, Aut (Paarsch)
Win (Hammond)
Spr (Kim)

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 aggregate planning and control. Prerequisites: 51 and 180, or Math. 43 or equivalent.
5 units, Spr (Nielsen)

185. The Distribution of Income and Wealth — Basic facts about the distribution of income and wealth in the U.S., with comparisons to other advanced countries. Methods of measuring inequality. Statistical distributions and stochastic models. Economic theories of the distribution of income: neo-classical, Marxist, and neo-Keynesian. The relation between wealth and income distribution. Normative theories of just distribution and the limiting effects of incentives on the redistribution of income (may be taken as 285 by graduate students). Prerequisites: 51, 102, one course in calculus.
5 units, not given 1995-96
187. Junior Research Workshop: Economic Growth, Technology, and Population — Preference given to juniors and students in the honors program considering related thesis topics. Introduces economics majors to current research in applied and theoretical economics through team and individual research projects. Topic: determinants of long-run economic growth, especially technology and population. Why do economies such as the United States grow at 2 percent per year? Why has Japan grown more rapidly over the last 40 years, and why has India grown more slowly? Enrollment limited to 15. Prerequisite: 51.
5 units, Aut (Jones)

190. Introduction to Accounting — (See 90.)

191. Introduction to Cost Accounting — (See 91.)

199D. Directed Reading and Research — Honors. In-depth study of an appropriate question and completion of a thesis of very high quality. Normally written under the direction of a member of the Department of Economics (or a member of some closely related department). (See description of honors program.) Register for at least 1 unit for at least one quarter. Meets first week of Autumn Quarter (see Stanford Daily for details).
1-10 units, Aut, Win, Spr (Haak)

PRIMARILY FOR GRADUATE STUDENTS

350. A.M. Thesis
by arrangement

400. Ph.D. Dissertation
by arrangement

A. CORE THEORY CURRICULUM

5 units, Aut (Pencavel)

5 units, Win (Bernheim)

204. Price and Allocation Theory III — Theory of resource allocation over time, competitive equilibrium and intertemporal efficiency, capital theory and factor pricing, growth theory and applications, equilibrium and dynamic efficiency with incomplete market structure. Prerequisite: 203.
5 units, Spr (Kurz)

208. Methods of Dynamic Optimization — Develops a basic facility in the use of dynamic optimization techniques employed in microeconomics and macroeconomics courses during the first year of the graduate program. Topics: discrete time dynamic programming under certainty, discrete time stochastic dynamic programming, and basics of optimal control in continuous time without uncertainty. Economic applications are developed in class and in problem sets.
5 units, Aut (Starrett)

5 units, Win (Jones)

5 units, Spr (Hall)

212. Theory of Income and Economic Fluctuations III — Dynamic stochastic equilibrium models as tools for understanding the evolution of prices and quantities. Decision theories appropriate to dynamic and random environments and corresponding equilibrium concepts. Applications include models displaying growth and cyclical fluctuations, and models of monetary and fiscal policies. Econometric restrictions imposed by the models. Prerequisite: 211.
5 units, Aut (Staff)

301A,B,C. Workshop in Microeconomics
10 units (Staff) by arrangement

302A,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.

and Leon Walras. The development of thought in terms of internal development and changing external economic conditions. 

5 units, not given 1995-96

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 1995-96

395A,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 1995-96, students must complete both 215 and 217 and submit an additional paper. Students wishing to do research in the field are strongly advised to take 267, as well as supporting work in international economics, comparative institutional analysis, and with the Food Research Institute.

215. Industrialization, Growth, and Economic Development — Theoretical and empirical analyses of growth, industrialization, coordination problems in industrial and rural development, industrial structure, surplus labor, rural-urban migration, self employment, multiple job holding, segmented labor markets, the changing nature of labor contracts, and poverty and inequality in developing countries.

5 units, Aut (Schaffner)


5 units, Spr (McKinnon)

267. Special Topics in International Economics — See section 'I' below.

5 units, Spr (Krueger)

D. ECONOMIC HISTORY

The requirements for the field are (1) a comprehensive exam in Spring Quarter based on material from at least two of the courses listed below, and (2) one research paper on a subject approved by one of the faculty teaching any of the following five courses.

224. Science and Technology in Economic Growth — (Same as Science, Technology, and Society 207.) Upper-division undergraduates may attend with consent of instructor. The roles played by the growth of scientific knowledge and technical progress in the development of industrial societies. Emphasis is on the interactions between science and technology, and the organizational factors which have influenced their effectiveness in contributing to productivity growth.

5 units, Win (Rosenberg)

225. Technology, Economy, and Society — Determinants and consequences of technological innovations in the economic history of the West from the 9th to the 19th centuries. Selected “clusters” of technical innovations in production and warfare are examined for the determinants of the rate and bias of innovative activity, economic and cultural conditions governing diffusion, and the problems of identifying and measuring primary and second-order economic consequences.

5 units, not given 1995-96

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 preeminence.

5 units, Spr (Wright)

227. European Economic History — Economic growth and development in Western Europe from the 11th to the 20th centuries, emphasizing the formative period up to the 19th century. The experiences of Britain, France, Germany, and other continental countries, with that order of emphasis. The interrelations between the growth and distribution of output, demographic trends, technological and organizational changes in trade and industry, and the changing formal and informal institutions governing political and economic activity.

5 units, not given 1995-96

228. Institutions in Economic History: Form, Function, and Evolution — (Same as 294.)

5 units, Aut (Greif)

325A,B,C. Workshop in Economic History

10 units (Staff) by arrangement
MONETARY THEORY AND ADVANCED MACROECONOMICS

Requirements for the field are successful completion of 233 and 234.

   5 units, Win (Horvath)

   5 units, Spr (Jones, Hall)

F. PUBLIC FINANCE

To receive credit for the field, students must complete 241 and 242 by passing the final examinations, and submit an acceptable research paper on a topic approved by the instructor for either course.

   241. 5 units, Win (Nechyba)
   242. 5 units, Spr (Bernheim)

243. Economics of the Environment — Upper-division undergraduates may attend with consent of instructor. Analysis of sources of environmental problems in market economies and of policy options for addressing these problems. Topics: choice of policy instruments (taxes, standards, tradeable permits), environmental risk assessment, valuation of non-marketed commodities (environmental amenities, biodiversity), environmental policy making under uncertainty, optimal mix of corrective and distortionary tax instruments, and dynamics of economic growth in the presence of non-reproducible natural resources.
   5 units, not given 1995-96

341A,B,C. Workshop on the Economics of the Public Sector — Issues in measuring and evaluating the economic performance of government tax, expenditure, debt, and other policies; their effects on private economic activity, saving, investment, labor supply, etc.; alternative policies and methods of evaluation. Workshop format combines student research, faculty presentations, and guest speakers. Prerequisite: 241 or consent of instructor.
   10 units (Staff) by arrangement

354A,B,C. Workshop in Law and Economics
   6 units, Win, Spr (Polinsky)

G. ECONOMICS OF LABOR

To receive credit for the field, students must complete 246 and 247.

   5 units, Win (Royalty)

   5 units, Spr (MaCurdy)

248. Labor Economics III — In-depth study of current research and policy issues in health care. Possible topics: demand for medical care and insurance, labor market for health care professionals, behavior of health care providers, technology diffusion and assessment, regulatory reform, evaluating quality of care, the political economy of health care reform. Empirical applications include models of limited dependent variables and the evaluation of experimental data.
   5 units, not given 1995-96

345A,B,C. Workshop on Economics of Factor Markets
   10 units (Staff) by arrangement

H. ECONOMICS OF INDUSTRY

To receive credit for the field, students must successfully complete 257 and 258, and submit one research paper, the subject of which has been approved in advance by one of the faculty teaching 257, 258, or 260.

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 (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
261. Allocation and Structural Change Under Increasing Returns — (Enroll in Food Research 326.)  
5 units (Arthur)

262. Experimental Methods of Institutional Analysis — Use and design of laboratory methods to test theories of individual behavior in various institutional settings, including markets, small groups, and political processes. Readings/lectures on methods of experimental research and current state of research findings, and individual research projects in which students design and run an experiment.  
3 units, not given 1995-96

303A,B,C. Workshop in the Economics of Science and Technology — Sponsored by the department and the Center for Economic Policy Research. Focuses on applied studies and policy issues relating to resource allocation and organization of basic science and engineering research, commercialization of scientific knowledge, diffusion of technological and organizational innovations, and impacts on productivity and economic welfare in the U.S. and other industrially advanced economies.  
10 units, Aut, Win, Spr (Staff)

355A,B,C. Workshop in Industrial Organization, Regulation, and Applied Microeconomics — Working seminar on current research in the field by visitors, presentations by students, and structured discussion of recent papers. Students are required to write an original research paper, make a formal seminar presentation, and lead a structured discussion.  
10 units, Aut, Win, Spr (Staff) by arrangement

358A,B,C. Workshop in Political Economics and Collective Choice — Multidisciplinary working seminar on current topics in mechanisms of social choice, political processes, and the politics of economic policy. Offered in collaboration with the Graduate School of Business and the Department of Political Science. Participants are required to undertake an original research project, approved by the instructors, and to make an oral presentation.  
10 units, Aut, Win, Spr (Bendor, Weingast)

1. INTERNATIONAL ECONOMICS

To receive comprehensive credit in this field, students must complete 265 and 266 and one additional paper. (Special topics course 267 is strongly recommended.) For students doing research in the field, further supporting courses are found in the fields of economic development, industrial organization, and public finance.

5 units, Aut (McKinnon)

5 units, Win (Krugman)

5 units, Spr (Krueger)

365A,B,C. Workshop in International Economics  
10 units (Staff) by arrangement

J. ECONOMETRICS

All Ph.D. students are required to take 270, 271, 272.

To receive credit in the econometrics field, students must complete 273, and either 274 or 275.

5 units, Aut (Wolak)

5 units, Win (Goldberger)

5 units, Spr (MacCurdy)

273. Advanced Econometrics I — Large sample theory; maximum likelihood estimation; non-linear least squares; generalized least squares. Prerequisites: 272, Math. 113.  
5 units, Aut (Potier)

274. Limited Dependent Variables — Discrete choice models; Tobit models; Markov chain and
duration models. Prerequisite: 273 or consent of instructor.

5 units, Win (Amemiya)


5 units, Spr (Horvath)

276. Special Topics in Econometrics — Possible subjects: robust estimation, stochastic control, prediction theory, Bayesian analysis, factor analysis, pooling of time series and cross section data. Prerequisite: 273.

5 units, not given 1995-96

370A, B, C. Workshop in Econometrics

10 units (Staff) by arrangement

K. MATHEMATICAL ECONOMICS

To receive credit in the mathematical economics field, students must complete two courses from 284, 286, or 287.


5 units, Win (Hammond)


5 units, not given 1995-96


5 units, Win (Arrow)


5 units, Spr (Kurz, Nielsen)

285. The Distribution of Income and Wealth — (See 185.)

5 units, not given 1995-96

286. Game Theory and Economic Application — Non-cooperative games, games in extensive and normal forms, games with incomplete information, Nash equilibrium and refinements, repeated games, signaling games, non-Nash solution concepts, weakness of game theory. Learning and evolution in game theory. Cooperative games, the characteristic function and core, balanced games and relations to Walrasian equilibrium; Shapley value. Bargaining theory.

5 units, Spr (Milgrom)

287. General Equilibrium Theory — Nonstandard methods in stochastic analysis and their application to price dynamics in large exchange economies. Focuses on Keisler's law of large numbers for Markov processes involving large sets of weakly interacting particles. Required original research paper using methods presented. Prerequisites: 202, 203, or consent of instructor.

5 units, Aut (Hammond)

288. Computational Economics — Computational approaches to solving economic problems. Overview of numerical analysis. Economic problems in computationally tractable forms, and the use of numerical analysis techniques to solve them. Examples of problems solved numerically (general equilibrium models, optimal taxation, dynamic programming, economic growth, life-cycle models, intervention in commodity markets, Bayesian econometrics, equilibria of dynamic and repeated games, and nonlinear rational expectations equilibria with asymmetric information). Prerequisite: equivalent of first-year graduate core economics sequence.

5 units, Win (Judd)

290. Multiperson Decision Theory — (Same as Business 608.) Review of selected current working papers emphasizing methods of game theory and topics in mathematical economics that use game-theoretic models. The effects of differences in information, limits on observability and contracts, etc., on strategic behavior. Prerequisites: two courses from the Choice Theory/Mathematics Economics sequences, or consent of instructor.

5 units, Spr (Wilson)

385A, B, C. Workshop in Mathematical Economics

10 units (Staff) by arrangement

386. Interdisciplinary Seminar on Conflict Resolution — (Same as Law 325, Operations Research 366, Psychology 283.) Addresses problems of conflict resolution and negotiation from an interdisciplinary perspective. Presentations by faculty and by scholars from other universities.

1-2 units, Win, (Arrow, Ross, Tversky, Wilson, Alexander)

L. COMPARATIVE INSTITUTIONAL ANALYSIS

To receive credit for this field, students are required to take 291 and then select at least one of: 292, 293, or 294. Students expecting to make Comparative Institutional Analysis their primary field are also required to take the workshop (391)
291. Contracts and Organizations — General issues and methods in studying contracts, organizations, and institutions. Topics: coordination, contracting with adverse selection, contracting with moral hazard; contracting with many agents, problems of information and commitment, contract renegotiation, incomplete contracts, repeated interactions and reputation, collusion, rent-seeking and influence activities, applications to firms, partnerships, political entities, etc.

5 units, Aut (Qian)

292. Comparative Analysis of Organizations and Systems — Contractual and information economics approach to organization. Evolutionary games and complementarity analysis of the roles of history vs. expectations, mutations (experiments and economic integration) in the evolutionary dynamics of economic institutions. Multiple equilibria of development, transition, corporate governance and financial systems. What are the efficiency and other implications of the diversity of economic systems viewed as a cluster of institutions?

5 units, Win (Aoki)

293. Reform and Transition in Socialist Economies — Applications of organization theory to problems in reforming socialist economies. Emphasis is on understanding problems in the creation of market institutions in China, Eastern Europe, and the territory of the former U.S.S.R. Theoretical topics: coordination, incentives, commitment problems, and contract enforcement. These problems are related to issues in privatization, the building of fiscal and financial institutions, international trade, and foreign investments.

5 units, not given 1995-96

294. Institutions and Organizations in Historical Perspective — (Same as 228.) Description and analysis of institutions and organizations in the Western historical experience, emphasizing the formative period from the 11th to the 18th centuries. The discussion of the formation, function, and evolution of institutions highlights alternative conceptual frameworks — neo-classical, transaction cost economics, institutionalism, and Marxism and Neo-Marxism, while utilizing game theory, mechanism design, contract theory, etc. Topics: institutions related to trade organization, the organization of production, feudalism, mercantilism, and the state.

5 units, Aut (Greif)

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.

BERLIN

100X. The History of German and European Economic Philosophy
4-5 units, Aut (Krüger)

127X. The Political Economy of Contemporary Germany
5 units, Spr (Krüger)

128X. Transition in Germany and Eastern Europe
4-5 units, Win (Krueger)

166X. The Economics of Europe
5 units, Aut (Howell)

FLORENCE

159X. The Political Economy of Industrial Change: Italy and Europe in a Global System
5 units, Win (Bianchi, Bellini)

KYOTO

121X. Economics and Business in Japan
5 units, Spr (McKenzie)

129X. The Economics of Technology Management in the Japanese Firm
5 units, Spr

125X. Russian Economy: Past Experience, Current Reform, and Prospects
5 units, Aut (Panova)

OXFORD

132X. Oxford Economists and Development Economics
5 units, Aut (Meier)

164X. Europe in the World Economy
5 units, Aut (Meier)

168X. Economic Organization of Science and Technology in the West since 1600
5 units, Spr (David)

SANTIAGO

163X. Latin America in the International Economy — Santiago.
5 units, Win (Ffrench-Davis)

165X. Latin American Economies in Transition — Santiago.
5 units, Aut (Munoz)
ENGLISH


Chair: Jay W. Fliegelman
Vice Chair: Albert J. Gelpi
Director of Creative Writing Program: Elizabeth Tallent

Director of Program in Writing and Critical Thinking: Kenneth W. Fields
Associate Director of Program in Writing and Critical Thinking: Claude Reichard

Professors: John B. Bender (English and Comparative Literature), Eavan Boland (Winter), George H. Brown, Terry Castle (on leave Autumn), George G. Dekker (on leave Spring), W. S. Di Piero, J. Martin Evans, John Felstiner (on leave Autumn), Kenneth W. Fields, Jay W. Fliegelman, Regenia Gagnier (on leave Autumn), Albert J. Gelpi, Barbara Charlesworth Gelpi, David Halliburton (on leave Spring), Shirley Heath (English and Linguistics), Seth Lerner (on leave Winter), John L. Heuréux, Herbert Lindenerberger (Comparative Literature and English, on leave Spring), Diane W. Middlebrook (on leave Autumn, Winter), Stephen Orgel, Patricia A. Parker (English and Comparative Literature), Marjorie G. Perloff, Robert M. Polhemus, Ronald A. Rebholz, David R. Riggs (on leave Spring), Ramón Saldívar (English and Comparative Literature, on leave), Gilbert Sor-rentino, Elizabeth Tallent, Elizabeth C. Traugott (Linguistics and English)

Associate Professors: Sandra Drake (on leave Spring), Horace A. Porter

Assistant Professors: Maureen Harkin, Sharon Holland, Suvir Kaul (on leave), Joss Lutz Marsh, Lora Romero, William Solomon, Jennifer Summit, Michael Tratner, Robert Allen Warrior (on leave)

Professor (Teaching): Larry Friedlander

Courtesies Professor: Charles R. Lyons (Drama)

Senior Lecturer: Helen B. Brooks


Visiting Assistant Professors: Geraldine Heng (Winter), Elisa Narin van Court (Autumn)

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 required courses may be taken on a Satisfactory/No Credit basis at the discretion of the instructor, but students intending to go on to graduate school should weigh the fact that a grade of satisfactory provides little evidence of their abilities.

MAJOR PROGRAMS OF STUDY IN ENGLISH

English majors are required to demonstrate proficiency in a foreign language. "Proficiency means that the student is able to read at least at the level of facility expected in second-year college courses in a foreign language. As a minimum, the requirement may be fulfilled by passing a fourth-quarter foreign language course other than a "conversation" course or by demonstrating equivalent knowledge. English majors are urged to continue with literature courses in whatever language or languages they study. English majors who already possess the necessary language skills are urged to satisfy this requirement by taking an upper-division course in a foreign literature read in the original language. Such a course simultaneously fulfills one of their elective requirements.
Because the Department of English recognizes that the needs and interests of literature students vary, it has approved several major programs of study in English. Each of these has different objectives and requirements; students should consider carefully which major corresponds most closely to their personal and professional objectives.

**Major in English** — This program provides for the interests of students who wish to understand the full variety and historical development of English and American literature over the centuries. It is recommended to prospective candidates for admission to graduate schools of English. Of particular value to students selecting this major are courses with broad historical perspectives on literature and language and courses which concentrate on major writers. Students must choose one course from each of the following eight areas. If possible, students should take courses in chronological sequence. At least one of the courses satisfying the major must be English 180-189 (Seminars for English Majors) or English 196 (Honors Seminar) or an English seminar offered in the Stanford in Oxford program at St. Catherine's College. Other English courses which are taught in a seminar format and require a substantial amount of critical writing may be approved by the Director of Undergraduate Studies on a case by case basis. Students are urged to satisfy this requirement in the sophomore or junior year. Seniors are admitted to English 180-189 seminars only with the consent of the instructor and are not given preference for course enrollment. Students are warned that delaying the seminar to their senior year may result in a delay of degree conferral.

C) Renaissance: English 113, 141, 172, 182, 182A
E) Restoration and 18th Century: English 115, 131, 163G, 184*, 184A, 215A
F) Romantic and Victorian: English 132G, 154, 177, 184*, 185, 185A
G) American Literature Written before 1900: English 121, 127D, 156, 163J*, 186, 186A, 186G*, 187T*
I) Poetry and Poetics: English 92, 150, 150G, 155B, 188B, 192

*Counts in one area only

In addition, students must elect three additional courses in English or American literature, or other literature written in English from those offered by the Department of English (excluding only English 1-2-3, 7-8-9, and advanced composition courses). In place of one of these elective courses, students may choose one upper-division course in a foreign literature read in the original language.

A student who took a 3 unit sub-100 English course while still a non-major may count it retroactively towards the elective requirement for the major. Only one such course may be applied to the major.

Students may apply as many as four English courses taken at other approved universities towards their major.

**INTERDISCIPLINARY MAJORS**

**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 eight courses in English, one from each of the areas B-H and P, listed under the major in English, and fulfill the seminar requirement. In addition, they must complete a coherent program of four courses in French literature, read in the original. The program of each student must be approved by the Director of Undergraduate Studies in English and by the Department of French and Italian.

**English and German Literatures** — Candidates for the A.B. in this major must complete a program exactly analogous to the two preceding majors, with eight courses in English, one from each of areas B-H and 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.

**English and Italian Literatures** — This is arranged as in the major in English and French Literatures, requiring the completion of eight courses in English, one from each of areas B-H and 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.

**English and Spanish or Spanish-American Literatures** — Candidates for the A.B. in this major must complete eight courses in English, including one from each of the eight areas B-H and P, a Department of English seminar, and a coherent program of four courses in Spanish or Spanish-American literatures read in Spanish. The program of each student must be approved by the departments involved as specified above.
CONCENTRATIONS

English with a Creative Writing Emphasis — This program is designed for students who want a basic knowledge of the English literary tradition as a whole and at the same time want to develop skills in writing poetry or fiction. Students must take a total of 12 courses offered through the Department of English. Like all English majors, they must choose one course from each of the eight areas B-H and P listed above, and fulfill the language and seminar requirements.

In addition, they must take four courses specifically designed for either the fiction or the poetry concentration. Fiction writers must first take English 90 (Fiction Writing), then two quarters of 190 (Intermediate Fiction Writing) or a more advanced fiction writing course, and 137 (Development of the Short Story). Poets must first take English 92, then two quarters of 192 (Intermediate Poetry Writing) or a more advanced poetry writing course, and one course in poetry in addition to the course that fulfills area requirement P, to be approved by a poetry instructor in the Creative Writing program. Courses taken to satisfy an area requirement cannot also satisfy a Creative Writing requirement.

Admission to English 190 and 192 is by consent of the instructor and is based on the quality of the student’s work. Admission to a single quarter of 190 or 192 does not guarantee admission to a second quarter of 190 or 192. Students should submit a manuscript to the Creative Writing office at least one week before registration day of the term in which the course is offered. Students not admitted to the intermediate courses may take the introductory course a second time.

English with Interdisciplinary Emphasis — This major is intended for students who wish to combine the study of literature of one broadly defined historical period with an interdisciplinary program of courses relevant to that literature. Students are required to fulfill the language and seminar requirements listed under the major in English and to take a total of 15 courses distributed as follows:

1. One course in area P, Poetry and Poetics.
2. Either one course each in areas B, C, and D (emphasis in Medieval and Renaissance literature) or one course each in areas E, F, G, and H (emphasis in English and American literature from the Enlightenment to the present).
3. a) Students electing an emphasis in Medieval and Renaissance literature must take 111 and 112.
   b) Students electing an emphasis in English and American literature from the Enlightenment to the present must take 110.
4. Three elective English courses in the area of emphasis.
5. Six courses related to the literature of the chosen period from such disciplines as anthropology, the arts (including the practice of one of the arts), classics, comparative literature, European or other literature, feminist studies, history, modern thought and literature, and political science. These six courses should form a coherent program, and they must be relevant to the historical focus of the courses chosen by the student to meet requirement 2. Each of these six courses must be approved in advance by the Interdisciplinary Program Director.
6. In addition, students in the interdisciplinary program must write at least one interdisciplinary 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.

ADVANCED WORK

INDIVIDUAL RESEARCH

Students taking 100- or 200-level courses may, with the consent of the instructor, write a follow-up 5-unit paper based on the course material and due no later than the end of the succeeding quarter (register for 194). The research paper is written under the direct supervision of the professor; it must be submitted first in a preliminary draft and subsequently in a final version.

INTEGRATED WORK

Students taking (either simultaneously or consecutively) two or three courses which have a clear thematic or historical relationship to each other may, with the consent of the relevant instructors, write one large-scale paper of 7,000-10,000 words integrating the material in the courses in question.

SENIOR INDEPENDENT STUDY

Independent study is open, on approval by the department, to seniors majoring in English who wish to work throughout the year on a critical or scholarly essay of about 10,000 words. 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 advisor in the department.

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 Quar-
ter of the junior year. Application consists of completing a form and submitting a sample of critical writing. Admission is selective. Provisional admission is announced in early December. Permission to continue in the program is contingent upon successful completion of two tutorials and submission, by May 15, of a Senior Honors Essay proposal with bibliography.

In the junior year students may choose between the following two options: (1) At Oxford, take two quarters of the seminar sequence offered by St. Catherine's College, or at least 10 units of tutorial work, arranged by the director of the Oxford program. (2) At Stanford, take 10 units of tutorial work in the Department of English. Students who elect the latter option select two regular Department of English lecture courses, registering for 3 rather than 5 units. With each course they also take a 5-unit tutorial (196T) on the same or related material with an advanced graduate student.

The courses taken at Oxford or at Stanford to satisfy this requirement for the honors program can also be used where appropriate to satisfy the area requirements for the English major.

In the Autumn and Winter Quarters of the senior year, honors students complete the senior honors essays for 10 units under supervision of a faculty adviser. In Autumn Quarter, honors students take a 5-unit senior honors seminar on critical approaches to literature. In Winter Quarter, they take a 3-unit essay workshop, normally taught by the director of the honors program. The workshop focuses on the process of researching and writing the essay. The deadline for submitting the honors essay is May 15.

Students in the honors program complete the following:

Area Requirements (B-H, P) — eight courses
Two tutorials — 10 units
Senior seminar and workshop — 8 units
Senior Honors Essay — 10 units
Three electives

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.

HONORS PROGRAM IN HUMANITIES

An honors program in Humanities is available for English majors who wish to supplement the major by a related and carefully guided program of studies. See the "Humanities Special Programs" section of this bulletin for a description of the program. Students wishing to take the Comparative Literature option within the honors program in Humanities should see the "Comparative Literature" section of this bulletin.

VISITING STUDENTS

Students who do not wish to become candidates for a graduate degree, but who are qualified to meet the standards of admission to a master's or Ph.D. program, may apply to Graduate Admissions, Registrar's Office, Stanford University, for admission as nonmatriculated students for a period of not more than three consecutive quarters. Each quarter they may take up to three English courses numbered 101 to 299, or two such courses and (with the consent of the instructor) one English course numbered above 300.

GRADUATE PROGRAMS

For University regulations governing advanced degrees see the "Graduate Degrees" section of this bulletin.

Eligibility — Students with a bachelor's degree of acceptable quality may apply to pursue graduate work toward an advanced degree in English at Stanford. (Formal application for candidacy is a separate step taken somewhat later.) Students whose previous preparation is in a field other than English are expected to make up deficiencies. Credits for previous graduate work at Stanford or elsewhere more than five years old may be reevaluated or rejected.

Graduate students are admitted as candidates for only the Ph.D. or the A.M. in English and American Literature. The A.M. is a one-year program without financial aid. A.M. students may apply to the Ph.D. program.

MASTER OF ARTS

Candidates may earn the master's degree in English and American Literature by satisfying the following requirements:

1. Successful completion with a 'B' letter grade indicator (LGI) of nine courses (normally 45 units) including at least two 300-level courses. Ordinarily, graduate students enroll in courses numbered 200 and above. They may take no more than three courses numbered 101-199 without the consent of the Director of Graduate Studies. The master's student may take no more than 10 units of directed reading and research (English 398). Interested students should consult their faculty adviser or the Graduate Program Adviser (Building 40, room 41G) for further details.

During the first two weeks of the first quarter, candidates for the master's degree in English and American Literature should consult the adviser designated by the Director of Graduate Studies in order to draw up a three-quarter study plan. Normally, the student should take one course each from the following five fields: Medieval, Renaissance, 18th Century and Romantic, Victorian and Modern, American.
The program should also contain four additional courses, representing a mixture of survey and specialized courses chosen to guarantee familiarity with a reasonable proportion of works on the Reading List for Doctoral Candidates. Normally, no more than two courses taken outside the department may be counted toward the degree, but the Graduate Studies Committee considers exceptions.

Candidates who can demonstrate unusually strong preparation in the history of English literature may undertake a 40-to-60-page master's thesis. Such candidates may register for up to 15 units of English 399 with the faculty member who supervises the work on the thesis. Candidates who write a master's thesis may petition to be excused from up to 15 units of the requirements described above. The additional 30 units normally consist of the five required courses and one additional course. These courses are chosen by the student and approved by the adviser and the Director of Graduate Studies.

2. Demonstration of a reading knowledge of one foreign language. (For ways of fulfilling this requirement, see the section below on language requirements for the Ph.D.)

Candidates for a coterminal master's degree must fulfill all requirements for the A.M. in English (including the language requirement), as well as general requirements and major requirements for the A.B. in English. A minimum LGI of 3.5 in the major is required of those applying for the coterminal master's degree. No courses used to satisfy the A.B. requirements (either as Distribution Requirements or department requirements) may be applied toward the A.M. However, additional undergraduate units not applied to any previous degree may be applied toward the A.M. See the description of programs under the "Undergraduate Degrees" section of this bulletin.

MASTER OF ARTS IN TEACHING

The A.M. in Teaching is offered jointly by this department and the School of Education. The degree is intended for candidates who have a teaching credential or relevant teaching experience and wish to further strengthen their academic preparation. The program consists of a minimum of 25 units in the teaching field and 12 units in the School of Education. Detailed requirements for the course are outlined in the "School of Education" section of this bulletin.

Candidates for the A.M. in Teaching may also qualify for the State of California Community College Instructor Credential by completing additional units of academic work at the graduate level. For further information, consult the Credentials Administrator, room 110, School of Education, early in the Autumn Quarter. Not offered 1995-96.

DOCTOR OF PHILOSOPHY

University regulations regarding this degree are discussed in the "Graduate Degrees" section of this bulletin. The following department requirements, dealing with such matters as residence, dissertation, and examinations, are in addition to the University's basic requirements for the doctorate. (Students should consult the most recent edition of "Informal Notes: Procedures for the Ph.D." Copies are available in the English Graduate Studies office, Building 40 room 41G.)

A candidate for the Ph.D. degree must complete three years (nine quarters) of full-time work, or the equivalent, in graduate study beyond the bachelor's degree. Candidates are expected to offer at least 97 units of graduate work in addition to the doctoral dissertation. At least three consecutive quarters of graduate work, and also the final course work in the doctoral program, must be taken at Stanford.

Toward the 97 course units currently required for the Ph.D., a student may count no more than 20 units of English 398 without the Graduate Director's written consent. A student takes at least 70 graded units (normally 14 courses) of the 97 normally required total units (397, 398, and 399 do not count toward the 70 graded units). No more than 15 units (normally three courses) may come from 100-level courses. When graduate students are teaching 50-percent time, one of these three courses may be taken for 4 units.

This program is designed to be completed in five years. Six sections of supervised teaching (four as a teaching assistant in a literature course and two as the instructor of a Writing and Critical Thinking course) are a requirement of the Ph.D. program.

Those students who began in September 1992, or thereafter, take an apprentice teaching program in the first quarter of their second year. Apprentice teaching in the Autumn Quarter of the second year constitutes a 50-percent quarter of work as a Teaching Assistant. Apprentice teachers attend the classes, conferences, and tutorials of the master teachers, then take responsibility for conducting a class, holding conferences, and grading papers. All these teaching activities are done under the supervision of the master teachers, who insure the quality of instruction.

Those students who began their Ph.D. program prior to September 1992 enroll in the Teachers' Workshop courses (397A, B, and C) in their second year. A candidate may take the Ph.D. degree in English Literature, in English and American Literature, in English and Comparative Literature, or in English and Humanities.
ENGLISH LITERATURE

Requirements are as follows:

1. A course in Old English; or a course in the history of the English language; or a course in an earlier historical form of a foreign language with a bearing on English literature and language, such as Old French or Old High German; and a course in Middle English.

2. A minimum of six courses for a letter grade from the graduate colloquia and graduate seminars, of which at least three must be graduate seminars. The colloquia and seminars should be from different genres and periods as approved by the adviser.

3. Students who began their Ph.D. course in September 1992, or thereafter, are required to have taken in the Autumn Quarter of their first year a 2-unit course introducing the new graduate student to the various opportunities and responsibilities of the department.

4. In the second year, students who began their Ph.D. course in September 1992, or thereafter, are required to complete in Autumn Quarter, a Teachers’ Workshop, which includes the Apprentice Teaching Program described above, and a Teachers’ Workshop in Winter Quarter. There are no units associated with this work.

Students who entered the Ph.D. program prior to September 1992 are required to have taken in their second year a 5-unit course on teaching composition (397A) in Autumn Quarter, which includes the Apprentice Teaching Program, and the Teachers’ Workshop courses 397B in Winter Quarter (1-5 units) and 397C in Spring Quarter (1-5 units).

5. Students are encouraged to take an advanced course in literary theory or criticism.

6. A minimum of 25 additional units of graduate courses and seminars (excluding 396, 397, 398, and 399) distributed according to the adviser’s judgment and the candidate’s needs. A student may receive graduate credit for three 100-level courses in the Department of English.

7. Consent of the adviser if courses taken outside the Department of English are to count toward the 97-unit requirement.

8. An oral qualifying examination based on a reading guide, to be taken at the end of the summer after the first year of graduate work. The final decision as to qualification is made by the Graduate Studies Committee in consideration of the student’s course record in conjunction with the examination.

A student coming to the doctoral program who has done graduate work at another university must petition in the first year at Stanford for transfer credit for course work completed elsewhere. The petition should list the courses and grades and describe the nature and scope of course work, as well as the content, contact hours, and writing requirements. A syllabus must be included. The Director of Graduate Studies considers the petition in conjunction with the student’s grades.

A student who has isolated a topic or area which seems promising for a doctoral thesis subject and who wants to explore it right away, and to incur additional specific course requirements insuring coverage and balance in program, may petition on entrance to qualify on the recommendation of a committee of advisers who would oversee and evaluate a full year’s course of study. Such petitions are rigorously scrutinized by the Graduate Studies Committee and granted only in exceptional cases.

9. A University oral examination to be taken no later than the Winter Quarter of the student’s third year of graduate work. This examination covers the field of concentration (as defined by the student and the student's adviser).

ENGLISH AND AMERICAN LITERATURE

Requirements are as follows:

1. A course in Old English; or a course in the history of the English language; or a course in an earlier historical form of a foreign language with a bearing on English literature and language, such as Old French or Old High German; and a course in Middle English.

2. A minimum of 35 units of graduate courses in American literature and 35 units in English. Among these, a minimum of six courses for a letter grade from the graduate colloquia and graduate seminars, of which three must be in American literature, and of which at least three must be graduate seminars. The colloquia and seminars should be in different genres and periods as approved by the adviser.

3. Students who began their Ph.D. course in September 1992, or thereafter, are required to take a 5-unit course introducing them to the major research techniques, scholarly methods, and professional contexts in the study of literature and a 2-unit laboratory in pedagogy.

Students who entered the Ph.D. program prior to September 1992 are required to have taken in the Autumn Quarter of their first year a 2-unit course introducing the new graduate student to the various opportunities and responsibilities of the department.

4. In the second year, students who began their Ph.D. course in September 1992, or thereafter, are required to complete in Autumn Quarter,
2. A knowledge of the basic structure of the English language and of Chaucer. This requirement may be met by taking at least 10 courses in English literature, including Chaucer. No particular courses are required of all students.

3. Students who began their Ph.D. course in September 1992, or thereafter, are required to take a 5-unit course introducing them to the major research techniques, scholarly methods, and professional contexts in the study of literature and a 2-unit laboratory in pedagogy.

4. Students who entered the Ph.D. program prior to September 1992 are required to have taken in their second year a 5-unit course on teaching composition (397A) in Autumn Quarter, which includes the Apprenticeship Teaching Program, and the Teachers’ Workshop courses 397B in Winter Quarter (1-5 units) and 397C in Spring Quarter (1-5 units).

5. A knowledge of one foreign language comparable to that demanded under the basic program and an advanced reading knowledge of a second language.

6. A minimum of 45 units in the history, thought, and literature of one period, in two or more languages, one of which must be English and one foreign. Students normally include at least two courses in a foreign literature read in the original language and two courses listed under Comparative Literature or Modern Thought and Literature. As many as 20 units of this requirement may be satisfied through courses in reading and research. A student may receive graduate credit for three 100-level courses in the Department of English.

7. A minimum of six courses for a letter grade of all students.

8. A University oral examination covering the field of concentration (as defined by the student and the student’s adviser.)
studying abroad may take this examination after their return early in the fourth year.

LANGUAGE REQUIREMENTS
All candidates for the Ph.D. degree (except those in English and Comparative Literature, for whom special language requirements prevail) must demonstrate a reading knowledge of two foreign languages. Candidates in the earlier periods must offer Latin and one of the following languages: Greek, French, German, Italian, or Spanish. In some instances they may be required to offer a third language. Candidates in the later period (that is, after the Renaissance) must offer either Latin, French, or German as one language and may choose the second language from the following: Greek, Latin, French, German, Italian, Spanish, Russian, or another language relevant to the student's field of study. In all cases, the choice of languages offered must have the approval of the candidate's adviser. Any substitution of another language must be approved by the Director of Graduate Studies.

The Graduate Studies Committee does not accept courses taken as an undergraduate in satisfaction of the language requirement for doctoral candidates. For students coming to doctoral work at Stanford from graduate work done elsewhere, satisfaction of a foreign language requirement is determined by the Director of Graduate Studies based on the contact hours, syllabus, reading list, etc. Transfer is not automatic.

The candidate must satisfy one language requirement by the end of the first year (that is, before registration in the following year), and the other by the end of the third year.

Foreign language requirements for the Ph.D. may be fulfilled in any of the following ways:
1. A reading examination given each quarter by the various language departments, except for Latin and Greek.
2. For Latin and Greek, an examination by the Department of English. The Latin examination is given before registration in the Autumn Quarter in order to permit those who need the course to register for Latin 3. It is also given in the eighth week of the Winter and Spring Quarters, along with other department examinations for languages not tested by the Educational Testing Service.
3. Passage with a 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 50, Italian 50, and Spanish 50, respectively, with an LGI of 'B' or higher.

CANDIDACY
Students are expected to file for candidacy after successful completion of qualifying procedures and, in any event, by the end of the second year of doctoral study. Candidacy is valid for five years, and may be extended, subject to satisfactory progress.

DISSERTATION
As early as possible during their graduate study, Ph.D. candidates are expected to find a topic requiring extensive original research and to seek out a member of the department as his or her adviser. The adviser works with the student to select a committee to supervise the dissertation. Candidates should take this crucial step as early in their graduate careers as possible. The committee may well advise extra preparation within or outside the department, and time should be allowed for such work.

Immediately after the dissertation topic has been approved by the adviser, the candidate should file a formal reading committee form as prescribed by the University.

The dissertation must be submitted to the adviser in rough draft but in substantially final form at least four weeks before the University deadline in the quarter during which the candidate expects to receive the Ph.D. degree. Dissertations may not be submitted during the Summer Quarter.

JOINT Ph.D. IN ENGLISH AND HUMANITIES
The Department of English participates in the Graduate Program in Humanities leading to the joint Ph.D. degree in English and Humanities. For a description of that program, see the “Humanities Special Programs” section of this bulletin.

Ph.D. IN MODERN THOUGHT AND LITERATURE
Stanford also offers a Ph.D. degree in Modern Thought and Literature. Under this program, students devote approximately half of their time to a modern literature from the Enlightenment to the present, and the other half in interdisciplinary studies. Interested students should see the “Modern Thought and Literature” section of this bulletin and consult the chair of the program.

CREATIVE WRITING FELLOWSHIPS
The Creative Writing Program each year offers five two-year fellowships in poetry and five two-year fellowships in fiction. These are not degree-granting fellowships. Information is available in the Creative Writing office.
COURSES
NUMBERING SYSTEM
Writing and Critical Thinking Courses: 1-3
Introduction to Literature: 5
Cultures, Ideas, and Values: 7, 8, 9
English Language Courses: 101-109, 200-209
English Period Courses: 10-19, 110-119, 210-219, 310-319
American Period Courses: 20-29, 120-129, 220-229, 320-329
Genre Courses:
Drama: 40-45, 140-145, 240-249, 340-349
Poetry: 50-59, 150-159, 250-259, 350-359
Topic Courses: 60-69, 160-169, 260-269, 360-369
Author Courses: 70-79, 170-179, 270-289, 370-389
Seminars for English Majors: 180-189
Graduate Colloquia: 300-309
Writing Courses, Workshops, Individual Study, etc.: 90-99, 190-199, 290-299, 390-399

INTRODUCTORY
Classes designed for students whose major is undeclared or is not in English.

Tutorial Center—A no-credit service to any student, undergraduate or graduate, who wants help with writing. Available through the Program in Writing and Critical Thinking office.
0 units, Aut, Win, Spr (Staff)

1, 2. Writing and Critical Thinking—The successful completion in proper sequence of 1 and 2 satisfies the University’s Writing Requirement. Both involve reading texts and reviewing writing techniques. First quarter: students concentrate on finding an appropriate thesis and developing and organizing ideas. Second quarter: students concentrate on style and diction and on preparing and writing researched essays. Students choose from one of three general thematic categories (A, B, or C). Readings vary in each, but the primary concern is student writing and its improvement. All are expository writing courses, not conventional courses in cultural studies, literature, film, etc. (DR: W)
1A, 2A. Writing About Rhetoric—Writing generally based on readings about language and the art of persuasion.
3 units, Aut-Win, Win-Spr (Staff)

1B, 2B. Writing About Social and Political Issues
3 units, Aut-Win, Win-Spr (Staff)

1C, 2C. Writing About Literature, Media, and Film—Writing generally about literature and other creative forms.
3 units, Aut-Win, Win-Spr (Staff)

3. Intensified Writing and Critical Thinking—Fulfills the University’s Writing Requirement in one quarter; offered only to students scoring 4 or 5 on the English AP exam. Classes meet twice a week for 75 minutes along with individual tutorial sessions with the instructor. Students concentrate on the same writing techniques as those presented in the 1 and 2 sequence. Students choose from one of three general thematic categories (A, B, or C). Readings vary in each, but the primary concern is student writing and its improvement. All are expository writing courses, not conventional courses in cultural studies, literature, film, etc. (DR: W)
3A. Writing About Rhetoric—Writing generally based on readings about language and the art of persuasion.
4 units, Aut, Win, Spr (Staff)

3B. Writing About Social and Political Issues
4 units, Aut, Win, Spr (Staff)

3C. Writing About Literature, Media, and Film—Writing generally about literature and other creative forms.
4 units, Aut, Win, Spr (Staff)

4. Directed Writing—For students who have completed the Writing Requirement and wish further work in writing. Workshops and individual tutorials, tailored to each student’s needs. Graduate credit available.
3 units, Win (Emery)

5. Introduction to Literature—Enriches understanding and appreciation of literature by introducing the essential tools and concepts used in textual analysis. Readings include masterpieces from a wide variety of literary genres, historical periods, and national literatures. DR: 7(2)
3 units, Win (Evans)

7, 8, 9. Literature and the Arts—A Cultures, Ideas and Values (CIV) sequence paired with special sections of Writing and Critical Thinking. The sequence emphasizes literature, writing, and the creative imagination. Lectures explore literature in its cultural context and include sessions on art, architecture, music, and drama, moving chronologically from antiquity to the present, setting works in historical, intellectual, and generic perspective. Students generally meet three times a week for lectures, and three times weekly to discuss texts and work on writing. Seminar instructors are experienced writing teachers, and student essays receive close attention. Writing seminars use a careful reading of the CIV texts to help students understand the process of writing and to improve their own writing. Students must complete all 15 units of the 7, 8, and 9 sequence to fulfill the CIV requirement. Each student must enroll concurrently in the writing section, if any, paired with their CIV assignment for the quarter. Students who scored 4 or 5 on an English AP exam may fulfill the University’s Writing Requirement with a 4-unit Writing and Critical Thinking sc-
ENGLISH

11. Masterpieces of English Literature II: From the Enlightenment to the Modern Period — (English majors and others taking 5 units, register for 111.) Introduction to literary masterpieces written in English between 1700 and the present. Treats fiction and poetry, with some drama. DR:7t(2)

3 units, Win (Paulson)

12. Masterpieces of American Literature — (English majors and others taking 5 units, register for 112.) Survey of some major works of American literature, 1840-1940. Authors: Hawthorne, Melville, Whitman, Dickinson, James, Fitzgerald, Wright, Faulkner. DR:7(2)

3 units, Aut (Solomon)

30. The Novel — (English majors and others taking 5 units, register for 130.) Introduction to the novel through a close, sympathetic reading of a variety of major novels, focusing on their construction, narrative technique, and expression of human values. DR:7(2)

3 units, Win (Bartholomew)

Spr (Paulson)

40. Introduction to Drama — (English majors and others taking 5 units, register for 140.) Principal dramatic forms, development of dramatic art, masterpieces of the theater from various periods, countries. DR:7(2)

3 units, Spr (Friedlander)

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 (Ross)

Win (Felstiner)

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:7t(2)

3 units, Spr (Middlebrook)

60. The English Bible — (English majors and others taking 5 units, register for 160.) Selected readings in important versions of the English Bible as the source, inspiration, and reference for English and American literary works. DR:7(2)

3 units, Aut (Brown)

65A. Introduction to Medieval Culture — (English majors and others taking 5 units, register for 165A.) Introduction to the development of medieval culture through study of religious, philosophical, literary, artistic, social, and political sources, emphasizing interrelationships among them. DR:7(2) or 8(3)

3 units, Win (Brown, Staff)

7,7A. Antiquity and the Middle Ages — From Gilgamesh and the Hebrew Bible to the dawn of the Renaissance, covering works including Homer, classical sculpture, Plato, Plautus, Roman architecture, Lao Tze, the New Testament, Sung landscape painting, Sundiata, West African Art, Marie de France, the Popol Vuh, Giotto, and Chaucer. Writing instruction concentrates on critical thinking, organization, and technical proficiency. DR:1 (three-quarter sequence)

5-8 units, Aut (Steidle, Staff) lectures plus sections and workshops

8,8A,8B,8C. Renaissance and Enlightenment — Readings from the Renaissance to the Enlightenment, including works by Machiavelli, More, painters of the Italian and the Northern Renaissance, Bach, Shakespeare, Donne, Milton, Defoe, Swift, Mozart, Rousseau, Mary Wollstonecraft, Paine, Jefferson, Franklin. Writing instruction concentrates on style and diction, and on preparing and writing a research paper. DR:1 (three-quarter sequence)

5-8 units, Win (Riggs, Staff) lectures plus sections and workshops

9,9B,9C. The Modern World — Thought and literature from the French Revolution to contemporary times, including works by Romantic, Victorian, Modernist, and Postcolonial writers in English; selections from Marx and Freud; art from European and African traditions; film and jazz. DR:1 (three-quarter sequence)

5-8 units, Spr (Trainer, Staff) lectures plus sections and workshops

10,11,12. Masterpieces of English and American Literature — In-depth study of selected works by major English and American writers from the medieval to modern periods.

10. Masterpieces of English Literature I: Chaucer, Shakespeare, Milton, and Their Contemporaries — (English majors and others taking 5 units, register for 110.) Introduces medieval and Renaissance literature through the works of Chaucer, Shakespeare, Milton, and selected contemporaries. DR:7(2)

3 units, Aut (Summit)

11. Masterpieces of English Literature II: From the Enlightenment to the Modern Period — (English majors and others taking 5 units, register for 111.) Introduction to literary masterpieces written in English between

7,8,9 sequence. Others must complete a 6-unit sequence of writing sections. Depending on writing section assignment and AP status, students in the three-quarter sequence 7, 8, and 9 sequence enroll in a total of 5 to 8 units of Literature and the Arts course work each quarter to fulfill both the University’s CIV and Writing requirements.

10,11,12. Masterpieces of English and American Literature from the medieval to modern periods. Treatment of selected masterpieces written in English between

2000 and the present. Treats fiction and poetry, with some drama. DR:7t(2)

3 units, Win (Paulson)

12. Masterpieces of American Literature — (English majors and others taking 5 units, register for 112.) Survey of some major works of American literature, 1840-1940. Authors: Hawthorne, Melville, Whitman, Dickinson, James, Fitzgerald, Wright, Faulkner. DR:7(2)

3 units, Aut (Solomon)

30. The Novel — (English majors and others taking 5 units, register for 130.) Introduction to the novel through a close, sympathetic reading of a variety of major novels, focusing on their construction, narrative technique, and expression of human values. DR:7(2)

3 units, Win (Bartholomew)

Spr (Paulson)

40. Introduction to Drama — (English majors and others taking 5 units, register for 140.) Principal dramatic forms, development of dramatic art, masterpieces of the theater from various periods, countries. DR:7(2)

3 units, Spr (Friedlander)

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 (Ross)

Win (Felstiner)

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:7t(2)

3 units, Spr (Middlebrook)

60. The English Bible — (English majors and others taking 5 units, register for 160.) Selected readings in important versions of the English Bible as the source, inspiration, and reference for English and American literary works. DR:7(2)

3 units, Aut (Brown)

65A. Introduction to Medieval Culture — (English majors and others taking 5 units, register for 165A.) Introduction to the development of medieval culture through study of religious, philosophical, literary, artistic, social, and political sources, emphasizing interrelationships among them. DR:7(2) or 8(3)

3 units, Win (Brown, Staff)
65B. Arthurian Literature — (English majors and others taking 5 units, register for 165B.) Survey of medieval classics (in translation) that recount the legends of Arthur and his companions. Focuses on the relation between history and fiction, the social uses of literature, and on the construction of gender roles. DR:7(2) 3 units, Spr (Lerer)

73. Shakespeare — (Enroll in Drama 59.) DR:7(2) 3 units, Win (Lyons)

79E. Hemingway and Fitzgerald — (English majors and others taking 5 units, register for 179E.) 3 units, Aut (Bacon)

90. Fiction Writing — Basic problems of narrative and imaginative writing. Prerequisite: completion of the writing requirement. 5 units, Aut, Win, Spr (Barbash, Chang, Isle, MacDonald, Snowman)

92. Reading and Writing Poetry — Introduction to the understanding and writing of poetry. Prerequisite: completion of the writing requirement. (Area:P) 5 units, Aut, Win, Spr (Donohue, Eisele)

BASIC UNDERGRADUATE SURVEYS, SEMINARS, AND WORKSHOPS

Note — Graduate students may receive graduate credit for three 100-level courses.

100A. Modernism and the Humanities: Symbolism — From Baudelaire to T.S. Eliot — (Same as French and Italian 158E, Humanities 197P.) The Symbolist movement in French poetry and its inheritance by English-writing poets Yeats, Pound, and Eliot and novelist Joseph Conrad. French poets include Baudelaire, Rimbaud, Mallarmé, and Valéry. 5 units, Win (Harrison, Perloff)

102. History of the English Language — (Same as Linguistics 62.) Evolution of English in Britain and the U.S.; the use of English world-wide. Emphasis on how and why language changes, issues in language contact, the effect of literacy, and standardization. DR:9(4) 5 units, Spr (Traugott)

110. Masterpieces of English Literature I: Chaucer, Shakespeare, Milton, and Their Contemporaries — See 10. 5 units, Aut (Summit)

111. Masterpieces of English Literature II: From the Enlightenment to the Modern Period — See 11. 5 units, Win (Paulson)

112. Masterpieces of American Literature — See 12. 5 units, Aut (Solomon)

113. The Renaissance — A basic survey of English literature. (Area:C) DR:7(2) 5 units, Aut (Orgel)

115. Survey of 18th-Century Literature — Works of fiction and poetry from the late 17th century to around 1800. The developments of the novel from Behn to Austen, and the poetry of Pope, Swift, Gray, and Goldsmith. Discussions of the historical context of these works. (Area:E) DR:7(2) 5 units, Aut (Harkin)

121. American Literature and Culture to 1855 — (Same as American Studies 150.) (Area:G) 5 units, Win (Fliegelman)

125. American Literature, 1890-1940 — (Area:H) 5 units, Win (Solomon)

127D. American Literature, 1820-1865 — Survey of the “popular” and “classic” literature in the U.S. 1820-1865, emphasizing the diversity of literary production in the period. Theoretical concerns, e.g., literary value and the relation of literature to gender, ethnicity, class, sexuality, region, and nationality. Short lectures on historical and literary historical topics (social reform movements, westward migration, market capitalism, mass culture, slavery, aboriginal peoples, evangelical religion, changes in the structure of family life, the history of the novel, the canonization of American literature. (Area:G) 5 units, Aut (Romero)

130. The Novel — See 30. 5 units, Win (Bartholomew) Spr (Paulson)

131. The 18th-Century British Novel — (Area:E) 5 units, Spr (Bender)

132G. The 19th-Century English Novel — (Area:F) DR:7t(2) 5 units, Win (Polhemus)

137. Development of the Short Story — Required of creative writing students in fiction. Reading/discussion of American, British, and Continental short stories, emphasizing changes and developments in the form. (Area:H) DR:7(2) 5 units, Spr (Tallent)

140. Introduction to Drama — See 40. 5 units, Spr (Friedlander)

141. Renaissance Drama — Surveys the great plays of English Renaissance; works from Kyd, Marlowe, Jonson, Webster. Selected works from French theater (Molière, Racine) for comparative purposes. (Area:C) 5 units, Win (Friedlander)

150. Poetry and Poetics — See 50. (Area:P) 5 units, Aut (Ross) Win (Felstiner)
150G. Poetry and Poetics—(Same as Feminist Studies 164.) See 50G. (Area:P)
5 units, Spr (Middlebrook)

154. Major Romantic Poets—(Same as 254.) Introduction to a selection of the poems and most important critical statements of Blake, Byron, Coleridge, Keats, Shelley, and Wordsworth. Freshman and sophomore prerequisite: consent of instructor. (Area:F)
3 units, Aut (B. Gelpi)

155B. The Voice in Contemporary Poetry—The use of the poet's voice in the contemporary poem since 1950 as a deliberate strategy which can mould a line or shape a stanza, and as the dramatic difference between voice and tone in a poet like Elizabeth Bishop. The poet's voice as a transforming power which can carry the historical poem forward into issues and experiences which realign its force and ethos, while imperiling its relation with tradition. (Area:P)
5 units, Win (Boland)

156. Whitman and Dickinson—(Area:G)
5 units, Spr (Bacon)

156D. Poetess: The Grammar of the Self When the Poet is a Woman—(Enroll in Slavic Languages 161/261.)
4 units, Win (Greenleaf)

160. The English Bible—(See 60.)
5 units, Aut (Brown)

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: the role of the novel in the rise of classical narrative cinema, the "Victorian Sensibility" of silent American cinema, particularly films of D.W. Griffith; Dickens, violence, melodrama, and the idea of an English national cinema; the culture of cinema and the culture of modernity; 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; imagining the horrible in novel, photograph, and film. Mandatory evening screenings. (Area:H) DR:7(2)
5 units, Win (Marsh)

161A. African-American Writing, 1950-1970—Central literary and intellectual concerns among Afro-American writers, emphasizing the historical and social context. The emergence of the Civil Rights movement in the 1950s and its development in the 1960s; the Black Power/Black Arts movement of the 1960s; and the emergence of women writers in the second part of the period. Continuities and changes in the work of individual writers over time. The relation between literary style and the artist's conception of audience and relation to community. Readings, entire and excerpted from novels, essays, poetry. Authors: Richard Wright, Ann Petry, Ralph Ellison, James Baldwin, Lorraine Hansberry, Leroi Jones, Amiri Baraka, Gwendolyn Brooks, Martin Luther King, Jr., Malcolm X. (Area:H)
3 units, Aut (Drake)

163G. Literary and Visual Culture in 18th-Century Britain—Introduces connections between literary and visual culture in 18th-century England. Texts by Addison, Pope, Burke, and others on aesthetics, looking at the works and writings of artists including Hogarth, Reynolds, and Gainsborough. Topics: the relation of different viewers to (natural and represented) landscapes, city-country oppositions, the sublime, and the social role of the visual arts in the period. (Area:E)
5 units, Win (Harkin)

5 units, Spr (Holland)

163K. Contemporary Latina Culture—(Area:H)
5 units, Win (Romero)

163M. The Literature and Culture of the Crusades
5 units, Win (Heng)

164B. Imagining the Holocaust—How has the literary imagination envisioned the destruction of European Jewry? The Holocaust and European, Israeli, and American responses through documentation, diaries, fiction, poetry by Appelfeld, Borowski, Wiesel, Levi, Ozick, Roth, Malamud, Schindler's List (Keneally) and through visual art. Survivor addresses the class. DR:7(2)
5 units, Win (Felstiner)

165A. Introduction to Medieval Culture—(Same as Medieval Studies 165.) See 65A. (Area:B)
DR:7(2) or 8(3)
5 units, Win (Brown, Staff) MTWTh 9

165B. Arthurian Literature—See 65B. (Area:B)
5 units, Spr (Lerer)

165D. Women Writers of the Middle Ages—Medieval women's writing, from lyrics and romances to religious works, letters, and a gyneco-logical treatise; how these texts represent authorship, gender, and literary tradition. Writers (in translation) include Christine de Pizan, Margery Kempe, Heloise, and Marie de France. (Area:B)
5 units, Aut (Lerer)

166. Introduction to Literary Theory—(Same as 266.) Introduces upper-division undergraduates to the historical and institutional contexts of contemporary critical theory. Freud, Marx, Saussure; Foucault, Derrida, Judith Butler. Theories of representation and signification; deconstruction and its critics; the autonomy of theory as an academic discipline.
3 units, Aut (Lerer)
169L. Self as Other: Interpellating Minority Subjectivities — (Enroll in Comparative Literature 141.)
   5 units, Win (Palumbo-Liu)

169M. Ethnic Memory and Cultural Nationalism — (Enroll in Comparative Literature 142.)
   5 units, Spr (Palumbo-Liu)

171A. Chaucer’s Canterbury Tales — Chaucer’s poetry read in Middle English. (Area:B)
   5 units, Aut (Narin Van Court)

172. Milton — (Area:C)
   5 units, Spr (Evans)

   5 units, Aut (Rebholz)

173B. Shakespeare — Tentative list: Midsummer Night’s Dream, As You Like It, Henry IV, Part One, Henry V, Hamlet, Othello, The Winter’s Tale. (Area:D) DR:77(2)
   5 units, Win (Parker)

173C. Shakespeare — Tentative list: Twelfth Night, As You Like It, Romeo and Juliet, The Merchant of Venice, Hamlet, Othello. (Area:D) DR:77†
   5 units, Win (Orgel)

177. Austen and Dickens — (Area:F)
   5 units, Spr (Polhemus)

177C. Virginia Woolf and Bloomsbury — (Area:H)
   5 units, Aut ‘Halliburton)

179E. Hemingway and Fitzgerald — See 79E. (Area:H)
   5 units, Aut (Bacon)

180-189. Seminars for English Majors — Preference given to sophomore and junior English majors. Scholarly and critical studies of literary texts. One seminar (or its equivalent) is required of all English majors. 180-188 satisfy the appropriate area requirements, B-H, P (see program for major in English above). The subject matter of 180 is mainly linguistic studies; 181, Medieval literature; 182, Renaissance literature, and so on. 189, which can count as one of three required electives (see program for major in English above), is mainly the theory of literary genres. Sign up in department.

181B. Seminar: The Other Middle Ages — (Area:B)
   5 units, Aut (Narin van Court)

181C. Seminar: Gender and the Medieval Literature of Courtly Love — (Area:B)
   5 units, Win (Summit)

181D. Seminar: The Heroic Ideal — Mutation and Adaptation, 750-1350 — (Area:B)
   5 units, Spr (Steidle)

182. Seminar: 17th-Century Lyric Poetry — (Area:C)
   5 units, Aut (Rebholz)

182A. Seminar: Renaissance Literature — (Area:C)
   5 units, Win (Ross)

183A. Seminar: Shakespeare Through Performance — (Area:D)
   5 units, Spr (Friedlander)

   5 units, Aut (Heath)

184A. Seminar: Issues of Gender, Identity, and Subjectivity in 18th-Century Literature — (Area:E)
   5 units, Spr (Wahl)

185. Seminar: Imagining Victorian Women — (Area:F)
   5 units, Win (Marsh)

185A. Seminar: Victorian Science (and) Fiction: 19th-Century Tales of the Supernatural — (Area:F)
   5 units, Spr (Alfano)

186. Seminar: Art and Democracy in Late 19th-Century American Literature — (Area:G)
   5 units, Aut (Luria)

186A. Seminar: Psychological Themes in American Fiction — (Area:G)
   5 units, Win (Moser)

186G. Seminar: Race and American Fiction, 1845-1945 — (Areas:G,H)
   5 units, Spr (Porter)

   5 units, Spr (Sorrentino)

   5 units, Win (Porter)

187S. Seminar: The Contemporary American Short Story — (Area:H)
   5 units, Aut (L’Heureux)

   5 units, Aut (Drake)

188B. Seminar: Poetry and Poetics — (Area:P)
   5 units, Win (Di Piero)

189A. Seminar: Second Wave of U.S. Feminism — (Area:H)
   5 units, Win (Holland)

190. Intermediate Fiction Writing — May be taken twice. Manuscript must be submitted to Building 50, room 51C. Prerequisite: 90.
   5 units, Win, Spr (Barbash, Snowman)

191. Expository Writing — Advanced composition open to undergraduates and graduates. Taught through tutorials, short lectures, and general discussion. General instruction in writing.

191E. Advanced General Composition
   3 units, not given 1995-96

192. Intermediate Poetry Writing — May be taken twice. For admission, manuscript must be submit-
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 any one quarter. 195 may not be used to fulfill departmental area or elective requirements without permission.
any quarter, by arrangement

196A. Honors Seminar: Critical Approaches to Literature — Required of all seniors in the English honors program. A history of literary criticism from Plato and Aristotle to Poulet and Fish.
5 units, Aut (Evans)

196B. Honors Essay Workshop — Required of all English honors students.
3 units, Win (Moser)

196T. Honors Tutorial
3 units, Aut, Win, Spr (Staff)

197. Senior Honors Essay
10 units (in two quarters) Aut, Win, Spr (Staff)

198. Individual Work — Undergraduates who wish to study a subject or an area not covered by regular courses may, with permission, enroll for individual work under the supervision of a member of the department. No more than 5 units of credit are given for 195 and/or 198 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

198A. Dialogue Tutorial: Dickens in the Round
2 units, Win (Marsh)

198B. Dialogue Tutorial: Nabokov's Postmodern Masterpieces
2 units, Spr (Holeton)

198M. Sophomore Seminar: The Modern Lyric Form
3 units, Win (Bacon)

198N. Sophomore Seminar: Shakespeare's Plays — (Area:D)
5 units, Win (Rebholz)

198P. Sophomore Seminar: Feminist Discourse and 20th-Century Literature
3 units, Win (Holland)

199. Senior Independent Study — Open, with department approval, to seniors majoring in English who wish to work throughout the year on a 10,000 word critical or scholarly essay (see "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)

199A. Comparative Literature and Minority Discourse — (Enroll in Comparative Literature 230.)
5 units, Spr (Palumbo-Liu)

TOPICS AND AUTHORS
(UNDERGRADUATES AND GRADUATES)

202. Emergence of "Literary Language" — The emergence of linguistic and literary repertoires in the English language, contexts for and effects of language contact, standardization and marginalization, orality and literacy, the role of technologies such as printing, changing views of the nature of "text" and "literary discourse," the relation of language to mind and culture, the relation of linguistic structure to style and genre. Draws on approaches from recent discourse analysis and historical linguistics.
4-5 units, Aut (Traugott)

205. Old English — Study of Old English; critical reading of short poems and selected prose in language and literature.
4-5 units, not given 1995-96

211. Readings in Middle English — The language and dialects of Middle English and reading in the various genres of prose and poetry. (Area:B)
4-5 units, Aut (Brown)

215. Anglo-Irish Writing, 1700-1820
4-5 units, Win (Carnochan)

215A. The Novel of Feeling — Focuses on novels and other texts from the second half of the 18th century which explore notions of sentiment and sympathy as a basis for social and aesthetic practice. Readings from novelists Sarah Fielding and Laurence Sterne to Jane Austen, texts by Hume, Smith, Wollstonecraft, and others. Readings in relevant recent critical work. The development of the characteristic forms of the novel of feeling, and the work of these texts in constructing gender and class positions. (Area:E)
4-5 units, Aut (Harkin)

217. James Joyce and Ulysses — Joyce's major prose before Finnegans Wake, centering on Ulysses and its multiple implications. (Area:H)
4-5 units, Win (Polhemus)

229E. Harlem Renaissance: Failure or Success? — Works by Langston Hughes, Wallace Thurman,
Zora Neale Hurston, Carl Van Vechten, Alain Locke, James Weldon Johnson, Jean Toomer, Nella Larsen, and others. (Area:H)

4-5 units, Spr (Porter)

254. Major Romantic Poets — (See 154.)

4-5 units, Aut (B. Gelpi)

256B. California Poets — (Area:H)

4-5 units, Spr (A. Gelpi)

260A. Narrative and Genre — (Same as Linguistics 267.) Genres of oral and written literature, especially narrative, in historical and sociocultural contexts. Emphasis on the role of certain institutions (e.g., law and education) in shaping particular genres. Topics: essays and epigrams, jokes and riddles in folklore and children's literature, stories as forms of resistance and accommodation, ideologies of genre creation and promotion. The roles of literacy, literary interpretation, and oral performance. Readings from Europe, N. America, Africa, Latin America and the Caribbean.

4-5 units, Win (Heath)

260B. The Bible in Fiction, Fiction in the Bible — (Enroll in Religious Studies 231.)

4-5 units, Aut (Bach)

266. Introduction to Literary Theory — (See 166.)

4-5 units, Aut (Lerer)

289. 20th-Century Literature and Economics — (Area:H)

4-5 units, Spr (Tratner)

290. 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, combinatorics, etc., and with devices of their own invention. Prerequisites: 90, 92, or any advanced writing course.

4-5 units, Aut (Sorrentino)

290A. Advanced Fiction Writing — Students selected by the instructor. Promising fiction writers who have completed 90 and 190 workshop critique their stories with a view toward bringing them to publishable quality. Manuscripts must be submitted to the Creative Writing office by December 15.

4-5 units, Win (Di Piero)

293. Verse Translation Workshop — Students pursue and present works in progress, discussing practical and theoretical questions. Consult instructor during prior quarter.

4-5 units, Aut (Di Piero)

295. Interactive Narrative and Artificial Intelligence — (Same as Computer Science 320.) Theory of, and approaches to, interactive narrative systems, especially those that incorporate artificial intelligence techniques. Weekly meetings; invited lecturers, discussion readings, critical review of CD Rom titles, and other implemented systems. Students create prototypes of AI-based interactive story systems.

2 units, Win (Friedlander, Hayes-Roth)

296. Critical Theory and the Profession: An Introduction to Graduate Study for A.M. Students — Introduces incoming graduate students to literary criticism and theory in the context of the past and present paradigms, conflicts, and modes of institutionalization. The role of texts in relation to social issues, canon formation, and the emergence of "new" approaches (e.g., cultural and ethnic studies), are compared and contrasted with more traditional approaches (e.g., philology, hermeneutics).

5 units, Aut (Halliburton)

300B. The Bible in World Culture — (Enroll in Comparative Literature 212.)

5 units, Spr (Parker)

301. Colloquium: Old English Poetry and Culture

4-5 units, Win (Brown)

302A. Colloquium: Literature and Politics in Early Tudor England — The origins of courtly literature in England, 1485-1557, through the relations between love and diplomacy as forms of surreptition and control, the performativity of courtly life and the history of the body, the sexuality of early Renaissance culture, court and university in the development of English Humanism, and printing and the public from Caxton to Tottel.

4-5 units, Aut (Lerer)

302B. Colloquium: Literature and Politics in 17th-Century England — Stuart and Commonwealth poetry, drama, and prose in the context of the politics of this century of revolutions.

4-5 units, Spr (Rebholz)

302C. Colloquium: The Invention of the Great Book in the Renaissance — Prerequisite for undergraduates: consent of instructor.

4-5 units, Spr (Orgel)

302D. Renaissance/Early Modern Seminar — (Enroll in Humanities 313.)

3-4 units, Aut, Spr (Brooks)
303B. Colloquium: Sexuality and Terror—Gothic and Fantastic Literature of the 18th Century—Classics of Gothic fiction by Walpole, Radcliffe, Lewis, Beckford, and others. The role of women in Gothic fiction and the genre's treatment of terror and sexuality. 4-5 units, Win (Porter)

304A. Colloquium: Romanticism in History—The concept of Romanticism as it emerged in poetry and philosophy at the end of the 18th century and rethought to the present day. Readings from sources: Romantic poets, Victorian thinkers, and modern critical theorists. 4-5 units, Aut (Lindenberger)

304B. Colloquium: Agency/Sex/Gender—Aphra Behn to George Sand—(Same as Comparative Literature 304B, French and Italian 304E.) Readings of literary and philosophical texts from England and France between the late 17th and the early 19th centuries, focusing on: the emergence of the notion of Agency, the (pre)history of the sex/gender distinction; how concepts of Agency relate to gender and sex distinctions. Are there discursive differences (mainly between literature and philosophy) in the construction of these notions and their interrelations? 4-5 units, Win (Bender, Gumrecht)

305G. Colloquium: "Stained-Glass Attitudes"—The Rossettis in Context—The Victorian passion for things medieval (art, architecture, poetic forms and themes, religious doctrines and rituals, social institutions). Works by Pugin, Ruskin, Newman, the Rossettis, Morris, and Hopkins. 4-5 units, Spr (B. Gelpi)

307C. Colloquium: Methods and Materials for the Study of Modern Literature—Research techniques and library resources for conducting a Benjaminian mode of cultural inquiry into post-Enlightenment British and American literature (1750-present). Reconstructing the original ideological environments of selected modern works, including semantic, socio-economic, and technological dimensions. Non-canonical and quasi-literary discourses are used to historicize texts. 4-5 units, Spr (McPherson)

308H. Colloquium: American Primitivisms—Interdisciplinary 20th-century representations of the primitive in the U.S. The ways the modern Western self has incorporated into its construction what has been variously designated as non-Western, primitive, indigenous, primitivist, atavistic. Compares texts and cultural-historic settings organized around literary naturalism (London, Hopkins, Petry); early Hollywood films and popular culture (DeMille, Burroughs); anthropology (Mead, Boas); Harlem Renaissance (Hurston); contemporary chicano/a writers (Chavez, Islas, Morales, Anaya, Anzaldua); cultural theory (Levi-Strauss, Freud, Robin Gates). 4-5 units, Win (Romero)

308K. Colloquium: Slavery and American Fiction—Representation and American Fiction—Works by Stowe, Twain, Melville, Douglass, Bontemps, Stylon, Morrison, Williams, and Johnson. 4-5 units, Win (Porter)

309. Colloquium: The Boundaries of Gender 4-5 units, Aut (Orgel)

309A. Colloquium: Modernisms 4-5 units, Win (Trainer)

309M. Colloquium: Epic and Empire—(Enroll in Comparative Literature 201.) 5 units, Spr (Parker)

311. Hybridity and Diaspora—(Enroll in Comparative Literature 311.) 5 units, Aut (Palumbo-Liu)

350. Seminar: Wallace Stevens and James Merrill—Poetry and poetics of two major 20th-century American lyric formalists situated in relation to relevant contemporary literary theory and critique. 4-5 units, Spr (Middlebrook)

356. Seminar: Whitman and Dickinson 4-5 units, Aut (A. Gelpi)

366. American Enlightenment 4-5 units, Aut (Fliegelman)

367. Seminar: Victorian Aesthetics and the Decadence—High Victorian aesthetics (Mill, Ruskin, the Pre-Raphaelite Brotherhood) to fin de siecle aestheticism and the Decadents. Aesthetic categories like feeling, beauty, and taste in the contexts of social movements (gender and sexuality) and social theory of empire and consumer society. Genres: poetry, manifesto, prose fiction and nonfiction, drama, scientific treatise, etc. Some comparative reference. 4-5 units, Spr (Gagnier)

373C. Seminar: Shakespeare—The canon of Shakespeare in itself and against the backdrop of contemporary contexts, including history and ideology; gender identity and transvestite theater, domestic spying and Other World "discovery"; miscegenation and race; the body, social hierarchy and dramatic structure. 4-5 units, Win (Parker)

382. Seminar: Finnegans Wake 5 units, Spr (Polhemus)

385. Seminar: Henry James and the Romance Tradition—James' novels and novellas (including Roderick Hudson, Portrait of a Lady and The Wings of the Dove), Hawthorne, and various prefacces and critical essays. Pertinent fictional and critical works by Hawthorne, Stevenson, Cather, and recent theorists. 4-5 units, Win (Dekker)

385H. Seminar: Yeats and Pound—The Question of Modernism(s)—The two poets' notion of...
what a poem should be diverged sharply and yet shares the Modernist faith in poetic autonomy, lyric over narrative, the image over discursive models. Could Anglo-American Modernism accommodate as its dominant figures, two antithetical poets? How do their notions of "the poetic" relate to the drive toward totalizing systems and Fascism? Close reading of Yeats' Collected Poems, Pound's Personae and Cantos, and the critical and philosophical writing of both poets (Yeats' A Vision and selected essays; Pound's Imagist manifestos, Gaudier-Brzeska, ABC of Reading, and Guide to Kulchur).

4-5 units, Win (Perloff)

390. Graduate Fiction Workshop — Primarily for graduate students in the Writing program. May be repeated for credit. Prerequisite: consent of instructor.
3 units, Aut (L'Heureux)
Win (Tallent)
Spr (Sorrentino)

391. Advanced Work in Writing and Criticism
any quarter, by arrangement

392. Graduate Poetry Workshop — Primarily for graduate students enrolled in the Writing program. May be repeated for credit. Prerequisite: consent of instructor.
3 units, Aut (DiPiero)
Win (Boland)
Spr (Fields)

394. Independent Study — Preparation for qualifying examination and for the Ph.D. oral examination.
any quarter, by arrangement

395. Ad Hoc Graduate Seminars — Three or more graduate students who wish in the following quarter to study a subject or an area not covered by regular courses and seminars may plan an informal seminar and approach a suitable member of the department to supervise it.
any quarter, by arrangement

396. Introduction to Graduate Study for Ph.D. Students — Required of all incoming Ph.D. students, addressing such basic questions as "What is 'literary' study in the 1990s and why are we engaged in it?" What role does literary study play (or not play) in the intellectual and cultural life of our society and how is that role being reconceived today? Focus is theory, but it is intended as an examination of modern "theorists" who are themselves regarded as major "writers," since the rapprochement between "theory" and "imaginative writing" is one of the hallmarks of the period. Seminar with individual students reporting on the reading and leading class discussion.
5 units, Aut (Perloff)

396L. Laboratory in Pedagogy — Required for first-year Ph.D. students in English, Modern Thought and Literature, and Comparative Literature (except for Comparative Literature students who are doing their teaching in a foreign language). Preparation for TA in undergraduate literature courses. Focus is on leading discussions and grading papers.
2 units, Aut (Fields, Reichard)

397A. Teachers Workshop I — Seminar and apprenticeship required for second-year graduate students in English, Modern Thought and Literature, and Comparative Literature teaching in the Writing and Critical Thinking Program. Each student is assigned as an apprentice to an experienced teacher and sits in on classes, conferences, and tutorials, with eventual responsibility for conducting a class, grading papers, holding conferences. Seminar meetings discuss rhetoric, theories of composition, and the teaching of writing. Readings in rhetoric and pedagogy. Each student designs a two-quarter syllabus in preparation for teaching English 1 and 2.
1-5 units, Aut (Fields, Reichard)

397B. Teachers Workshop II — Seminar for second-year graduate students teaching the first quarter of composition in the Writing and Critical Thinking Program. Focus is on the students' concurrent teaching and preparation for teaching the second quarter of the sequence.
1-5 units, Win (Fields, Reichard)

397C. Teaching Workshop III — See 397B.
1-5 units, Spr (Fields, Reichard)

397R. Research in Writing and Writing Instruction — (Enroll in Education 243.)
4 units (Sperling)
adaltnerate years, given 1996-97

398. Research Course — A special subject of investigation under supervision of some member of the department. Thesis work is not registered under this course.
any quarter, by arrangement

398R. Revision and Development of a Paper — Student revises and develops a paper under the supervision of a faculty member with a view to possible publication.
5 units, any quarter, by arrangement

399. Thesis
any quarter, by arrangement

REGULARLY OFFERED BUT NOT DURING 1995-96

122. American Literature, 1855-1917
123. American Literature, 1917 to the Present
158A. Plath, Sexton, Rich
161C. 20th-Century Afro-American Fiction
161F. The Harlem Renaissance
201. Old Saxon
239. American Short Fiction
290A. Reading and Writing the Novella
314E. Seminar: Historical Interpretation of Renaissance Drama — Theory and Practice
UNDERGRADUATE PROGRAM

The honors program in Ethics in Society is open to majors in every field and may be taken in addition to a department major. Students should apply for entry at the end of Spring Quarter of the sophomore year or at the beginning of the Autumn Quarter of the junior year. Applicants should have a cumulative letter grade indicator (LGI) of ‘B+’ or higher. They should also maintain this minimum average in the courses taken to satisfy the requirements.

Requirements —

1. Required courses:
   a) Philosophy 20, Introduction to Moral Theory, or Philosophy 170. This is normally taken in the sophomore year.
   b) Philosophy 30, Introduction to Political Philosophy (same as Public Policy 103A), or Philosophy 171. This is normally taken in the sophomore year.
   c) Ethics in Society 77, The Ethics of Social Decisions (same as Philosophy 77). Ethics in Society honors students must enroll under Ethics in Society. This course is aimed primarily at the junior year and is taken upon admission to the honors program.

2. One 4- or 5-unit undergraduate course on a subject approved by the honors adviser, designed to encourage students to explore those issues in Ethics in Society that are of particular interest to them. Courses of relevance to the Program in Ethics in Society are offered by members of the Program Committee and by other departments. Students may also take a course with the honors thesis in mind. To promote a broad interdisciplinary approach, this elective should normally be outside the Department of Philosophy. Students are not restricted to choosing from the sample of such courses included below.


4. Ethics in Society 200A,B. Honors thesis on a subject approved by the honors adviser, 8-10 units, with work spread over two quarters.

A typical student takes Philosophy 20 and 30 in the sophomore year. On admission to the honors program as a junior, he or she takes Ethics in Society 77, given Winter Quarter. Requirement 3 is also fulfilled in Winter Quarter, and requirement 2 (the optional subject) at any time during the junior year, or possibly Autumn Quarter of the senior year. The honors thesis is written during the Autumn and Winter Quarters of the senior year.
GRADUATE STUDIES

In addition to the Ethics in Society Lecture Series, the program’s main provision for graduate students is a seminar on applied ethics (Philosophy 278). Students present talks on normative themes of their own choosing, providing an opportunity for graduate students from different disciplines to interact in the process of deliberating over ethical matters of common interest.

COURSES

UNDERGRADUATE

For course information not listed, please refer to the relevant department listings elsewhere in this bulletin. See the Time Schedule each quarter for any changes in listings.


5 units, Win (Cohon) MWF 11 plus section

30. Introduction to Political Philosophy — (Enroll in Philosophy 30, Public Policy 103A.) Introduction to some fundamental issues of political life. Why do laws have authority? Can it be fair for some people to be wealthier than others? How free should society be? Do we need a government at all? These questions are explored through a reading of the classic texts in political philosophy, from the 4th century B.C. to the present. DR:8(3)

5 units, Aut (Satz) MWF 11 plus section

77. The Ethics of Social Decisions — (Same as Philosophy 77.) Application of moral reasoning to a particular social or political issue. Topics change each year.

4 units, Win (Hursthouse) TTh 11-12:15

78. Medical Ethics — (Enroll in Philosophy 78.) Introduction to ethical theory. Topics: models of the doctor-patient relation, confidentiality, informed consent, abortion, euthanasia, criteria for death, distribution of scarce medical resources, genetic manipulation.

4 units (Staff)

98. Dialogues Tutorial: Promises and Moral Obligations — (Enroll in Political Science 98.) Addresses abstract issues of moral philosophy by focusing on a familiar, concrete, and accessible topic, the moral obligation to keep promises.

2 units, Spr (Tunick)

100. Computers, Ethics, and Social Responsibility — (Enroll in Computer Science 201.)

3 units, Spr (Roberts) MWF 11

110. Ethics and Public Policy — (Enroll in Science, Technology, and Society 110, Public Policy 103B.) DR:8(3)

5 units, Win (McGinn) MW 2.15-3.30

136. Population Perspectives in the Third World — (Enroll in Food Research 136.)

5 units (Arthur)


1-4 units, Win, Spr (Lusignan, Packenham, Gupta) W 7:30-9:30 p.m.

150. Economics and Public Policy — (Enroll in Economics 150, Public Policy 104.)

5 units, Win (Cogan)

154. Feminist Political Theory: Gender Power and Justice — (Enroll in Political Science 154, Feminist Studies 138.) DR:8f(3)

5 units, given 1997-98

156. Economics of Health and Medical Care — (Enroll in Economics 156, Health Research and Policy 256, Medical Information Sciences 256.)

5 units, Aut (McClellan) TTh 1:15-3:05

157. Seminar: On Privacy — (Enroll in Political Science 157.)

5 units, Aut (Tunick) Th 3:15-5:05

164. Introduction to Race and Ethnicity in American Experience — (Enroll in History 164, American Studies 164.) DR:3

5 units, Aut (Camarillo, Fredrickson) MF 11-12:15

170. Ethical Theories — (Enroll in Philosophy 170.)

4 units, Spr (Cohon) MWF 11

171. Political Philosophy — (Enroll in Philosophy 171.)

4 units, not given 1995-96

177. Antiracism, Multiculturalism, and Common Humanity — (Enroll in Philosophy 177.)

4 units, Spr (Satz) MW 1:15-2:30

185. The Distribution of Income and Wealth — (Enroll in Economics 185.)

5 units, not given 1995-96

190. Honors Seminar — (Same as Philosophy 178.) Interdisciplinary. Students present issues of public and personal morality; topics chosen with the advice of the instructors. Student-prepared reading list is made available a week prior to the presentation. Group discussion follows.

3 units, Win (Satz, Okin) W 1:15-3:05
200A,B. Honors Thesis — Limited to Ethics in Society honors students.
8-10 units, any two quarters (Staff) by arrangement

210. Ethics and the Built Environment — (Enroll in Science, Technology, and Society 210.)
3-4 units ( McGinn) given 1996-97

268. Seminar: Contemporary Theories of Justice — (Enroll in Political Science 268.)
5 units, Aut (Okin) Th 12:45-3:05

286. Character and the Good Life — (Enroll in Religious Studies 286.)
5 units (Yearley) not given 1995-96

PRIMARILY FOR GRADUATE STUDENTS

273. Topics in the Philosophy of Economics — (Enroll in Philosophy 273.)
4 units, not given 1995-96

278. Graduate Seminar in Social Ethics — (Enroll in Philosophy 278.) Examination of the conflict between liberalism and communitarianism and possible alternatives.
3 units, Aut (Moravcsik) T 1:15-3:05

279. Virtue Ethics — (Enroll in Philosophy 279.) 3 units, Win (Hurtherse) Th 3:15-5:05

285. The Distribution of Income and Wealth — (Enroll in Economics 285; same as 185.)
not given 1995-96

370. Gender, Law, and Public Policy — (Enroll in Law 380.)
3 term units, Win-Spr (Rhode) W 4:15-6:45

FEMINIST STUDIES

Chair: Estelle Freedman
Program Committee:
(Faculty) Joel Beinin, Sharon Holland, Karen Kenkel, Yvonne Yarbro-Bejarano; (Graduate Students) Juliet Crider, Kris Gowen; (Undergraduates) David Barba, Kathleen Beman; (Staff) Cathy Jensen, Lisa Webb

Resource Faculty and Staff
Anthropology: Jane Collier, Carol Delaney, Paulla Ebron, Joan Fujimura, Hill Gates, Akhil Gupta, Purnima Mankekar, Sylvia Yanagisako
Art: Wanda Corn, Suzanne Lewis, Melinda Takeuchi
Asian Languages: Susan Matisoff
Business: Joanne Martin
Chemistry: Carl Djerassi
Classics: Andrea Nightingale, Daniel Selden, Susan Stephens, Susan Treggiari
Comparative Literature: Patricia Parker
Dance: Janice Ross

Drama: William Eddelman, Harry J. Elam, Anna Deavere Smith
Education: Elizabeth Cohen, Nel Noddings, Francisco Ramirez, Myra Strober, Joan Talbert, David Tyack


Feminist Studies: Jordanna Bailkin, Susan Christopher, Susan Krieger, Carol Manahan, Lynn Meisch

French and Italian: Brigitte Cazelles, Odile Hullot-Kentor, Carolyn Springer

German Studies: Russell Berman, Karen Kenkel, Kathryn Strachota

History: Joel Beinin, Gabrielle Hecht, Kennell Jackson, Nancy Kollmann, Carolyn Lougher, Mary Louise Roberts, Karen Sawislak, Laura Smoller

Institute for Research on Women and Gender:
Iris Litt, Sherri Matteo

Latin American Studies: Elizabeth Friedman

Law: Barbara Babcock, Mary Dunlap, Janet Halley, Margaret Radin, Deborah Rhode, David Rosenhan

Library: Kathryn Kerns, Katharine Martinez

Linguistics: Shirley Heath, Elizabeth Traugott

Medical School: Anne Arvin, Helen Blau, Marita Grudzen, Roy King, Cheryl Koopman, Herbert Liederman, Charlea Massion, Kate O’Hanlan

Philosophy: John Dupre, Maureen Rozemond, Debra Satz

Political Science: Elisabeth Hansot, Terry Karl, Susan Okin

Psychology: Laura Carstensen, Felicia Pratto

Religious Studies: Alice Bach, Rudy Busto, Hester Gelber

Science, Technology, and Society: Renee Courrey

Slavic Languages: Monika Greenleaf

Sociology: Susie Chow, Janet Johnston, Cecilia Ridgeway, Szonja Szelenyi

Spanish and Portuguese: Adrienne Martin, Mary Louise Pratt, Yvonne Yarbro-Bejarano

Feminist Studies is an interdisciplinary undergraduate program investigating the significance of gender in all areas of human life. Feminist analysis is based on the assumption that gender is a crucial factor in the organization of our personal lives and our social institutions. It focuses on how gender differences and gender inequality are created and perpetuated. The courses offered by the program use feminist perspectives to expand and reevaluate the assumptions at work in traditional disciplines in the study of individuals, cultures, social institutions, policy, and other areas of scholarly inquiry.
The Program in Feminist Studies coordinates the courses offered on women, gender, and feminism throughout the University and facilitates the undergraduate major in Feminist Studies. In addition, it seeks to encourage feminist analysis and teaching at Stanford, both in courses instituted within the program and those housed within departments.

The committee awards the annual Michelle Z. Rosaldo and Francisco Lopes prizes for the best undergraduate essays on women, gender, or feminism. The prizes are awarded in two divisions: a thesis division for senior honors theses and masters' papers written by undergraduates in co-terminal degree programs, and an essay division. The Michelle Rosaldo prizes are awarded for the best work in the social sciences and the Francisco Lopes prizes for the best work in the humanities. Submissions are due in the Feminist Studies office April 17 for essays and May 17 for theses. Essays and theses completed later in Spring Quarter may be submitted for consideration the following year.

HONORS CERTIFICATION
FEMINIST STUDIES MAJORS

Admission—The honors program offers an opportunity to do supplemental independent research on a thesis of superior academic quality. It is open to students with a letter grade indicator (LGI) of 'B+' or better in course work in Feminist Studies. Normally, students apply for honors certification in the junior year, or, at latest, in Autumn Quarter of the senior year. To apply, students should design a project in consultation with both of their major advisers. A proposal, signed by both advisers describing the project and including the number of units to be awarded, must be submitted to the chair of the program for final approval. In order for an honors proposal to be considered during a particular quarter, it must be submitted to the Feminist Studies office by the fifth week of the quarter.

Requirements—Units for approved honors projects are taken in addition to those units already approved for the major.

In addition to completing all the units proposed, the student submits in the senior year two preliminary drafts and a final draft of a thesis based on substantial research. For students graduating in June, the first draft is due by the end of January, the second by mid-March, and the final draft by mid-April. In order for honors to be granted, the student’s two advisers must read the thesis and collectively certify, by means of a signed letter to the Feminist Studies Committee, that the thesis is of superior academic quality and merits the award of honors. This certification must be turned in no later than May 15.

MAJORS IN OTHER DEPARTMENTS

Honors Certification in Feminist Studies for majors in other departments or programs, as distinguished from honors for students pursuing a major in Feminist Studies, is intended to complement study in any major. Students in any field of study are encouraged to apply.

Admission—Honors certification is open to students majoring in any field who have completed Feminist Studies 101 and 102 with an LGI of 'B+' or better, or who have taken three Feminist Studies courses related to the topic of their proposed honors research. Normally, students apply for honors certification in the first quarter of the junior year and must apply no later than the third quarter of the junior year. To apply, students must first consult the chair of the Program in Feminist Studies outlining the plan for course work, the rationale for the program, and an honors project. The chair acts as one of the student’s faculty advisers and helps the student select two other faculty advisers to supervise the student’s progress. The completed application, with the signatures of two faculty advisers and the chair
of the program, is reviewed by a subcommittee of the Feminist Studies Committee for final approval.

Requirements —

1. Thirty units of course work in addition to the units granted for the honors project.
   a) 15 units of core courses: Feminist Studies 101, 102, and 103.
   b) Select the remaining 15 units, in consultation with advisers, from the list of courses approved by the Feminist Studies program. None of the courses selected may simultaneously count toward the student’s major.
2. Submit in the senior year two preliminary drafts, and then a final draft, of a thesis based on substantial research. The thesis must be of acceptable quality on an aspect of Feminist Studies approved by the student’s faculty committee. For students graduating in June, the first draft is due by the end of January and the second by mid-March. The final draft must be submitted four weeks before the end of exam week. Students may receive up to 10 units of credit for preparation of the honors thesis, but these units do not count toward the requirement.

Honors Certification is recommended for students who have achieved an LGI of ‘B+’ or better in their required course work in Feminist Studies and who have submitted a thesis judged to be of superior academic quality by the subcommittee of the Feminist Studies Committee charged with making such decisions.

CURRICULUM

The following course of study is recommended for a major in Feminist Studies: a minimum of twelve courses (a core of five plus seven others) for a total of at least 60 units. The seven courses not in the core should be chosen in consultation with the student’s advisers. To ensure coverage, intellectual focus and breadth in the program, and practical experience, the twelve courses required for the major should be distributed among the core (five courses), the focus (at least five courses), and a practicum.

CORE

The core consists of five courses. The first three are required and should be taken in sequence. The remaining two courses should be chosen from the list of feminist studies courses.

One of these courses should be in the social sciences, the other in the humanities. Also, one of these two should offer a multi-cultural perspective.

Required Courses — Feminist Studies 101, 102, and 103.

Courses that fulfill the humanities requirement in the Feminist Studies major can be found among courses listed under Anthropology, Education, History, Political Science, Psychology, and Sociology.

FOCUS

Of the seven courses not part of the core, at least five should reflect a particular thematic focus, and all seven should be chosen in consultation with the student’s advisers.

1. At least three of the focus courses should be feminist studies courses or be selected from the list of affiliated courses in other departments and programs (see below).
2. At least one should be a major survey, methodology, or theory course, offered by a department or interdepartmental program as an initiation into the practice of study in the field.

The following thematic clusters illustrate foci that individual students can design, in consultation with their advisers.

Cross-Cultural Perspectives on Gender
Feminist Perspectives on Science, Health, and the Environment
Gender and Sexualities
Race, Class, and Gender
Women’s Health
Women in Language and Symbol
Women and Work

PRACTICUM

For Feminist Studies majors, the practicum, taken for 3 to 6 units, should involve field research, community action, or other supervised research. This requirement may be fulfilled by designing a public service internship or by undertaking supervised work in a department. The practicum should be completed by Winter Quarter of the student’s senior year. In Feminist Studies 104, a two-quarter, bi-weekly senior seminar, majors present oral reports on the relationship of the practicum to their academic work and must submit a paper to receive credit for the practicum.

COURSES

Courses listed under the Core and Interdepartmental Offerings contain a significant component of attention to gender difference, the situation of women in Western or non-Western cultures, or the role of sex-gender systems in social organization. Some courses are planned after this bulletin is printed. Updated listings are available at the Feminist Studies office.

CORE

101A. Introduction to Feminist Studies: Issues and Methods — (Same as History 173C.) How gender inequality is created and perpetuated, and when feminist theory and movements emerge to
respond to gender inequality. Topics: theories of inequality; history of feminism; international and multicultural perspectives on feminism; women's work, health, and sexuality; creativity, spirituality, and movements for social change. DR: 9f(5)

5 units, Aut (Freedman) MW 1:15-3:05
plus sections

102G/202G. Feminist Media Theories—(Same as German Studies 171A/271.) Anglo-American and German feminist criticism of film and television, including social, political, and psychoanalytical media theories. Critical power and limitations of such theories in relation to particular films and television programs. Topics: women's film production, the possibility and nature of a female/feminist aesthetic, theories of male and female spectatorship, and the gendered quality of film/television genres. Criticism by Berger, Modelski, Kaplan, Mulvey, Doane, Penley, Koch, Schlupmann, Silverman, de Lauretis; films by Sanders-Brahm, von Trotta, Arzner, Hitchcock, and Fassbinder. Prerequisites: 101, consent of instructor.

4 units, Win (Kenkel)

103B/203B. Subjectivity in Feminist Research—Subjective approaches to research on, by, about, and for women. What happens to research when women's perspectives and feminist values become central? Enrollment limited. Prerequisites: 101, consent of instructor.

5 units, Spr (Krieger) T3:15-6:05

103F. Seminar: Gender and Political Theory—(Same as Political Science 266.) Reads/analyzes major works and parts of works from the Western tradition of political thought, viewing them through the prism of gender. The ideological roots of inequality between the sexes. Ways in which assumptions about sexual difference have shaped the essential concepts of our tradition, including reason, nature, politics, justice, and the separation of public from private life. Compares different and sometimes contrasting interpretations of the primary works read. Enrollment limited. Prerequisites: 101, and a course in political theory.

5 units, Aut (Okin) T 3:15-5:30

104. Practicum/Senior Seminar—For Feminist Studies majors only. Two-quarter, bi-weekly senior seminar. Students present oral reports on the relationship of the practicum to their academic work. Credit represents approximately three hours work per unit each week. Required: a 3-5 page statement on the nature of the internship and its relevance to Feminist Studies. Must be arranged in advance through the program office. Prerequisites: at least one course in Feminist Studies, written consent of faculty sponsor.

3-6 units, any quarter, by arrangement

195. Directed Reading

301. Graduate Seminar in Interdisciplinary Feminist Scholarship

2-4 units, Win, Spr (Christopher)

INTERDEPARTMENTAL OFFERINGS

111. Second Wave of U.S. Feminism—(Enroll in English 189A.)

5 units, Win (Holland)

112. Feminism—(Enroll in Philosophy 175.)

5 units, Spr (Rozemond, Satz) MWF 10

120. Women in Modern Middle East—(Enroll in History 187C.) DR: 2f or 9f(5*)

5 units, Spr (Beinin) MW 1:15-3:05
Th 7-10 p.m.

126. The Psychology of Gender—(Enroll in Psychology 116.) DR: 9f(4)

3 units, Win (Carstenson) MW 9:30-10:50

130. Gender and Education—(Enroll in Education 170.) (SSEP)

4 units, Spr (E. Cohen) MW 3:15-5:05

131A. Women in Higher Education—(Enroll in Education 273X.)

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

133. Person, Gender, and Family in Welfare Policy—(Enroll in Anthropology 145.)

5 units, Win (Delaney)

140A. Women in Transition to Democracy in Latin America—(Enroll in Latin American Studies 91.)

5 units, Spr (Friedman)

140D. Identity and the Visual Arts—Explores the construction of sexual differences through the visual arts in a variety of geographical, historical, and cultural settings by considering gender in relation to other identities (class, race, ethnicity, and sexuality). The dynamics between types of social, political, and cultural identities and the visual representation of these identities.

5 units, Aut (Bailkin) TTh 1:15-3:05

140E. Indigenous Women and Politics in Latin America—Focuses on areas of Spanish-speaking Latin America with substantial indigenous populations (Mexico, Guatemala, Ecuador, Peru, and Bolivia). Feminist historians and anthropologists, and written and oral histories by indigenous women
help analyze the intersection of race, class, ethnicity, and political involvement over time.

5 units, Aut (Meisch) MW 10-11:50

145. Seminar: Gender-Specific Perspectives on Birth Control — (Enroll in Human Biology 150.)
DR:

6 units, Spr (Djerassi)

145A. Women's Health Research — (Enroll in Human Biology 30)
1 unit, Aut, Win, Spr (Litt)

146. Women, Sexuality, and Health — (Enroll in Human Biology 169.) DR:9f(4)
4 units, Spr (Matteo)

147A. Gender and Science — (Enroll in Anthropology 160, History and Philosophy of Science 160.) DR:8f(3) or 9f(5)
5 units, Aut (Matteo) TTh 2:15-4:05

147B. Women and Technology — (Enroll in Science, Technology and Society 195.) Seminar on current and historical intersections between technologies and women's lives. Themes: the role of technologies, especially reproductive and visual technologies, in constructing the roles of women; women as developers and users of technology; gendered descriptions of technology, technological professions, and the process of technology development; women at work and women’s work in different historical periods. Discussion based on novels, reports and historical literature, commercials, and films.
5 units, Spr (Courey) W 2:15-4:05

160A. Dance History and Philosophy — (Enroll in Dance 160A.) DR:7f(2)
3-4 units, Win (Ross)

162B. Contemporary Latina Writers — (Enroll in English 163K.)
5 units, Win (Romero)

164. Poetry and Poetics — (Enroll in English 150G.)
DR:7f(2)
5 units, Spr (Middlebrook)

165D. Seminar: Gender and the Medieval Literature of Courtly Love — (Enroll in English 181C.)
Explores a set of texts written in the courtly love tradition of the Middle Ages, which became highly influential in the development of Western conventions of romantic love. Focus on how discourses of romantic love create and enforce gender roles and how they variously repress, deflect, or unexpectedly open up possibilities for same-sex love. Readings in feminist theory and texts by Ovid, Jean de Meun, Chaucer, and Christine de Pizan including anonymous love lyrics.
5 units, Win (Summit)

168. Feminist Perspectives on Theology — Introduction to feminist critiques of traditional Christian theology from a range of cultural perspectives. Feminist Christian theologians from N. America, Asia, Latin America, and the work of Jewish feminist writers. Readings on feminist hermeneutics, biblical studies, and redemption and liberation theologies. Topics: feminist theology, perspectives on the sacred, patriarchy and the early church, images of divinity and humanity, anger, power, sexuality, sin, Christology, and re-imaging the divine. DR:9f(5)
5 units, Win (Manahan) TTh 1:15-3:05

169A. Latina/o Gay/Lesbian Culture — (Enroll in Spanish and Portuguese 289.)
5 units, Win (Yarbro-Bejarano)

181. Women Writers of the Middle Ages — (Enroll in English 165D.)
5 units, Spr (Summit)

191B. Writing AIDS/Writing on AIDS — (Enroll in English 1B-15.)
5 units, Win, Spr (Townsend) TTh 9-10:15

220. Comparative Feminisms — (Enroll in Anthropology 147A.)
5 units, Spr (Mankekar)

240/340. Lesbian Meanings, Communities, Identities — Scholarship and research on lesbian experiences, emphasizing diversity and themes of female gender. Prerequisite: consent of instructor.
5 units, Spr (Krieger) TTh 1:15-3:05

245. Feminist Methodologies — (Enroll in Anthropology 247.)
5 units, Win (Mankekar)

250. Nationalism and Gender — (Enroll in Anthropology 250.)
5 units, Spr (Mankekar)

AFFILIATED DEPARTMENTAL LISTINGS
These courses also count toward the Feminist Studies major.

ANTHROPOLOGY
235. Mass Media and Subjectivities
5 units (Mankekar)

246. Feminist Theories of Science and Technology
5 units, Aut (Fujimura)

ART
229G. Colloquium: Women and Gender in Japanese Art
5 units (Takeuchi) not given 1995-96

ASIAN LANGUAGES
49/149. Rewriting the Women's Place: Modern Japanese Women Writers in Translation
5 units, Win (Suzuki)

DRAMA
152. Performance and the Body
4 units, Win (Rayner)
154. Early 20th-Century American Drama  
4 units, Win (Elam)

ENGLISH
132G. The 19th-Century English Novel  
5 units, Win (Polhemus)
154/254. Major Romantic Poets  
5 units, Aut (B. Gelpi)
161A. African-American Writing, 1950-1970  
5 units, Aut (Drake)
163J. 19th-Century African-American Writers  
5 units, Spr (Holland)
185. Seminar: Imagining Victorian Women  
5 units, Win (Marsh)
367. Seminar: Victorian Aesthetics and the Decadence  
4-5 units, Win (Gagnier)

FRENCH AND ITALIAN
133. Literature and Society in Africa and the Caribbean  
3-5 units, Spr (Mudimbe-Boyi)
166E. Womens' Voices in Contemporary Italian Fiction  
4 units, Aut (Springer)
223E Women and Psychoanalysis  
3-5 units, Aut (Hullot-Kentor)

HISTORY
23S. Women and Gender in Early Modern Russia  
5 units, Win (Kollman) T 1:15-3:05
94S. Introductory Seminar: From Raping Nanking to Bombing Hiroshima—Race, Gender, and Remembering the Pacific War  
5 units, Win (Lockyer)
287/387A. Undergraduate/Graduate Colloquium: Modern Jewish Identity  
5 units, Spr (Rodrigue) M 1:15-3:05
336A. Technology, Work, and Culture in Comparative Perspective  
5 units, Aut (Hecht) Th 1:15-3:05

HISTORY AND PHILOSOPHY OF SCIENCE
120/220. Constructing HIV/AIDS: The Epidemic’s 2nd Decade  
5 units, Win (Linden) T 2:15-5:05
126/226. Biopolitics and Culture of Breast Cancer  
5 units, Spr (Linden)

MEDICINE
237. Women and Health  
1-2 units, Aut (Grudzen, Massion) F 12-1
seminar 1:15

RELIGIOUS STUDIES
170. Sex and Gender in East Asian Religions  
4 units, Aut (Faure)

SLAVIC LANGUAGES
162/262. Women in 19th-Century Russian Literature.  
3-4 units, Spr (McLean)
TTh 11-12:30 undergraduate
TTh 2:15-3:05 graduate

SOCIOLOGY
5. Status, Friendship, and Social Pressure: An Experiential Approach  
5 units, Spr (Berger) MWF 10
see M or T 2:15-4:05 or T 7-8:50 p.m.
121/225. Social Psychology and Social Structure  
5 units, Win (Staff)

140. Introduction to Social Stratification  
5 units, Win (Szelenyi) TTh 1:15-2:30
147. Women of Color: The Intersection of Race, Ethnicity, Class, and Gender  
5 units, Win (Chow) MWF 1:15
150. The Family  
5 units, Aut (Staff) MWF 10

SPANISH AND PORTUGUESE
317. Women and Transgression in the Spanish Renaissance  
3-5 units (Martin) not given 1995-96

NOT GIVEN 1995-96
102A. Critical Perspectives on Feminist Theory
102D. Faithful Inscriptions
122. U. S. Women’s History
123. Gender and Stratification
134. Sociology of Gender
134B. Africa: Gender and Representation
135/235. Women and Organizations
138. Feminist Theory: Gender, Power, and Justice
139A. Education and the Status of Women: Comparative Perspective
140. Gender in Cross-Cultural Perspective
147. Creation/Procreation: A Comparative Study
148A. Gender and Social Theory
150. Virgin Mary and Images of Power
156. Contemporary Ethnic Drama
165A. Misogyny and Feminism in the Renaissance
214. The Book of Genesis and Beyond
227. Seminar: Religion and Gender Religion
360. Gender, Race, and Nation in 19th-Century Latin America
387. Feminists Write Race
FILM STUDIES

Stanford does not offer an undergraduate major in Film Studies, but a number of courses are offered in various departments. A professional A.M. curriculum in Documentary Film and Video Production is offered by the Department of Communication.

COURSES

ANTHROPOLOGY

130. Film Images of African American Cultures
5 units, Win (Gibbs)

COMMUNICATION

The following courses are open to all students:

101/201. Film Aesthetics
3-4 units, Spr (Breitrose)

122A/222A. Documentary Film
4 units, Aut (Breitrose)

141B/241B. History of Film: The Second 50 Years
4 units, Win (Breitrose)

4 units (Breitrose) given 1996-97

The following course is primarily for Communication undergraduates. Non-majors are admitted only if space is available.

114. Introduction to the Moving Image
5 units, Aut (Krawitz)
Win (Samuelson)

142/242. Broadcasting in America
4 units, Spr (Breitrose)

The following workshops are available as part of the Summer Mass Media Institute: Film Production, Professional Journalism, Television Production, Screenwriting.

ENGLISH

160D. Cinema and Literature
5 units, Win (Marsh)

FRENCH AND ITALIAN

FRENCH DIVISION

191. French Cinema
3 units, Aut (Staff)

GERMAN STUDIES

171A/271. Feminist Media Theories
4 units, Win (Kenkel)

SPANISH AND PORTUGUESE

SPANISH

191. Spanish Cinema: From Surrealism to Almodóvar
3-5 units, Win (Haro)

192. Film and Literature: U.S.-Mexican Border Representations
3-5 units, Win (Fox)

294. Latin American Cinema: The Short Story in Film
3-5 units, Aut (Ruffinelli)

395. Transitional Film Production
3-5 units, Spr (Fox)

PORTUGUESE

190. Brazilian Film
3 units

FOOD RESEARCH INSTITUTE

Emeriti: (Professors) Roger W. Gray, Bruce F. Johnston, Dudley Kirk
Director: Scott R. Pearson
Associate Director: Carl H. Gotsch
Professors: W. Brian Arthur, Walter P. Falcon, Carl H. Gotsch, Timothy E. Josling, Scott R. Pearson, Anne E. Peck, Clark W. Reynolds, Jeffrey C. Williams, Pan A. Yotopoulos
Assistant Professors: Heidi J. Albers, Marcel Fafchamps, Scott D. Rozelle, Frederic Zimmerman

The Food Research Institute, a research and teaching unit in the School of Humanities and Sciences, was founded to study problems of food supply, distribution, and consumption on a worldwide scale. The range of its investigation comprises the world food and agricultural economy, domestic and international trade in primary products, agriculture and economic development, and world population problems.

The institute does not supervise studies leading to a bachelor's degree, although certain of its courses may be counted toward majors in other undergraduate programs including Economics, Human Biology, Political Science, and Sociology.

The graduate teaching program is designed primarily for students with extensive undergraduate training in economics or agricultural economics who possess a special interest in problems lying within the institute's areas of research. The general University requirements, as set forth in the "Graduate Degrees" section of this bulletin, should be consulted by all prospective graduate students.
UNDERGRADUATE PROGRAMS
COTERMINAL
A.B./A.M. PROGRAM

The Food Research Institute offers the co-ter- minal degree for advanced undergraduate students in Economics, Human Biology, Political Science, and other departments who are interested in a concentration of course work in the institute. For admission, a student must have a minimum letter-grade indicator (LGI) of 3.2. Prerequisites include Economics 51 and 52 and one course in quantitative methods. Students must apply at least four quarters in advance of the degree conferral date and before the end of their eleventh quarter. Application should be made to the chair of the institute's master's program. In addition to meeting the requirements for the undergraduate degree, students must complete the requirements for the A.M. as stated below. Students should also consult the University rules for coterminal degree programs.

GRADUATE PROGRAMS
MASTER OF ARTS

The A.M. degree with a concentration in International Developmental Policy is awarded to students who complete at least 25 units of work in the Food Research Institute and a total of 45 units of approved work with an LGI of 'B' or better. Advanced language training may not be included in the 45 units, and students are strongly encouraged to concentrate their course work in two or three areas within the institute. The master’s program is designed to equip students with specific skills, and admission is not encouraged for those desiring a Ph.D.

Qualified graduate students from other schools and departments may apply for an A.M. degree within the institute. For such candidates, the same regulations prevail as for the regular A.M., except that the four-quarter rule may be waived. Applications should be made to the chair of the master’s program.

DOCTOR OF PHILOSOPHY

The first two years of the doctoral program consist of a series of required and elective courses totaling about 90 units. Course work in microeconomic theory, macroeconomic theory, and quantitative methods is required. In addition, students prepare for examination in elective fields through courses, seminars, and directed reading. Field examinations are taken by the end of the second year. Concentrations include Production, Consumption, and Market Analysis; International Agriculture Policy; and Agricultural Development and Economic Growth. A student wishing to offer a concentration outside this list or out- side the institute must secure prior approval from the Instruction Committee.

Each student is required to prepare a detailed prospectus of the doctoral dissertation, which is subject to committee approval, and to defend research on the topic in a University administered oral examination. The complete dissertation is subject to faculty approval, but no further formal defense is required.

Students must also satisfy University requirements concerning residency and standards of progress as described in the "Graduate Degrees" section of this bulletin.

Ph.D. MINOR

Qualified doctoral candidates in other schools and departments may apply for a minor in Food Research. Requirements for this option include successful completion of two institute concentrations and approval by the chair of the Instruction Committee of the overall program of work.

FELLOWSHIPS

The Food Research Institute has available a limited number of University fellowships that provide tuition and stipend for qualified students. Instructions for applying for financial aid are included in the application packet. The financial aid application must be filed by January 1.

COURSES

PRIMARILY FOR UNDERGRADUATES

103. The World Food Economy — (Graduate students register for 203; same as Economics 106.) Interrelationships among food, population, resources, and economic development. Agricultural and rural development in achieving economic and social progress in low-income nations. Emphasis on public sector decision-making as it relates to food policy.
4 units, Spr (Falcon, Naylor) MW 9-10:50

105. Commodity Futures Markets and Prices — (Graduate students register for 205; same as Economics 107.) The uses and functioning of commodity futures markets, market performance issues and measures, and analysis of the economic effects of futures markets.
5 units, Spr (Peck) given 1996-97

113. Planning and Analysis of Development Projects — (Graduate students register for 213.) Techniques for designing, scheduling, costing, appraising, and monitoring development projects. Modules: identification and design; scheduling and costing using CPM methods; theory, calculation, and use of conventional appraisal criteria; development of monitoring and evaluation methods. Use of microcomputers with project scheduling and spreadsheet software required.
5 units, Win (Gotsch) MW 10-11:50
dependence on and externalities from extractive developing countries. Debt-for-nature swaps, indig- newable and nonrenewable natural resources in economic analysis of government policies toward re- development and those of population growth, with impli- cations in terms of alternative structures of develop- ment, the timing of the demographic transition, income distribution, employment, and migration. 5 units, Win (Yotopoulos) TTh 1:15-3:05

110. Case Studies in Economic Development — (Graduate students register for 220.) The successful capitalist development model has at least two variants as the experience in Asia indicates. Basic differences relating to the role of industrial policy, foreign investment, financial markets, and domestic demand and export are illustrated with case studies from Asia and elsewhere. Open to undergraduates with consent of instructor. 5 units with paper requirement.

3 or 5 units, Spr (Yotopoulos) MW 3:15-5:05

117. Natural Resource Policy in the Third World — (Graduate students register for 227.) Economic analysis of government policies toward renewable and nonrenewable natural resources in developing countries. Debt-for-nature swaps, indigenous people and park access, timber management, dependence on and externalities from extractive industries, agricultural subsidies affecting soils, and management of watersheds and aquifers. Examples from Thailand, China, Brazil, Costa Rica, Zimbabwe, South Africa, and Saudi Arabia. Prerequisite: Economics 51 or equivalent. 5 units, Spr (Albers) MW 1:15-3:05

136. Population Perspectives in the Third World — (Graduate students register for 236; same as Human Biology 136.) Topics: population growth in the Third World; demographic terminology and methods; trends and determinants of fertility, mortality, and migration; population growth in relation to the environment, urbanization, and development; theories of demographic change; population policies; prospects for the future. 5 units (Arthur)

146. Economic Policies of the European Community — (Graduate students register for 246.) Analysis of the current economic policies of the European Community and the internal market after 1992. Development of competition, transportation, and factor market policies; agricultural policy reform and changes in the food industry; external trade policy and relations with the U.S. and Japan; monetary and macroeconomic coordination and proposals for a common currency and central bank. Prereq- usites: Economics 51, 52, or equivalent. 5 units (Josting) given 1996-97

148. The Economies of Greater China and the World — (Graduate students register for 248.) Structure and development of the economy of the People’s Republic of China, Taiwan, and Hong Kong. Topics: interregional and international trade; foreign investment; the role of economy during transition; rural reform policy and development institutions, including markets; local governments and private economic entities; the urban and industrial reforms; rural industrialization; progress (or stagnation) in China’s poverty belts; population control; and comparisons with other countries in Asia, the socialistic bloc, and the rest of the world. Prerequisite: Economics 1. 5 units, Spr (Rozelle) TTh 1:15-3:05

149. Development Theory at Work: Can Africa Succeed? — (Graduate students register for 249.) Bridges gap between economic development theory and issues that arise in practice. The African experience is contrasted to illustrate the difficulties, challenge, and ambiguities of development theory. Topics: industrialization, structural adjustment, agricultural technology, institution building, famines, environmental issues, AIDS, and corruption. Students use a multimedia computer simulation. 5 units, Aut (Fafchamps) TTh 11-12:50

167. Contemporary Issues in International Economic Policy — (Graduate students register for 267.) Economic analysis of current issues in the world trade system, including implementation of the GATT Uruguay Round; trade and competition; labor laws
and trade; the conflict between trade and environmental concerns; developments in regional integration in Europe, the Americas, and the Pacific Rim; and the problems facing newly marketized and developing countries in the "new" trade environment. Seminar with student presentations. Undergraduate prerequisite: consent of instructor.

5 units (Josling) given 1996-97

169. International Agricultural Trade and Policy — (Graduate students register for 269.) Introduces principles of international trade, analysis of trade policy, and particular issues that arise in trade in primary commodities. Recent changes in patterns of international trade in agricultural products and the growth in processed agricultural product trade. Recent negotiation of new trade rules for agriculture at the bilateral, regional, and multilateral level, and international trade aspects of domestic policy formulation. Computer exercise and writing assignments.

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

181. Applied Macro Policy for Developing Countries — (Graduate students register for 281.) Open economy macroeconomic analysis as applied to contemporary developing countries and regions integrating into the international economy. Micro/macro linkages in the process of market completion, technology diffusion, and social access. Cases of exchange rate policy, monetary and fiscal policy, labor market policies, and changes in regulatory regimes and their impacts on capital and labor market adjustment during development process. Undergraduate prerequisite: consent of instructor.

5 units, Spr (Reynolds) MW 11-12:50

PRIMARILY FOR A.M. STUDENTS

203. World Food Economy — See 103.

205. Commodity Futures Markets and Prices — See 105.

210. Application of Microcomputers to Economic Analysis — Food Research A.M. students have priority. Development of skills in using computer software suitable for the analysis of economic policies. Lectures with extensive, guided, hands-on lab sessions covering major application packages. Modules include spreadsheets, word processors, drawing and graphics programs, database management systems, and communications software featuring Internet-related modules on e-mail, ftp, gopher, and WWW. Enrollment limited to 20.

5 units, Aut (Gotsch) sec 1 TTh 9-10:50

sec 2 TTh 3:15-5:05

211. International Development Policy Analysis I — First in a two-quarter sequence. Elements of policy analysis with an emphasis on developing countries. Topics: the LDC policy environment; economic theory and policy analysis; analytical techniques for policy analysis focusing on PAMs, budgeting methods, and partial equilibrium methods. Computer-aided exercises. Prerequisite: demonstrated computer proficiency or concurrent enrollment in 210.

5 units, Aut (Gotsch, Pearson)

sec 1 MW 10-11:50, sec 2 MW 3:15-5:05

212. International Development Policy Analysis II — Continuation of analytical methods begun in 211, emphasizing optimization. Case studies examine exchange rate policies and food price and stabilization policies. Emphasis is on applications of analytical methods, writing, and class presentation. Prerequisite: 211.

5 units, Win (Pearson, Gotsch)

sec 1 TTh 10-11:50, sec 2 TTh 3:15-5:05

213. Planning and Analysis of Development Projects — See 113.


218. Economic Development in Latin America — See 118.


220. Case Studies in Economic Development — See 120.


248. The Economic Development in Greater China — See 148.


281. Applied Macro Policy for Developing Countries — See 181.


PRIMARILY FOR Ph.D. STUDENTS

323. Economic Development Theory — Survey of various theoretical approaches to economic development. Topics: growth and structural change; development strategies; the role of agriculture in the development process; peasant behavior and risk; contracts and information; theories of institutions and collective action; the role of markets; bureaucracy, interest groups, and the developmental state.

5 units, Aut (Farahamps, Rozelle) MW 11-12:50

324. Explorations in the New Development Economics — Expanded case for systematic interven-
331. Price Relationships and Analysis of Commodity Markets — Analysis of commodity prices and markets, including marketing margins, spatial and temporal aspects, storage behavior, information expressed in prices, market structure, market integration, demand systems, and sectoral models. Prerequisites: microeconomics, econometrics.

5 units, Win (Williams) MW 11:12:50

332. Economics of Production — Production theory emphasizing agriculture. Topics: production, cost, and profit functions; technological change; risk, uncertainty, and environmental issues in models of production. Readings, complemented with problem sets, emphasize econometric estimation of production relationships. Prerequisites: 202, econometrics, or consent of instructor.

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

363. Preparation for Writing Doctoral Dissertations — Required seminar for second-year students in the institute's doctoral program and open only to them. Preparation and presentation of dissertation prospectuses and of thesis literature reviews.

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

365. Agricultural Policy Analysis I — First in a three-quarter sequence. Development of analytical tools commonly used in applied policy work: PAMs and budgeting techniques, partial equilibrium methods including discussion of applied welfare analysis, introduction to optimization methods at the household and sector levels. Extensive use of computer-based exercises.

5 units, Aut (Zimmerman) TTh 3:15-5:05

366. Agricultural Policy Analysis II: Comparative Agricultural Policies — The analytical experience of developed and developing countries with agricultural market and trade policy interventions. Emphasis on evaluation of policy impacts, political economy aspects of policy formation, and significance of institutional issues. Reforms in the agricultural markets and trade policies of the past decade, including changes brought about by budget constraints, structural adjustment programs, and by international trade agreements. Builds on analysis and modeling techniques developed in 365.

5 units, Win (Josling) TTh 3:15-5:05

367. Agricultural Policy Analysis III — The international dimensions of agricultural policy, including the political economy of protection of agricultural commodities, and multilateral and regional trade negotiations. Research seminar; students present papers on topics related to agricultural policy in developed and developing countries.

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

368A,B,C. Seminar on Doctoral Student Research — Presentations of dissertation research by doctoral student candidates.

1 unit, Aut, Win, Spr (Williams, Staff) T 12-1:50
371,372,373,374. Directed Reading and Research
371. Aut (Staff) by arrangement
372. Win (Staff) by arrangement
373. Spr (Staff) by arrangement
374. Sum (Staff) by arrangement
401,402,403,404. Dissertation Reading and Research
401. Aut (Staff) by arrangement
402. Win (Staff) by arrangement
403. Spr (Staff) by arrangement
404. Sum (Staff) by arrangement

FRENCH AND ITALIAN

Emeriti: (Professors) Robert G. Cohn, John Freccero, Raymond D. Giraud, René Girard, Alphonse Juilland, Pauline Newman-Gordon, Roberto B. Sangiorgi, Leo Weinstein
Chair: Ralph M. Hester
Vice Chair: Robert Harrison

French Section
Associate Professor: Elisabeth Mudimbe-Boyti (Winter, Spring)
Assistant Professor: Odile Hullot-Kentor
Professor (Teaching): John G. Barson (Language Program Coordinator) (Autumn)
Senior Lecturer: Nelee Langmuir
Lecturers: Alain Giraud (Winter, Spring), Mary Jane Parrine (Curator, Romance Languages and Humanities), Mary Beth Raycraft
Visiting Professor: Thierry Weil (Spring)
Visiting Associate Professor: Alina Clej
Visiting Instructor: Céline Spector

Italian Section
Professors: Patricia Parker (English, Comparative Literature, and by courtesy, Italian), Jeffrey Schnapp
Associate Professors: Robert Harrison, Carolyn Springer
Senior Lecturers: Maria Devine, Annamaria Napolitano (Language Program Coordinator)
Visiting Professor: Emerlinda Campani (Spring)

* Recalled to active duty Winter, Spring

The French Section offers a variety of programs in French culture, language, literature, and linguistics, including a major in French, French as double major, and extended majors. The goal is to encourage students to pursue a course of studies suited to their individual needs and interests. Students considering any one of these options are required to have completed the first- and second-year language sequence (French 23) or its equivalent. Equivalent competency may be evaluated by a placement test administered by the department at the beginning of each quarter.

BACHELOR OF ARTS

Majors in French formulate their course curriculum in regular consultation with the French
undergraduate major adviser. French majors must complete a minimum of 55 units of undergraduate work above the 100 level.

Requirements for the A.B. include one advanced language course (123, 125, or 261), three of the introductory series on French and Francophone literature and culture (130, 131, 132, 133), and a minimum of ten additional courses (40 units) numbered 140-299. Of these courses, at least four must be chosen from the pre-revolution periods. Individual work (French 199) should normally be limited to 4 units.

With the approval of the adviser, a maximum of 24 upper-division units outside the French Section, including courses from the Stanford in Paris programs, may be credited toward the major.

MAJOR TRACKS

FRENCH AND AFRICAN STUDIES

Students wishing to major in French with an emphasis on African Studies may combine department offerings with courses listed under the African Studies program and courses in Anthropology, History, Linguistics, Political Science, or other appropriate departments. This track includes 12 units in advanced French language-related courses numbered above 100 and 16 units in four basic culture and literature courses. Three to four other department courses above French 133 must be taken for 12-16 units of culture, history, economics or politics. Six units in the same African language may be substituted for one of these courses. Additional courses outside the department, determined in consultation with the department adviser, must include three courses with a total of 15 units to be taken in related areas of History, International Relations, Political Science, or other appropriate areas.

The following is one example of a concentration in this track.

**Course No. and Subject** | **Units**
--- | ---
French and African Studies: | |
120. France Today | 3
123. Creative Writing | 4
125. Contemporary French Usage, Spoken and Written | 4
130. Middle Ages and Renaissance France | 4
131. 17th- and 18th-Century France | 4
132. 19th- and 20th-Century France | 4
133. Contemporary Francophone Literature | 4
261. Stylistics and Textual Analysis | 4
Subtotal | 31

Other Courses:

- 170E. Introduction to African Systems of Thought | 4
- 278. Topics in French and Francophone Literature | 4
- Linguistics 606A, B. Swahili | 6
Subtotal | 14

Additional Courses Given in Other Departments:

- Pol. Sci. 118A. Political Change in Tropical Africa | 5
- History 148C. Africa in the 20th Century | 5
- History 249S. The Colonial State and Society in Africa | 5
Subtotal | 15
Total units | 60

FRENCH AND FRANCOPHONE LITERATURE, LANGUAGE, AND CULTURE

The following is one example of a concentration in this track.

**Course No. and Subject** | **Units**
--- | ---
Advanced French Language and Basic Literature and Culture: | |
123 (125 or 261) Advanced Language | 4
130 (131, 132, 133) French and Francophone Literature and Culture | 12
Any Four Courses on Prerevolutionary Periods: | |
224. 17th-Century Novel | 3-5
227. Elite and Popular Culture to 1789 | 3-5
295A. The Classical Era | 2
Subtotal | 24-28

Sample Selection of Additional Courses:

- 147E. Camus | 3-5
- 191. French Cinema | 3
- 259. Modern French Autobiography | 3-5
- 262. Pronunciation and Phonetics | 3-5
- 278. Topics in French and Francophone Literature | 3-5
- 281. Literature of the Fantastic | 3-5
- 292. French Democracy vs. British Liberalism | 3-5
Subtotal | 21-33
Paris Program courses or courses in other departments (approved by department adviser) | 12-24
Total | 57

FRENCH AND ENGINEERING STUDIES

Engineering majors may elect to include in their program from four to six specially designed courses in French. The actual number of courses is dependent on competency in French and is determined in consultation with an adviser. Courses in engineering taken at French institutions during a student’s attendance at the Stanford Paris Program, as well as internships in French firms, may count as part of this extended major. Admission to engineering courses in Paris requires an advanced proficiency level, to be determined with a department adviser. Engineering majors successfully completing a major in French are also eligible for a Certificate of Advanced Proficiency in French upon their passing an official proficiency test for technological and scientific French sanctioned by the French government. This certificate, which is noted on the official transcript, is widely accepted in French-speaking countries of the European Union and in most Francophone countries throughout the world as guaranteeing the certificate holder’s high-level competency in French. Engineering students wishing to extend their major to include French and to include Paris Program courses and internships in France must consult closely with advisers in Engineering, French, and Overseas Studies.
The program will include the following courses given in French specially designed for students in technology and science:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>126. Technological and Scientific French</td>
<td>3-5</td>
</tr>
<tr>
<td>127. French Media and Communications</td>
<td>3-4</td>
</tr>
<tr>
<td>128. Management of Technological Resources</td>
<td>3-5</td>
</tr>
<tr>
<td>129. Advances of Technology in Europe</td>
<td>3-5</td>
</tr>
</tbody>
</table>

The following course, given in English, although not preparing for French language proficiency, is highly recommended:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>STS 144. Technology, the State, and Social Order in Modern France</td>
<td>5</td>
</tr>
</tbody>
</table>

The School of Engineering, the Department of French and Italian, and the Stanford Overseas Studies Office have information on engineering courses offered through the Stanford Center in Paris by affiliated French institutions (Ecole Polytechnique, Ecole des Mines, Ecole de France Telecom).

**FRENCH AND EUROPEAN STUDIES**

Students wishing to major in French with an emphasis on European Studies may combine department offerings with courses given within the Departments of History and Political Science, and the Program in International Relations. This path includes 12 units in language-related courses numbered above 100 (any three of French 120 series) and 12 units in three basic culture and literature courses (French 130, 131, 132, 133). Three additional department courses above 100 must be taken for 12 units, including 4 units in History of the French Language and 8 units in stylistics, pronunciation, and phonetics. Courses outside the department, determined in consultation with the department adviser, must include four courses with a total of 16 units to be taken in related areas of Linguistics. Linguistics 1, Introduction to Linguistics, is required within the latter group and should be taken first.

The following is one example of a concentration in this track.

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>French Language, Basic Culture, and Literature:</td>
<td></td>
</tr>
<tr>
<td>120. France Today</td>
<td>3</td>
</tr>
<tr>
<td>123. Creative Writing</td>
<td>4</td>
</tr>
<tr>
<td>130. Middle Ages and Renaissance France</td>
<td>4</td>
</tr>
<tr>
<td>131. 17th- and 18th-Century France</td>
<td>4</td>
</tr>
<tr>
<td>132. 19th- and 20th-Century France</td>
<td>4</td>
</tr>
<tr>
<td>261. Stylistics and Textual Analysis</td>
<td>4</td>
</tr>
</tbody>
</table>

Subtotal: 30 units

Advanced Language Courses in French and other Departments:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>262. Pronunciation and Phonetics</td>
<td>4</td>
</tr>
</tbody>
</table>

Subtotal: 12 units

**Other Courses:**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>110. Phonetics and Phonology</td>
<td>4</td>
</tr>
<tr>
<td>or 120. Syntax</td>
<td></td>
</tr>
<tr>
<td>147. Ethnography of Communication</td>
<td>4</td>
</tr>
<tr>
<td>150. Introduction to Sociolinguistics</td>
<td>4</td>
</tr>
</tbody>
</table>

Subtotal: 16 units

Total units: 55

**FRENCH AS A DOUBLE MAJOR**

Students considering a double major in French are encouraged to design a course of studies that fosters their understanding of the interaction between French and their second area of exper-
A minimum of 56 units of undergraduate work beyond the French 23 level must be completed.

Requirements for the double major include one advanced language course (from the 120 series, or 261), three of the introductory series on French and Francophone literature and culture (130, 131, 132, 133), and a minimum of ten additional courses (40 units). Of these courses, at least four (16 units) are selected from the 200-level courses offered by the French Section. The remaining six courses (24 units), which must have a significant French component, may be taken outside the department and are selected in consultation with the French undergraduate adviser. The adviser also determines which courses taken at the Stanford in Paris Programs may count toward the major.

HUMANITIES

Students who wish to supplement their department major with a related program of studies should see the "Humanities Special Programs" section of this bulletin.

EXTENDED MAJORS

French and English Literatures — In addition to the requirements for the A.B. in French, candidates complete four English literature courses numbered 100 or above related to their French program. Two English literature courses may be applied toward the four electives in French.

French and Italian Literatures — In addition to the requirements for the A.B. in French, students complete four Italian courses numbered 200 or above related to their concentration in French.

English and French, and Italian and French — English majors and Italian majors interested in a combined degree with French should refer to "Extended Majors" in the English and Italian sections of this bulletin.

HONORS PROGRAM

Majors in their junior year may apply to the honors program if they have already taken five upper-division courses with a letter grade indicator (LGI) of 'B+.' The honors program candidate must fulfill all regular requirements for the A.B. in French and write a substantial essay on an aspect of French culture. Preferably in the Spring Quarter of the junior year, the qualified student submits to the major adviser a detailed outline of the proposed essay. Upon approval of the project by the Faculty Council, the student may receive 9 to 12 units of credit in French 198.

STANFORD IN PARIS

All majors are strongly encouraged to study abroad. Stanford University offers two undergraduate programs for study in France. The Stanford Program in Paris offers undergraduates the opportunity to study during the Autumn and Winter Quarters at the University of Paris and other university-level institutions. Students with at least two quarters of French may live with Parisian families or in residence halls and work under the supervision of a Stanford faculty member.

Many of the courses offered in Paris may count toward the requirements of the French major. All students either planning to attend the Overseas Programs in Paris, or returning from these programs, are encouraged to consult with the French undergraduate adviser in order to ensure that course work and skills acquired abroad can be coordinated appropriately with their degree program upon return. Detailed information, including program requirements and curricular offerings, may be obtained in the "Overseas Studies" section of this bulletin, or from the Overseas Studies Office in Sweet Hall.

GRADUATE PROGRAMS

Admission to the Program — Applications and admissions information may be obtained from Graduate Admissions, the Registrar’s Office. Applicants should read carefully the general regulations governing degrees in the “Graduate Degrees” section of this bulletin. They should have preparation equivalent to an undergraduate major in French with a minimum letter grade indicator (LGI) of ‘B+’ and should also have reached a high level of speaking proficiency, demonstrated either in a personal interview or by a tape recording sent to the department. Previous study of a language other than French is highly desirable. Recent Graduate Record Examination (GRE) results are required.

TEACHING CREDENTIAL

For information concerning the requirements for teaching credentials, consult the “School of Education” section of this bulletin and the Credential Administrator, School of Education.

MASTER OF ARTS

(TERMIAL PROGRAM)

The terminal A.M. in French provides a combination of language, literature, cultural, and methodology courses designed to prepare secondary school, junior college, or college teachers.

Candidates must complete a minimum of 36 units of graduate work, with an LGI of 'B,' and pass a final examination. To fulfill the requirements in one year, enrollment must be for an average of 12 units per quarter.

Applications for admission must be received by May 31. Candidates for this degree are not eligible for financial aid and may not apply to the Ph.D. program during their year of study.
REQUIREMENTS

The basic program of 36 units consists of the following:

1. One methodology course (260)
2. One cultural history course
3. A course in stylistics and textual analysis (261 or equivalent)
4. Remaining units in advanced literature courses (200 level or above), three of which must focus on the pre-revolutionary period

Stylistics and Textual Analysis (261) is designed to assure that both advanced undergraduates and graduates have achieved a high level of proficiency in written, expository French and the competency required to deal with the appropriate discourse of literary criticism, including the relationship between the written and spoken exposé. Graduate students already having achieved a high degree of competency in writing (either at Stanford or elsewhere) may, with the approval of the adviser, be exempted from this requirement upon presentation of significant writing samples showing the original criticism by the reader, for example, course or term papers. Such writing samples must be submitted to the current instructor of 261 before the end of Autumn Quarter.

EXAMINATION

The terminal A.M. examination is normally administered two weeks before the end of the Spring Quarter by the three members of the Examination Committee, selected each year by the chair. It consists of two parts:

1. The written exam (two hours) tests the candidate’s general knowledge of French literature and is based on the terminal master’s reading list.

   The candidate answers four questions (out of six) in a manner that demonstrates his/her ability to synthesize and draw parallels between periods, genres, and systems of representation. At least one question must be answered in French and two in English. A dictionary is allowed.

   Should the candidate fail the A.M. written exam, he/she is given a second (and final) chance at the end of the Spring Quarter. Questions in this second test focus on the candidate’s weaker areas.

2. The oral exam (one hour) tests the candidate’s competence in textual analysis. The candidate gives a commentary in French of a text selected by the Examination Committee from the terminal A.M. reading list.

DOCTOR OF PHILOSOPHY

Stanford’s Ph.D. program in French encourages students both to develop a command of French literature and culture and to integrate their specialization with work in related disciplines, including literary theory, philosophy, cultural studies, political theory, humanities, gender studies, film, Francophone studies, and teaching pedagogy.

Students admitted to the program work closely with the graduate adviser in structuring a plan appropriate to their needs and interests. Aside from the benefits of the program’s highly flexible structure, a number of unique resources are available to the students. The French Section’s exchange program with the Ecoles Normales Supérieures provides selected candidates with the opportunity to pursue dissertation research in Paris. Ph.D. candidates in French may also become involved in the production of the yearly publication Constructions, a scholarly journal published by graduate students in the Department of French and Italian.

REQUIREMENTS

A candidate for the Ph.D. degree in French must complete at least 72 units of graduate-level study beyond the bachelor’s degree and teach three or five courses in the section.

The A.M. or its equivalent in French is required of all Ph.D. students. This degree may be obtained during the course of study for the Ph.D. Students entering with a master’s degree or previous graduate work receive credit as determined on a case-by-case basis, up to a maximum of 36 units. Fellowship funding and teaching requirements are adjusted according to University regulations.

Course requirements are as follows:

1. Students develop their knowledge of French literature and culture by taking a minimum of eleven courses (56 units) to be chosen from the 200 series. A maximum of two of the courses listed under the rubric “General Courses” may be included if work in these courses is done in French (see below).

   Students select these courses in consultation with the graduate adviser, on the basis of the following criteria: (a) exposure to all periods of French literature and culture, and (b) in-depth work in the student’s chosen field. A maximum of 24 units outside the French Section may be accepted.

2. Students complete the remaining course requirements by doing work commensurate with their specific interests and additional areas of specialization (for example, courses on French cinema, linguistics, critical theory, Old French language, gender, Francophone culture and literature).

   The Ph.D. Qualifying Examination — The qualifying examination, which normally takes place at the beginning of Spring Quarter of the second year, consists of two parts:
The scope of the dissertation should be such that it can be organized, and present the results in publishable form. Demonstrate the ability to carry out research, or-
Library; and the Music Library has excellent holdings in Italian opera.

STANFORD IN ITALY
Located in a palazzo in downtown Florence, Stanford in Italy affords both undergraduate and graduate students the opportunity for intensive study of Italian language, culture, and literature. All Italian majors are encouraged to spend at least one quarter at Stanford in Italy. Many of the courses offered there may count toward the fulfillment of requirements for the Italian major. Students are encouraged to consult with the Italian undergraduate adviser before and after a sojourn in Florence to ensure that their course selections meet Italian Section requirements. Information on the Florence program is available in the "Overseas Studies" section of this bulletin, or at the Overseas Studies Office, room 126, Sweet Hall.

UNDERGRADUATE PROGRAMS
BACHELOR OF ARTS
The Italian major offers students the opportunity to develop an in-depth knowledge of Italian literature, language, and civilization through a highly flexible program combining course work in Italian with work in such fields as art history, classics, comparative literature, economics, English, French, history, international relations, music, philosophy, and political science. All Italian majors are required to have completed two second-year language courses: Italian 21, 22, and/or 23 (or the equivalent taken at the Florence campus). Students considering an Italian major should consult with the Italian undergraduate adviser as early as possible (even before completing the language requirement) in order to ensure a maximum of flexibility in designing a course of study suited to individual needs and cultural interests.

Italian majors must complete 60 units of course work above the 100 level.

The remaining requirements for the major are the following:

1. A minimum of 32 units of Italian courses (selected from courses numbered 100 and above).
2. Of these courses, at least one on Dante is required, as well as at least one in each of the following areas: (a) the Middle Ages, (b) the early modern period, and (c) the modern period. A Dante course may fulfill the Middle Ages requirement.
3. The intermediate-level survey sequence (Italian 127, 128, 129).
4. At least one advanced language course beyond the level of Italian 23.

Of the 60 units required for the major, up to 28 units of course work in related fields may be taken outside the department.

EXTENDED MAJORS
Requirements for both extended majors are essentially identical to those of the Italian major with a concentration in Italian literature.

Italian and English Literatures — In addition to the 32 units required for the A.B. in Italian, candidates must complete four English literature courses numbered 100 and above related to the field of concentration in Italian Studies.

Italian and French Literatures — In addition to the 32 units required for the A.B. in Italian, candidates must complete four French literature courses numbered 100 and above related to the field of concentration in Italian Studies.

LA CASA ITALIANA
La Casa Italiana, 562 Mayfield, is an undergraduate residence devoted to developing an awareness of Italian language and culture. It works closely with the Italian Cultural Institute in San Francisco and with other local cultural organizations. It often hosts visiting representatives of Italian intellectual, artistic, and political life. A number of departmental courses are regularly taught at the Casa, which also offers in-house seminars. Assignment is made through the regular undergraduate housing draw.

HONORS PROGRAMS
ITALIAN
Italian majors with a letter grade indicator (LGI) of 'B+' or better in all Italian courses are eligible for departmental honors. In addition to the requirements listed above, honors candidates must complete an honors essay representing 6 to 9 units of academic work through enrollment in Italian 198. Proposals for essays must be submitted to the Italian faculty by the end of the candidate's junior year. If the proposal is accepted, a member of the Italian faculty is assigned to serve as the student's adviser for the essay. Students interested in the honors program should consult the Italian undergraduate adviser early in their junior year.

HUMANITIES
An honors program in the Humanities is available for Italian majors who wish to supplement their studies with a carefully structured program of humanistic studies. See the "Humanities Special Programs" section of this bulletin for further information.
GRADUATE PROGRAMS

Admission to the Program — Although they need not have been undergraduate Italian majors, candidates are expected to be proficient in the Italian language and to have done significant course work in Italian literature and/or Italian studies on the undergraduate level. Candidates with a broad humanistic and linguistic background are especially encouraged to apply. Contact Graduate Admissions, the Registrar’s Office for application information. Recent Graduate Record Examination (GRE) results are required.

MASTER OF ARTS
(TERMINAL PROGRAM)

The A.M. in Italian provides a combination of language, literature, civilization, and general courses designed to prepare secondary school, junior college, or college teachers. Applicants should be undergraduate majors in Italian or in a related field. Knowledge of a second Romance language is desirable.

Candidates must complete a minimum of 36 units of graduate work, with an LGI of 'B,' and pass a comprehensive oral examination. To fulfill the requirements in one year, students should enroll for an average of 12 units per quarter.

The basic course program (36 units) is nine graduate courses in Italian, one of which may be in a related field. The option of substituting a master’s thesis for two literature courses is available.

Reading knowledge of a second Romance language is required. French is recommended.

Requirements for the completion of the A.M. include a comprehensive literature and language oral examination, which is given before the end of Spring Quarter or at the beginning of the following Autumn Quarter. Before taking the exam, a candidate for the degree must submit to the Italian faculty a sample graduate seminar paper representative of the quality of his or her graduate work. On the basis of this paper, the results of the comprehensive examination, and the student’s overall progress, members of the department vote for or against awarding of the A.M. degree.

Applications for admission must be received by May 31. Candidates for this degree are not eligible for financial aid.

DOCTOR OF PHILOSOPHY

Stanford’s Ph.D. program in Italian offers the opportunity for advanced work in Italian literature and Italian studies within an unusually flexible interdisciplinary framework. It is fully independent of the Ph.D. program in French and aims to encourage students to bring broader methodological and interdisciplinary concerns to bear on the study of Italian literature. Like conventional Italian Ph.D. programs, it places primary emphasis on developing a command of Italian literature as a whole. Unlike conventional Italian Ph.D. programs, it allows students to construct a highly individualized course of study, integrating specialization in a particular literary period with work in such fields as art history, classics, comparative literature, feminist studies, film, French, history, history of science, linguistics, literary theory, Medieval or Renaissance studies, philosophy, and religion. The program is founded on the belief that this sort of balance between period specialization and interdisciplinary breadth is not only desirable but also essential in a small field such as Italian studies, particularly given the diversity of the Italian literary canon, which extends over a wide variety of disciplines.

Students admitted into the Ph.D. program in Italian work closely with the adviser in structuring a plan of study appropriate to needs and interests. Such a plan usually involves a mix of teaching and courses taken within the Italian program, courses taken in other departments, and independent work under supervision of a member of the Italian faculty, thus integrating financial support with training as scholars and prospective university teachers. Assuming satisfactory academic progress, fellowships are offered for three or four years. Graduate-level work completed elsewhere may be counted as fulfilling part of the requirements for the degree. Students in the fifth year normally apply for outside fellowships or part-time teaching positions in the department.

Aside from the benefits of the program’s structure and fellowship plan, a number of unique resources are available to Ph.D. students in Italian at Stanford. During their years of study, students may be permitted to take courses, pursue dissertation research, and do independent work at the Stanford campus in Florence under supervision of a member of the Italian faculty. The Florence center, located in a palazzo along the Arno, is near important Florentine libraries and archives and the University of Florence. An additional resource is the graduate student publication, Constructions, a scholarly journal published twice annually by the Department of French and Italian. Graduate students also have at their disposal the resources of La Casa Italiana, a residential theme house which serves as an Italian cultural center and hosts such events as colloquia, lectures, and film series.

REQUIREMENTS

Residency and Course Work — In accordance with University regulations, candidates for the Ph.D. must complete at least nine quarters (three years) of full-time work, or the equivalent, in graduate study beyond the bachelor’s degree. For a graduate student entering with an A.B., the Ph.D. program should normally be completed in four
years. The first year is devoted to full-time study; the second and third years to teaching and the completion of course requirements (for a total of no fewer than 72 units of graduate work), and the fourth to dissertation work. Students entering with a master's degree receive credit for previous graduate work as determined on a case-by-case basis, up to a maximum of 36 units. Fellowship funding and teaching requirements are adjusted according to University regulations.

Students should read carefully the general regulations governing degrees in the "Graduate Degrees" section of this bulletin.

Teaching — In addition to training capable and creative scholars, one of the program's primary objectives is to promote the effective teaching of Italian at all levels. To this end, students teach three or five Italian language courses (normally during the second and third year). During the first term of teaching, students must enroll in Italian 301, Graduate Workshop on Pedagogy, a seminar which permits working closely with a master-teacher and involves a regular schedule of class visitations.

Language — As soon as possible, but not later than the end of the third year, the candidate must have passed reading examinations in two additional foreign languages. If the candidate's period of concentration is earlier than the 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, two courses are required: French and Italian 279E, Colloquium on Research Methods in French and Italian Literature; Italian 301, Graduate Workshop on Pedagogy. Apart from this requirement, students are granted considerable freedom in structuring a course of study appropriate to individual needs. During the first year, most course work is usually done within the Italian Section in order to ensure an adequate preparation for the qualifying examination. In the second and third years, students' programs normally consist of a combination of course work done inside and outside the Italian Section, supplemented by tutorials and independent work pursued under supervision of the Italian faculty.

Qualifying Procedures — Students are admitted on a probationary basis. The probationary period ends once a student is officially admitted to "candidacy" for the Ph.D. as a result of successful completion of the qualifying procedure. The qualifying procedure takes place at the end of the third or during the fourth quarter of graduate study, at which time the student: (1) takes the oral qualifying exam (equivalent to the master's exam), and (2) submits to the Italian faculty a sample graduate seminar paper which the student considers representative of the quality of his or her graduate work at Stanford. On the basis of this paper, the results of the qualifying examination, and the student's overall progress, the faculty members of the department vote for or against admission to candidacy. The terminal A.M. degree is awarded to students who have successfully completed the oral qualifying exam but who are not admitted to candidacy for the Ph.D.

Examinations — Two oral examinations are required of candidates for the Ph.D.: the qualifying examination (mentioned above), and the University oral examination.

1. The qualifying examination tests the student's general knowledge of the Italian language and literature and is taken at the end of the third or during the fourth quarter of graduate study. It is composed of two sections, the first consisting of a 20-minute presentation by the candidate, the second of a 70-minute question and answer period on the candidate's talk and on his or her reading list. The examination committee for the qualifying examination is made up of the members of the Italian faculty, including the student's faculty adviser who chairs the examination. While the reading list for the qualifying examination must be based on the department's standard list, it should be amplified in consultation with the student's adviser so as to reflect each student's particular areas of interest.

2. The University oral examination is normally taken at the end of the third year of graduate study or at the beginning of the fourth year. The examination is divided into four sections. The first, 30 minutes, consists of a formal presentation addressing one of the questions that the student received the morning of the examination. The second, also 30 minutes, is a question and answer period concerning the student's presentation. The third, one hour, takes the form of an oral colloquy on the student's reading list as a whole. The fourth, lasting 30 minutes, is allocated to a defense
of the student's dissertation proposal (a copy of which is submitted to the examiners one week in advance of the examination). Successful completion of the examination constitutes approval of the proposal.

Dissertation — The fourth and (if necessary) fifth years of graduate study are devoted to writing and researching the doctoral dissertation.

JOINT DEGREES AND MINORS

A joint degree program in Humanities and Italian Literature is described in the "Humanities Special Programs" section of this bulletin. Minors are possible in a wide variety of related fields. Joint degree programs and minors frequently require 24 additional units of work, making completion of all course requirements in nine quarters difficult if careful advance planning is not done.

Ph.D. MINOR IN ITALIAN LITERATURE

The section offers a minor in Italian Literature. The requirement for a Ph.D. minor is a minimum of 24 units of graduate course work in Italian literature. Students interested in a minor in Italian should consult the graduate advisor.

COURSES

GENERAL

These courses are open to all undergraduate and graduate students, are taught in English, and do not require a knowledge of French or Italian.

101E. Seminar on Literature and the Institution of Literacy Study — (Enroll in Comparative Literature 101.)

5 units, Aut (Gumbrecht)

147E. Camus — Camus’ major works: novels, plays, short stories, essays.

3-5 units, Win (Apostolidès)


5 units, Win (Harrison, Perloff)

166E. Women's Voices in Contemporary Italian Fiction — Introduction to 20th-century women’s writing in Italy, from Sibilla Aleramo’s A Woman to the narrative experiments of the last decade. Readings: Dacia Maraini, Fabrizia Ramondino, Francesca Duranti, and Rosetta Loy. Texts in translation. DR:7(2)

4 units, Aut (Springer)

170E. Introduction to African Systems of Thought—Anthropology, ethography, and the classical debates on ethosciences; problems involving intellectual histories of religious and mono-religious thought; case-studies in the African practices of philosophy. Discussions on texts by Franz Cahay, Marcel Griaule, Paulin Hountondji, Jahn Janheinz, Léopold Senghor, Placide Tempels. DR:2(*) or 8(3*)

4 units, Win (Mudimbe)

191E. Italian Cinema

3 units, Spr (Campani)

201E. Definition and Inquiry: Colloquium on Research Methods in French and Italian — Acquaints graduate students with general and specialized resources for French and Italian studies. Emphasis on overall strategy for research, with an opportunity to explore bibliographical sources in the students' fields of interest.

3 units, Aut (Parrine)

206E. The Grail Legend in Modern Culture — Focusing on the legendary quest of the “Holy” Grail, explores the uses and transformations of medieval romance in modern culture. The first-known Grail romance (the Story of the Grail, Chrétien de Troyes, late 12th century). Traditional motifs: courtly love, life in the forest, and chivalric adventures in relation to the Grail as symbol of an unattainable ideal. The reinscriptions of those motifs in post-medieval culture, emphasizing films (e.g., Excalibur, Monty Python and the Holy Grail, Indiana Jones and the Last Crusade, Apocalypse Now). DR:7(2)

4 units (Cazelles) not given 1995-96

208E. Female Saints — The medieval lives of saintly women. Traditional motifs in the portrayal of perfection (the saint as founding hero); perfection in the literary context of 12th- and 13th-century France (the Lady as Saint); and the rhetorics of female perfection (the body sacrificed). Readings from medieval poems in English translation. DR:8†(3)

4 units (Cazelles) not given 1995-96

222E. Building, Dwelling, and Thinking: Or Thoreau, Vico, and Heidegger — Heidegger declared “language is the house of being,” but the relation between language and house is not a metaphoric or analogical one. He said “one day, by thinking the essence of Being in a more appropriate way, we will come to know what ‘house’ and ‘to dwell’ are.” This is an attempt to think the essence of a house in order to then to ask what the word “being,” as Heidegger intends it, really means. The three thinkers ponder the relation between “building, dwelling, and thinking” most radically and fundamentally. Readings: Vico’s The New Science; Thoreau’s Walden; and Heidegger’s essays “The Letter on Humanism,” “Building, Dwelling, and Thinking,” and “The Poet’s Homecoming.”

3-5 units, Spr (Harrison)

223E. Women and Psychoanalysis — Freud’s psychoanalytic theory of women and object-relations theories which shaped the debates over female psy-
225E. Pirandello, Sartre, and Beckett: Self and World in Modern Literature—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, _Fu Mattia Pascal, Cosi è (se vi pare)_ and _Sei Personaggi_; Sartre’s _La Nausée_ and _Huis Clos_; Beckett’s _Molloy_. Readings available in translation. DR:7(2) or 8(3)
4 units, Aut (Hullot-Kentor)

243E. Louis Ferdinand Céline, or: The Violence of Literature—(Same as Comparative Literature 243E.) Céline’s texts, early 1930s-60s, are a literary repertoire of the aggressive and violent experiences of the 20th century: war technology and labor in industrial production, colonialism, new diseases, and the miseries of medicine and social welfare. Not a humanist, Céline belongs to those European intellectuals who supported Fascist ideology and politics, and who never publicly renounced adherence. Content and perspective make him an important hard-to-bear author. Texts in translation. In English
3-5 units, Win (Gumbrecht)

248E. Contemporary French Theater—(Same as Drama 158F.) 20th-century French theater, including authors Anouilh, Claudel, Sartre, Camus, Artaud, Genet, Beckett, Ionesco, Duras and stage directors Antoine, Copeau, Planchon, and Chereau.
4 units, Spr (Apostolidès)

250E. Poetry and Philosophy: History of an Antagonism—The uneasy relationship between poetry and philosophy, beginning with Plato, who set up the terms of their antagonism, and ending with Nietzsche, whose "overturning" of Platonism entailed a reevaluation of the poetic faculty. Emphasis on the way poets and philosophers have undertaken incursions into the other’s domains, setting up a relation of opposition and promiscuous interaction. Texts: Plato, Aristotle, Sir Philip Sidney; Vico and Nietzsche. Poems from all periods (Sappho, Dante, Donne, Baudelaire, Pound and contemporary language poets). DR:7(2) or 8(3)
4-5 units, Spr (Harrison)

251E. Theories of Difference—(Same as Comparative Literature 251E.) Major issues in epistemology including the concepts of knowledge, representation and difference, the methodological reflector being 19th and 20th French and German phenomenology. Readings: Edmund Husserl, Cartesian Meditations; Martin Heidegger, Discourse on Thinking, Identity and Difference; Karl Jaspers, Truth and Symbol; Jean-Paul Sartre, Being and Nothingness; Gabriel Marcel, Problematic Man; Maurice Merleau-Ponty, The Visible and the Invisible; Jacques Derrida, Of Grammatology.
3-5 units, Win (Mudimbe)

252E. Languages, Structures, and Societies: An Introduction to Structuralism—(Same as Comparative Literature 252E.) Analysis of the background and basic concepts of structuralism. Readings: Ferdinand de Saussure, _Course in General Linguistics_; Roland Barthe, _Elements of Semiology_; Lévi-Strauss, _Mythologiques_. Additional readings from George Dumézil, Luc de Heush, and Edmund Leach.
3-5 units (Mudimbe) not given 1995-96

253E. Diversity of Knowledges and the Unity of Science—(Same as Comparative Literature 253E.) An international pluridisciplinary seminar using immigration and diasporas as concrete case studies. Televised and distributed by SCOLA. Each Friday different speakers are featured.
3-5 units, Spr (Mudimbe)

255E. Introduction to Rene Girard’s Theory: Mimesis, Violence, and the Sacred—Examination of one of the most influential theories in contemporary human sciences, emphasizing its epistemological and philosophical underpinnings and its potential for interdisciplinarity. Relevance of the theory in anthropology, economics, political philosophy, religious studies, and literary theory.
3-5 units, Win (Dupuy)

257E. Iconomy—Study of the notion of image in every form. The psychological, social, and material image. Links between art history, communications, psychology, sociology, and philosophy. DR:7(2)
4 units, Win (Apostolidès)

260E. Boccaccio: Minor Works—Intensive reading of Boccaccio’s poetry and prose writing, emphasizing his evolving conception of antiquity and of the world of arts and letters. Topics: Boccaccio and classical mythology, Boccaccio as historian and biographer, and as misogynist (The De Claris Mulieribus and Corbaccio), and contemporary theoretical approaches to Boccaccio’s texts.
4 units, Spr (Schnapp)

261E. Dante’s Divine Comedy—Open to all students. Intensive study of Dante’s poem in relation to the culture and history of Medieval Europe. Topics: Dante and pre-Modern theories of autobiography; theology and poetics in the Comedy, Dante and the Natural Sciences, Dante’s Christianization of Classical Epic (Virgil, Lucan, Statius), the Comedy and Dante’s minor works. DR:7f(2)
3-5 units, Win (Schnapp)

262E. Petrarcha and Pertrachismo—Readings from the Conzoniere, Epistolae, De Vita Solitaria, and Secretum, studied in relation to later developments in Petrarchan poetics in Italy (Ariosto, Gas-
para, Stampa, Tasso), Spain (Garcilaso, Quevedo, (jorgona), England (Sydney, Shake-speare), and France (Ronald). Topics: Petrarch and Dante, Petrarach and the aesthetics of fragmentation, Pietro Bembo and the Petrarchoan canon.

4 units, Spr (Freccero)

268E. Italo Calvino in Translation — Calvino’s development as a writer. The increasing degree of his experimentation with structure and literary language, and the enduring component of fantasy. The Path to the Nest of Spiders, Marcovaldo, The Baron in the Trees, Cosmicomics, Invisible Cities, Mr. Palomar, and Six Memos for the Next Millennium.

DR:7(2)

4 units, Spr (Springer)

283E. The Literature of Addiction — The phenomenon of addiction in 19th-century France through the study of literary and “scientific” documents of the period. Addiction as a literary and social practice with consequences for modern (and modernist) forms of subjectivity. The ways in which modernity and literary modernity function and define themselves. Emphasis is on the ideological implications of addiction (its relation to an expansionist colonial policy), and on the ways in which, as a “scientific object” addiction was construed as a “deviant,” and ultimately gendered (feminine) practice. Readings: De Quincey, Balzac, Baudelaire, Gautier, Huysmans, Rachilde, documentary and theoretical materials.

3-5 units, Win (Dupuy)


3-5 units, Win (Dupuy)

304E. Seminar: Agency/Sex/Gender: Aphra Behn to George Sand — (Same as Comparative Literature 304B, English 304B.) Readings of literary and philosophical texts from England and France between the late 17th and the early 19th centuries focusing on: the emergence of the notion of agency, the (pre) history of the sex/gender distinction; how concepts of agency relate to gender and sex distinctions. Are there discursive differences (mainly between literature and philosophy) in the construction of these notions and their interrelations?

4-5 units, Win (Bender, Gumbrecht)

324E. Fascism and Culture — (Same as Comparative Literature 324E.) Interdisciplinary seminar examines fascist and right-wing modernist cultural production in art, architecture, literature, and industrial design. Inquiry into the cultural, intellectual, and political prehistory and history of fascism in France, Germany, Italy, and Spain, emphasizing the connections and conflicts between totalitarian politics and modernist artistic forms. Topics: the “engineering” of new human subjects and social forms; bodies and machines; rhetorics of effemination and virility; magic realism and myth in 1920s/30’s art; socialist vs. fascist modernisms; modernist iconographies of leadership, the masses, the nation-state; futurism, metaphysical painting, the ‘900 movement, documentarism, classicism, kitsch, the state exhibitions of the 1930s; fantasies regarding the material world and “total” art forms. Readings from LeBon, Sorel, Bataille, Le Corbusier, Marinetti, Mussolini, Bontempelli, Sombart, Junger, Benn, Hitler, Gropius, Lewis, Pound. Enrollment limited.

5 units, Spr (Schnapp)

358E. Pierre Bourdieu — Introduction to the work of Pierre Bourdieu, focusing on the function of the school, the practice of social sciences, and the politics of knowledge. Emphasis on philosophical presuppositions of Bourdieu’s work and the logic of his investigations. Readings in English and/or French: La Reproduction, Les Héritiers, Les Sens Pratiques, La Noblesse d’Etat, Choses Dites, and Distinction.

3-5 units (Mudimbe) not given 1995-96

369E. Seminar: Fragments of a Material History of Literature — (Same as Comparative Literature 369.) Introduction to literacy studies from the perspective of the material practices and constraints that shaped Western ideas concerning “literature” and literary expression. Topics: rhetoric; mnemotechnics; the history of writing instruments, machines, surfaces, and supports; paleographic analysis; oral/written communications, technologies; printing and textualities: modern/postmodern media permutations of “literature.” Authors: Derrida, Genette, Svembro, Zumthor.

5 units, Aut (Schnapp)

FRENCH SECTION

Note — Changes in course offerings after this bulletin has gone to print are sometimes necessary. Students are advised to consult the department bulletin board regularly. Courses are taught in French unless noted.

Introductory Language Courses (1-99)
Advanced Language Courses (100-125)
Courses in French, Technology, and Science (126-129)
Undergraduate courses in Literature and Culture (130-199)
Courses for Advanced Undergraduates and Graduates (200-299)
Graduate Seminars (300-399)

FIRST- AND SECOND-YEAR LANGUAGE

Note — Students registering for the first time in a first- or second-year course must take a placement test, if they had any training in French before entering Stanford. The main placement testing session for newly entering students is held on Saturday, September 23. Basic French grammar
and vocabulary are covered in French 1 and 2, at the successful completion of which students have acquired beginning level functional proficiency in listening comprehension, speaking, and reading. Third quarter study in satisfaction of the University Foreign Language Requirement may then continue with an appropriate course numbered, 3, 21, 22, or, with the recommendation of the Language Program Coordinator, 23. French 3X is only for students having already taken French 2 at Stanford. Auditing is not permitted in participation language courses.

1. First-Year French (Part A) — Acquisition of communicative competence using an all-in-French, student-centered approach, emphasizing listening comprehension, oral, and written expression. Development of conversational skills in areas relating to daily life. Exposure to excerpts from a variety of authentic language texts. Utilization of language lab, multimedia, and computer facilities in the language learning process in consonance with student interest.

   5 units, Aut, Win, Spr (Staff) MTWThF or MWF plus two hours by arrangement

2. First-Year French (Part B) — Continuation of 1. Completion of coverage of essential grammar, e.g., expressing hypothetical conditions, use of the subjunctive. Readings include short stories and authentic texts (e.g., Le Petit Prince). Student initiated projects, individual and collaborative, assist in reinforcing oral and written skills in a variety of situations (e.g., preparing original plays, video documentaries, WWW pages). Utilization of language lab, multimedia, and computer facilities in the language learning process in consonance with student interest.

   5 units, Aut, Win, Spr (Staff) MTWThF or MWF plus two hours by arrangement

3X. First-Year French (Third Quarter) — (Formerly French 3.) For students who have taken French 2. Continuation and completion of basic grammar and vocabulary learned in beginning French 1 and 2.

   5 units, Aut (Staff) MWF plus two hours by arrangement

3R. First-Year French Review — Speaking, reading, and comprehension are reviewed and developed according to individual need to raise competency to satisfy the University graduation requirement in foreign language. Especially for students scoring above 600 on the placement test, with previous exposure to first-year French but unable to sustain their studies at a more advanced level and whose purposes would best be served by a customized review. Grammar study is tailored to individual needs. Readings and projects offer systematic exposure to authentic texts relating to everyday life and major interests: economy, politics, education, society, culture, technology. Not part of a regular first-year sequence.

   4 units, Aut (Staff) MWF plus hour by arrangement

10. First-Year Conversation — French life and culture: theater, movies, travel, etc. Useful information for students planning travel in France. Offers additional conversational practice to students in French 2 and an opportunity to tailor oral performance in areas of individual interest, especially preparation for study abroad. French life and culture: theater, movies, travel, etc. Useful information for students planning travel in France. Prerequisite: 1 or equivalent.

   2 units, Aut, Win, Spr (Staff) MW or TTh

15. Conversation in Every Day Life — Designed to improve communication in everyday situations. Discussion topics on travel, food, shopping, student life, and current events using newspapers, magazines, videos, and multimedia. Prerequisite: 3, or 21, or equivalent.

   2 units, Aut, Win, Spr (Staff) MW or TTh

20. Conversation and Culture — France as seen through the writings of French and foreign authors. Oral presentations and discussions. Systematic address to cross-cultural issues. May be repeated once for credit after an interval of two quarters. Prerequisite: 22 or equivalent.

   2 units, Aut, Win, Spr (Staff) MW or TTh

20S. Intermediate Conversation — Summer session only. Second-year level, designed to improve communication in everyday situations. Discussion topics include travel, food, shopping, student life, and current events using newspapers, magazines, videos, and multimedia. May be taken simultaneously with French 40 (Summer language tutorials). Prerequisite: one year of college French or equivalent preparation. No auditors.

   3 units, Sum (Staff) MTWTh

Note — Sections of intermediate French (21, 22, 23) having special emphasis and specific readings on certain themes and topics (communications, international studies, politics, law, trade, etc.; African, Caribbean, Canadian, and French women writers; French film, etc.) are indicated in the Time Schedule by a suffix.


   4 units, Aut, Win, Spr (Staff) MWF plus hour by arrangement

22. Second-Year French (Part A) — Sequence intended to round out students’ exposure to French at the second-year level in preparation for French courses at third-year level and beyond. Readings: novels, plays, poetry, history, current events. Gram-
Basic study is related to developing diversified writing styles. Projects. Extra unit for individual or group project (e.g., supplementary reading and written paper, utilization of video or multimedia, classroom presentations.) Prerequisite: one year of French or consent of coordinator.

4-5 units, Aut, Win, Spr (Staff) MWF plus hour by arrangement

22C. Second-Year French: Communications — Reading and review of essential grammar; emphasis on communication using class conversation and e-mail in the design and accomplishment of student-generated projects (e.g., writing a newspaper in collaboration with students at another university, creating a World Wide Web page, correspondence with students in France.) Computers mediate exchanges and develop writing skills. Up to 3 extra units for projects: e.g., written papers, films, plays, multimedia, etc. 1-3 units for motivated, high-aptitude students wishing to undertake third-year French upon completion of French 22C.

4-7 units, Aut (Barson)

22F. Second-Year French: Francophone — Intermediate level language review: speaking, grammar, writing, with selections of readings from writers mainly of Africa and the Caribbean; some cinema and Canadian authors.

4-5 units, Win (Staff) MWF plus hour by arrangement

23. Second-Year French (Part B) — Continuation of 22, 22C, or 22F. Reading and discussion of complete works, including some literature. Grammar study in its relationship to analytical writing. Extra unit for individual project (e.g., supplementary reading and written paper, utilization of video or multimedia, classroom presentations.) Satisfies the foreign language requirement for students majoring in international relations. Prerequisite: one year of French or consent of coordinator.

4-5 units, Aut, Win, Spr (Staff) MWF plus hour by arrangement

40. Intensive French Specials — By petition only and with consent of instructor. Students with special programmatic needs for an alternate curriculum may complete 3-7 units through a combination of course work and tutorials. No auditors.

3-7 units, Sum (Staff) MTWTh

4A, B, C. Intensive French for Beginners — Accelerated first-year course in which either two or three quarters of French are covered. An all-in-French method is used for developing competence in: listening, speaking, writing, and reading. Written exercises, compositions, conversational drills, and daily work in the language lab. No auditors.

9-12 units, Sum (Staff) MTWThF

50. Reading French — For graduate students or seniors seeking to meet University reading requirement for advanced degrees. Accelerated course specifically for the acquisition of reading ability. No auditors.

4 units, Aut (Staff) MWF

ADVANCED LANGUAGE

101. Language Specials — With consent of department only. See instructor for section number.

1-5 units (Staff)

120. Conversation: France Today — Advanced conversation and discussion on contemporary problems and based on French newspapers, magazines, or films. May be repeated once for credit after an interval of two quarters. Prerequisite: 23 or equivalent.

3 units, Aut, Win, Spr (Staff)

121. Business French — For students who need to function and communicate in the French-speaking business world. Readings and acquisition of specialized vocabulary, discussions, written work, including translations and business letters. Prerequisite: 22 or equivalent.

3 units, Spr (Staff)

123. Creative Writing — Writing as practical communication and as literature. The cultural and social determinants in shifting from spoken to written French, formal and informal. Textual analysis and creative writing centered on various genres and styles, e.g., letters, essays, short stories, poems; description, narration. Grammar and vocabulary review. Class discussion, all in French, focuses on model texts and original writing done by students. Prerequisite: 23 or equivalent.

4 units, Aut (Staff)

125. Contemporary French Usage, Spoken and Written — Can serve as adjunct to Paris program. Grammar, syntax, and stylistics, emphasizing similarity and divergence of oral and written French. Some discussion of linguistics applied to the analysis of texts and oral presentations.

4 units, Spr (Staff)

126. Technological and Scientific French — Introduction to the languages of science, technology, and research in contemporary France. Through a reading of historical texts and recent journal articles, the principal categories and characteristics of French technological and scientific discourse are analyzed. Topics: scientific method, approaches to research, and the interplay between science and society focusing on engineering and medicine. Technical vocabulary, reading strategies, and listening comprehension. Written exercises, oral presentations, and research paper. Accelerates proficiency for students at a second-year level. Learners uncertain of their level should take French placement test before the beginning of the quarter and/or consult with the instructor.

3-5 units, Aut (Raycraft) TTh 12:15-2:05
127. French Media and Communications — For students interested in acquiring knowledge and developing practice in technical, legal, and business French. Examines technological policy of contemporary France in a historical perspective and in reference to contemporary issues in the French computing, broadcasting, telecommunications, and multimedia industries. Readings from current journals are a basis for acquisition of specialized vocabulary. For the extra unit, research paper or a multimedia presentation on a topic of choice. Prerequisite: 126 or equivalent. DR:7(2)

3-4 units, Win (Giraud) MW 11-12:13

128. Management of Technological Resources — Technology vs. science and why they have different production and diffusion processes. The role of the management of technology in the corporation and its relationship with the management of Research and Development, support of corporate development, learning and integrating external technologies, making money with existing technologies, adapting technologies to a new business, competitive intelligence, feeding the strategic process, and implementing the strategy. Lectures/seminar discussions. Research paper. Prerequisite: 126, 127 or equivalent or consent of instructor.

3-5 units, Spr (Weil)

129. Advances of Technology in Europe

3-5 units, Spr (Giraud)

LITERATURE AND CULTURE

UNDERGRADUATE

130. Middle Ages and Renaissance France — Introduction to the literature and culture of France, 11th-16th century. Readings from the epics (The Song of Roland), medieval romances (Yvain, Chrétien de Troyes), post-Petrarchan poems (Du Bellay, Ronsard), and prose humanists (Rabelais, Montaigne). Prerequisite: 23 or equivalent. DR:7(2)

3-5 units, Aut (Hester)

131. 17th- and 18th-Century France — Introduction to the literature and culture of France from the Baroque to the Enlightenment. Readings: Corneille, Diderot, Molière, Montesquieu, Rousseau, and Voltaire. Criticism of excerpts from contemporary filmed versions of French "classical" literature. Prerequisite: 23 or equivalent. DR:7(2)

3-5 units, Win (Hullot-Kentor)

132. 19th- and 20th-Century France — Masterpieces which have marked European culture since the 19th century are examined to understand their impact on cultural life and their lasting value. Prerequisite: 23 or equivalent. DR:7(2)

3-5 units, Spr (Raycraft)

133. Literature and Society in Africa and the Caribbean — The relationship between literature and society in Africa and in the French Caribbean. Acculturation. Readings/discussions on social and cultural conflicts, search for identity, Negritude, poetry, integration of history and oral tradition in the written work, women's role and status in a changing context, and writers' social responsibility. Readings: novels by Mongo Beti, Mariama Ba, Simon Schwart-Bart, Albert Memmi; poetry, criticism, and film. DR:2(*) or 7(2*)

3-5 units, Spr (Mudimbe-Boyi)

191. French Cinema

3 units, Aut (Staff)

198. Honors — Open to juniors and seniors with consent of adviser. 9-12 units total credit for completion of honors essay.

3-12 units (Staff)

199. Individual Work — Open only to majors in French with consent of department. Normally limited to 4-unit credit toward the major.

1-12 units (Staff) by arrangement

ADVANCED UNDERGRADUATE AND GRADUATE

Note — Prerequisite for the following courses taught in French is one course from the 130 series or equivalent.

224. 17th-Century Novel — Major 17th-century novels: D'Urfé's L'Astrée; Sorel's Histoire comique de Franchon; Cyrano de Bergerac's Voyage dans la lune; Furetière's Le Roman bourgeois; Lettres Portugaises; Lafayette's La Princesse de Clèves.

3-5 units, Spr (Hullot-Kentor)


3-5 units, Win (Hullot-Kentor)

260. Methodology of Teaching French — Approaches, methods, and procedures in relation to foreign language acquisition theory. Teaching practice regularly observed in demonstration class.

3-5 units, Spr (Hester)

261. Stylistics and Textual Analysis — In-depth textual analysis and commentary of excerpts from various genres. Different styles of criticism. Text exposition, written and spoken. Designed to assure high-level proficiency in written French. Prerequisite for undergraduates: 123.

3-5 units, Win (Bertrand)

262. Pronunciation and Phonetics — Theory study and corrective work: articulation, intonation, rhythm, phonetic alphabet, etc.

3-5 units (Hester) not given 1995-96
278. Topics in French and Literature: The Discourse of (self)Representation — Diachronic and synchronic examination of theoretical issues to the study of literature from Africa and the Caribbean. The diachronic perspective presents an evolution of this literature from Nègritude (and its reference to Surrealism) to Créolité, the role of French intellectuals and of the journal Présence Africaine. The synchronic approach inscribes the broader context of “post-colonial” critique, focusing on otherness, voice and silence, construction of identity, métissage, history and memory. Readings: Césaire, Dadié, Maximin, Kane; texts by Glissant, Sartre, Barthes, Todorov.

3-5 units, Win (Mudimbe-Boyì)

279. Society and Culture: 19th- and 20th-Century France — The links between sociopolitical events and cultural activity after Romanticism, leading up to the ideological and artistic revolutions of our time. 19th-century revolutionary movements are discussed in relation to popular and learned culture. Collective mentalities and sensibilities of the period.

4 units, Aut (Bertrand)

281. The Literature of the Fantastic — Some of the forms and themes of the fantastic through readings of 19th- and 20th-century French romantic, modernist, and surrealist authors. What do the hybrid creatures and terrifying distortions of the fantastic reveal about contemporary social and sexual anxieties? How is the fantastic to be read? Readings: Nodier, Gautier, Balzac, Villiers de l’Isle Adam, Breton, Carrington, Giselle Prassinas, Todorov, Zizek.

3-5 units, Win (Clej)

281. Geography as Fiction and Science — The notion of space and its relations to the production of knowledge, focusing on the politics of knowledge as actualized spatially in ancient geographies (Herodotus, Diodorus Siculus, Pliny, etc.) and the progressive organization and reorganizations of geographical knowledges.

3-5 units, Spr (Mudimbe)

292. French Democracy vs. British Liberalism — Social and political philosophy before and after the French Revolution, on both sides of the Channel. Readings in Montesquieu, Rousseau, Smith, Constant, Tocqueville, J. S. Mill.

3-5 units (Dupuy) not given 1995-96

GRADUATE

335. Diderot and the Encyclopedists — The principles of the “age of light” with emphasis on Denis Diderot’s work and theories on literature, art, history, biology, and philosophy.

4 units, Spr (Apostolidès)

399. Individual Work — For students in French working on special projects or engaged in pre-dissertation research.

1-12 units, any quarter (Staff) by arrangement

ITALIAN SECTION

Note — Changes in course offerings are sometimes necessary after this bulletin has gone to print. Students are advised to consult the department bulletin board on a regular basis. Courses are taught in Italian unless noted.

Introductory Language Courses (1-99)

Advanced Language Courses (100-129)

Undergraduate courses in Literature and Culture (130-199)

Courses for Advanced Undergraduates and Graduates (200-299)

Graduate Seminars (300-399)

FIRST- AND SECOND-YEAR LANGUAGE

Note — Students registering for the first time in a first- or second-year course must see the instructor for proper placement if they have had any prior training in Italian.

1. First-Year Italian (First Quarter) — Intensive introduction to the Italian language with emphasis on speaking and oral comprehension.

5 units, Aut, Win, Spr (Staff) MTWThF plus language lab

2. First-Year Italian (Second Quarter) — Continuation of 1 with emphasis on the development of reading and writing skills, and on Italian culture. Prerequisite: 1 or equivalent.

5 units, Aut, Win, Spr (Staff) MTWThF plus language lab

3. First-Year Italian (Third Quarter) — Continuation of 1 and 2 with additional cultural and literary readings. Prerequisite: 2 or equivalent.

5 units, Aut, Win, Spr (Staff) MTWThF plus language lab

7A,B,C. Individualized First-Year Italian — Same as 1, 2, 3. For students who, having conflicts with normally scheduled courses, wish to complete 5-15 units at their own pace in regular consultation with the instructor. Students must submit an application to the Italian language instructor and coordinator during first week of classes.

1-15 units, Win (Staff)

21. Second-Year Italian (First Quarter) — Comprehensive review of Italian grammar combined with further study of advanced grammar and Italian
culture through literary texts. Prerequisite: 3 or equivalent.

3-4 units, Aut, Win (Staff)

22. Second-Year Italian (Second Quarter) — Continuation of 21 with emphasis on translation, stylistics, and composition. Prerequisite: 21 or equivalent.

3-4 units, Win, Spr (Staff)

23. Second-Year Italian (Third Quarter) — Continuation of 22. Prerequisite: 22 or equivalent.

3-4 units, Spr (Staff)

30. Conversation: Italy Today — Advanced conversation for students returning from the Florence program and/or who have completed one quarter of second-year Italian. Subject matter varies each term; may be repeated for credit. Prerequisite: consent of instructor.

2 units, Aut, Win, Spr (Staff)

41A,B,C. Accelerated First-Year Italian — Covers one, two or three quarters of Italian. Conversational drills and daily work in the language lab. All-in-Italian method used, developing the four basic skills: listening, speaking, writing, and reading. No auditors.

9-12 units, Sum (Staff) MTWThF

50. Reading Italian — Open to advanced undergraduates with consent of instructor; primarily for graduate students seeking to fulfill University foreign language requirements for advanced degrees. Accelerated course designed for acquisition of reading skills in Italian. No auditors.

3-4 units, any quarter (Staff)

101. Language Specials — With consent of department only. See instructor for section number.

1-5 units (Staff)

114. Advanced Stylistics and Composition — Designed to achieve a high level of proficiency in written and spoken Italian. Readings of literary and non-literary texts with in-depth textual and grammatical analysis in class, oral reports, translations, and frequent writing assignments. Prerequisite: 22 or consent of instructor.

3-4 units, Win (Napolitano)

INTERMEDIATE-LEVEL LITERATURE

127. Italian Studies: Italian History — Introduction to Italian history through the study of specific events, movements, figures, and artifacts. Prerequisite: 3 or equivalent.

3-4 units, Aut (Napolitano)

128. Italian Studies: The Middle Ages and the Renaissance — Selected literary works from the Sicilian school, the Stilnovisti, Dante, Petrarch, Boccaccio, and Machiavelli. DR:7(2)

4 units, Win (Springer)

129. Italian Studies: Mannerism to the Modern — Selected works of Ariosto, Tasso, Galileo, Goldoni, Verga, and Pirandello.

4 units, Spr (Springer)

190A. Sophomore Seminar: Popular Culture through the Ages — For sophomores only. Throughout the 20th century, popular culture was defined in a negative way as the culture (Gramsci) of the "subordinate classes." The rise and spread of popular culture in 16th- and 17th-century Europe, when the breaking of religious unity brought individuals new ideas and concepts via preaching or story telling; how concepts, fashions, and literary forms originated from the masses. How Italy, its fragmented political structure (city-states, Signorie), its emphasis on individual thinking, and varied and strongly divided social and linguistic regionalism fostered the development of a diversified popular culture; parallels between popular culture's phenomena then and now. Enrollment limited. Application procedure required.

3 units, Win (Napolitano)

198. Honors — Open to juniors and seniors with consent of adviser. 9-12 units total credit for completion of honors essay.

3-12 units (Staff)

199. Individual Work — For students engaged in special work. See instructor for section number.

1-12 units (Staff) by arrangement

ADVANCED LITERATURE

299. Individual Work — For students engaged in special work. See instructor for section number.

1-12 units, any quarter (Staff) by arrangement

GRADUATE

301. Graduate Workshop on Pedagogy — Introduction to the theory and practice of teaching Italian. Observations of demonstration classes taught by the master teacher and regular class visitations.

2 units, Spr (Napolitano)

399. Individual Work — For graduate students engaged in work on a special project in the field of Italian studies or pre-dissertation research. May be repeated for credit. See instructor for section number.

1-12 units, Aut, Win, Spr, Sum (Staff) by arrangement

AFFILIATED OFFERINGS

The following courses are accepted for credit in the major. See respective department listing for course descriptions, units, days, times, quarter, and Distribution Requirements (DR) information.
CLASSICS

205A,B. The Semantics of Grammar  
(Devine)

ENGLISH

163M. The Literature and Culture of the Crusades  
(Heng)

HISTORY

231A. Undergraduate Colloquium: Technology, the State, and Social Order in Modern France  
(Hecht)

LINGUISTICS

1. Introduction to Linguistics  
(Bresnan)

GERMAN STUDIES

Emeriti: (Professors) Helmut R. Boeninger, Walter F.W. Lohnes, Katharina Mommsen, Kurt Mueller-Vollmer; (Adjunct Professor) Gertrude Mahrholz
Chair: Russell A. Berman
Professors: Theodore M. Andersson, Russell A. Berman, Elizabeth Bernhardt, Gerald Gillespie, Orrin W. Robinson III
Assistant Professors: Karen J. Kenkel, Arthur Strum
Courtesy Associate Professor: Karen J. Kenkel, Arthur Strum
Senior Lecturers: William E. Petig, Kathryn Strachota, Brigitte Turneaure
Lecturer: Henry Lowood
Acting Assistant Professor: John P. Heins
Visiting Professor: Gerhard Hafner (Winter, Spring)
Fellow: Beatrice Hanssen

The department offers a variety of programs in German language and linguistics, literature, culture, and thought. Courses are open to majors and all interested students. Candidates are accepted for the degrees of Bachelor of Arts, Master of Arts, and Doctor of Philosophy.

By carefully planning their programs, students may fulfill the A.B. requirements for a double major in German Studies and another subject. An extended undergraduate major in English and German literature is available, as are coterminous programs for the A.B. and A.M. degrees in German Studies, and joint programs for the Ph.D. degree with Comparative Literature, Graduate Program in Humanities, Linguistics, and Modern Thought and Literature.

Special collections and facilities at Stanford offer possibilities for extensive research in German studies and related fields pertaining to Central Europe. Facilities include the Stanford University Libraries and the Hoover Institution on War, Revolution, and Peace. Special collections include the Hildebrand Collection (texts and early editions from the 16th to the 19th century), the Austrian Collection (with emphasis on source material of the time of Maria Theresa and Joseph II, the Napoleonic wars, and the Revolution of 1848), and the Stanford Collection of German, Austrian, and Swiss Culture. New collections emphasize culture and cultural politics in the former German Democratic Republic. The Hoover Institution has a unique collection of historical and political documents pertaining to Germany and Central Europe from 1870 to the present. The department also has its own reference library. Extensive use is made of the language lab in the Undergraduate Library as well as the department's own audio-visual equipment, films, tapes, and slides.

The Republic of Austria has endowed the Distinguished Visiting Professorship in Austrian Studies. There is also a Distinguished Visiting Professorship in Swiss Studies funded by sources in Switzerland. These professorships rotate on a yearly basis through several departments.

Haus Mitteleuropa, the German theme house at 620 Mayfield, is an undergraduate residence devoted to developing an awareness of the culture of Central Europe. A number of department courses are regularly taught at the house, and there are in-house seminars and conversation courses. Assignment is made through the regular undergraduate housing draw.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

Majors in German Studies formulate their plans in quarterly consultation with an undergraduate major adviser.

Majors must demonstrate basic language skills, either by completing German 22 or the equivalent, such as an appropriate course of study at the Stanford in Berlin Center. Students then enroll in intermediate and advanced courses on literature, culture, thought, and language. Requirements for the A.B. include at least three courses at the 130-139 level (introductory surveys on topics in German literature, thought, linguistics, and culture). Including these classes, the total requirement for the A.B. is a minimum of 55 units of work beyond the basic courses. With the approval of the adviser, appropriate courses offered by other departments can be accepted toward this total, up to a maximum of 25 units.
STANFORD IN BERLIN

All undergraduates interested in Germany are urged to enroll in the Berlin program, which is open for academic study Autumn, Winter, and Spring Quarters. The program also offers internships in German industry, government, and cultural organizations year round. Through the center, students with at least two years of college-level German can also take courses at Freie Universität, Technische Universität, or Humboldt Universität. Most students live in homes with German hosts. Most credits earned in Berlin can be applied to the undergraduate major in German Studies. All students who are planning to study at the Stanford Center in Berlin or engage in an internship are encouraged to consult with their major advisers and the Overseas Studies office about integrating work done abroad into their degree program. Returning interns who wish to develop a paper based on their experience should enroll in 298. More detailed information is available at the Overseas Studies Office in Sweet Hall or with the faculty adviser in the department.

INTERNSHIPS

Internships in Germany are arranged through the Overseas Studies program. In addition, students may consult with the department to arrange local internships involving German language use or issues pertaining to Germany or Central Europe. Interns who prepare papers based on their experience enroll in 298.

HONORS

Majors with a minimum letter grade indicator (LGI) of 'B+' in German courses are eligible for departmental honors. In addition to requirements listed above, each honors candidate submits an essay representing 6 to 9 units of academic work. The essay topic is chosen in consultation with a faculty member of the department. Opportunities to commence research projects are offered at the Berlin Center.

EXTENDED MAJOR IN ENGLISH AND GERMAN LITERATURES

Students may enter this program with the consent of the chairs of both departments. See the "English" section of this bulletin.

MULTIPLE MAJORS

Students can combine a major in German Studies with a major in any other field. By carefully selecting courses in such disciplines as history, international relations, or economics, students can prepare themselves exceptionally well in the area of Central Europe. Multiple majors are especially recommended for students spending one or more quarters at the Stanford Center in Berlin.

COTERMINAL PROGRAMS

Students may elect to combine programs for the A.B. and A.M. degrees in German Studies. For details, see the "Undergraduate Degrees" section of this bulletin.

TEACHING CREDENTIALS

For information concerning the requirements for teaching credentials, consult the "School of Education" section of this bulletin or inquire at the Degrees Program office, School of Education.

CERTIFICATION OF PROFICIENCY IN GERMAN

In accordance with standards developed by the American Council on the Teaching of Foreign Languages and the Educational Testing Service, the department certifies a student's proficiency on three levels: intermediate, advanced, and superior. This certification is not tied to the number of courses taken, but is a measurement of a student's proficiency in listening comprehension, speaking, reading, writing, and culture. Detailed information is available in the department office.

GRADUATE PROGRAMS

MASTER OF ARTS

This program is designed for those who do not intend to continue studies through the Ph.D. degree. Students desiring the A.M. degree must complete a minimum of 36 units of graduate work. If students enroll for three quarters for a minimum of 12 units per quarter, they can fulfill the A.M. requirements in one year. The program normally includes:

1. 201, 202 (Language and Style)
2. 251 (Syntax of Modern German)
3. A minimum of four courses, with at least one course in each of the three areas of concentration: language and linguistics, literature, and thought.

In addition, students must take graduate-level courses in German and/or approved courses in related fields such as linguistics, comparative literature, philosophy, history, or art history. Students concentrating in German culture studies should choose related courses in the Central European field in such departments as Anthropology, Economics, History, and Political Science.

A.M. candidates must take an oral examination toward the end of their last quarter.

MASTER OF ARTS IN TEACHING

The A.M. degree in the teaching of German is offered jointly by the School of Education and German Studies. The program includes 25 units of German in courses selected in consultation with
the department adviser. For a statement of requirements other than German, see the "School of Education" section of this bulletin.

STANFORD TÜBINGEN GRADUATE EXCHANGE

Annually, one or two Stanford graduate students in German Studies are accepted as exchange students by the University of Tübingen, and their counterparts from Tübingen participate in academic programs at Stanford.

DOCTOR OF PHILOSOPHY

The requirements for the Ph.D. include: (1) a minimum of 36 graduate units during the first year of graduate study and a minimum of 9 units per quarter during the six quarters following the first year; (2) a reading knowledge of one language other than English and German, normally French; (3) a master's oral examination, unless the student already has an A.M. upon entering the program; (4) a qualifying paper; (5) a qualifying examination; (6) the University oral examination; and (7) a dissertation. Students in Medieval Studies must also have a reading knowledge of Latin.

The first year of work, which leads to the A.M. degree, is designed to introduce each student to the three major areas of study. During Spring Quarter of the first year, all students, except those admitted with a master's degree, must take an oral A.M. examination. During the one-hour examination, the student is questioned by three examiners, chosen by the student, on work undertaken in specific graduate courses.

By July 1 of the summer following the first year of graduate study, students should present as a qualifying paper an example of their course work. Although ordinarily not meant to represent an original contribution to scholarship, it should demonstrate the candidate's ability to grasp complex subject matter with sufficient competence to organize materials and to present arguments in a clear and concise manner commensurate with scholarly standards. The paper is submitted to the department chair, who passes it on for approval by the student's faculty adviser and a second reader appointed by the chair in consultation with the adviser.

Students who enter the program with a master's degree from another institution must submit, in lieu of a qualifying paper, a master's thesis or a major research paper as evidence of ability to pursue advanced scholarly work.

At the end of the sixth quarter of study (and only if the qualifying paper has been accepted), the student takes a one-hour oral qualifying exam with two examiners, the student's chosen adviser, and another faculty member appointed by the chair. The purpose of this examination is to demonstrate a broad familiarity with the literature of the major periods, movements, and some major figures. The department does not legislate a canonic list. Instead, the student should, upon consultation with faculty members, compose a list that displays broad coverage of the material. The length of the examination list varies, but 50 items of various sorts (novels, poems, philosophical excerpts, and so on.) might serve as a target figure. Together, the qualifying paper and the qualifying exam constitute the department qualifying procedure. Only after successful completion of the qualifying procedure will the department approve the student's admission to candidacy.

A student who fails the qualifying examination may retake it once at the beginning of the seventh quarter. Students with heavy minor requirements (or in joint-degree programs such as the Graduate Program in Humanities) may postpone the qualifying examination from the end of the sixth to the beginning of the seventh quarter, thereby gaining additional summer reading time.

The University oral examination in the Department of German Studies consists of an area examination; on consultation with the four prospective examiners, the student prepares a specialized list of relevant literature from an area of concentration, as well as appropriate secondary literature. The area of concentration is considerably broader than a dissertation topic but nevertheless allows for intensive work. Examples of areas of acceptable scope are: a 100-year period with some thematic emphasis, problems emerging from a particular genre in various contexts, a major literary movement, institutional setting, or discursive structure.

At least two weeks before the examination date, the student distributes the definitive version of the bibliography as well as a position paper, approximately 25 pages in length, addressing a major issue in the area of study. The examination consists of questions regarding the 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. can-
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 "Graduate Degrees" section of this bulletin.

AREAS OF CONCENTRATION

Language and Linguistics — Students choosing this concentration should take the general survey courses 251 (Syntax of Modern German), 252 (Linguistics and the Analysis of German), and 253 (History of the Language) or their equivalents. In their further studies, students may choose courses in contrastive English-German linguistics, methods of teaching German, historical German dialects and comparative German linguistics, modern German syntax, phonology and dialectology, and theoretical synchronic and diachronic linguistics. Students are also encouraged to take related courses in other departments, especially in English and Linguistics.

During the first year, students normally take:
201, 202. Language and Style
211. Basic Structures of German and English
253. History of the German Language
or 252. Linguistics and the Analysis of German
255A. Middle High German
257. Gothic
or 258. Introduction to Old Norse
or 254. Old Saxon
or 256. Old High German
Three courses in German Literature and in German Thought, with at least one course in each.

Literature — Requirements are a minimum of two courses or seminars per quarter for at least four of the six quarters following the first year. Lecture courses and colloquia require final examinations but not term papers. Seminars, of which the student is expected to take a minimum of two after the first year, require research papers.

During the first year, students normally take:
201, 202. Language and Style
255A. Middle High German
Two courses in German Literature, preferably in the 330-series. One seminar in German Literature.

Two courses in German Thought, preferably Geistesgeschichte I and II.

One course in German Language and Linguistics.

German Thought — Requirements are a minimum of two courses or seminars per quarter for at least four of the six quarters following the first year, to include four courses or seminars at the 340 or 400 level and four courses or seminars at the 330 or 350-390 level. Lectures and colloquia require final examinations but not term papers. Seminars, of which the student is expected to take a minimum of two after the first year, require research papers. Students are advised to take some electives outside the department, related to their field of interest.

During the first year, students normally take:
201, 202. Language and Style
253. History of the German Language
or 251. Syntax of Modern German
or 252. Linguistics and Analysis of German
241. Deutsche Geistesgeschichte I
242. Deutsche Geistesgeschichte II
243. Deutsche Geistesgeschichte III
Three courses in German Literature, one of which should be at the 330 level and one at the 360, 370, or 380 level. One seminar in German Thought (340 level).

INTERDISCIPLINARY PROGRAMS

The department participates in the Graduate Program in Humanities leading to a joint Ph.D. degree in German Studies and Humanities. For a description of that program, see the "Humanities Special Programs" section of this bulletin. Students may work toward a Ph.D. in German Studies with minors in such areas as comparative literature, modern thought and literature, linguistics, or history. Students obtaining a Ph.D. in such combinations may require additional training.

COURSES

OVERVIEW

General Courses (bearing the suffix A, given in English)
Introductory Language Courses (1-99)
Advanced Language Courses (100-199)
GERMAN STUDIES

Thematic Advanced Language Courses (100-119)
Beginning Literature Classes (120-129)
Topics in German Studies (130-139)
Advanced Topics in Thought (140-149)
Linguistics (150-159)
Literature (160-169)
Culture (170-179)
Courses for Advanced Undergraduates and Graduates (many courses also have a 300-level cross-listing):
Advanced Language Skills (200-209)
Literature and Culture (230-239)
German Thought (240-249)
Linguistics and Older Languages (250-259)
Major Authors (260-269)
Genres (270-279)
Major Works (280-289)
Special Topics (290-299)
Courses for Advanced Graduate Students (300-499):
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.

7A,8A,9A. Myth and Modernity — The sequence fulfills the Cultures, Ideas, and Values requirements by examining the tension between mythic traditions and critical reason, while introducing fundamental problems in cultural interpretation. Focuses on German culture, with appropriate comparisons to other contexts. Texts are drawn from literature, philosophy, and the arts, including film and music. May be counted toward a major in German. One lecture per week and two two-hour discussion sections.

7A. Reason and Revolution — The Enlightenment in Germany, with reference to reason and its limits, the rhetoric of revolution, and romantic subjectivity. Works by Kant, Goethe, Beethoven, Marx, and Nietzsche. DR:1 (three-quarter sequence)

5 units, Aut (Berman) T11 plus section

8A. Logos — Enlightenment as conceptual thought between reason and terror, the costs of progress and generational conflict, knowledge and violence, the discontent with theory. Readings from Plato, Sophocles, Freud, Mann, and Kafka. DR:1 (three-quarter sequence)

5 units, Win (Heins) T11 plus section

9A. Rationalization and Myth — The relation between rationalization and the return of myth in the 20th century, with reference to mass culture and technology, the Holocaust, and the possibility of resistance. Works from Brecht, Mann, Hesse, Freud, Adorno, Arendt. DR1 (three-quarter sequence)

5 units, Spr (Kenkel) T11 plus section

7G,8G,9G. Supplementary section for Myth and Modernity with readings in German.

7G. 1 unit, Aut (Heins)
8G. 1 unit, Win (Heins)
9G. 1 unit, Spr (Heins)

30A. Central Europe: Geography, Institutions and Society — Geography, people, and institution 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, Fluchtlinge, Aussiedler, Umsiedler, Gastarbeiter; Central Europe and the European Community; re-structuring the educational system. The German language; standard and dialects. DR:9(5)

3 units, Aut (Lohnes)

38A. Introduction to Germanic Languages — (Same as 138.) Survey of the oldest attested stages of the Germanic language family, including Gothic, Old Norse, Old Saxon, Old English, Old High German, Old Dutch and Old Frisian. External history and internal relationships. DR:9(4)

3 units, Aut (Lohnes)

77A. Sophomore Seminar: The German-Americans — German immigration patterns to America from the founding of Germantown, PA, to the solicitation of immigrants during the 19th century. Topics: religion; the Amish and Hutterites; contributions of German-Americans in the arts, science, and industry; and the German-Americans during the two World Wars. Contact Dialogues and Seminar office for application and information.

3-5 units, Win (Petig)

156A. Introduction to the Scandinavian Languages — (Reading.) Quick survey of grammar and translation of easy texts in Danish, Norwegian, or Swedish depending on class preference.

3-5 units, Win (Andersson)

168A. Hesse, Kafka, Mann — (Same as 268A.) The three internationally best-known prose writers of German Modernism. Their differences and resemblances, artistic heritages, major themes, styles, and contributions to the age of "Myth and Psychology." Readings: selected short stories and the novels Buddenbrooks, Siddharta, The Trial, and Felix Krull.

3-5 units, Win (Gillespie)

171A. Feminist Media Theories — (Same as 271; Feminist Studies 102G/202G.) Anglo-American and
German feminist criticism of film and television, including social, political, and psychoanalytic media theories. Discussions of the critical power and limitations of such theories in relation to particular films and television programs screened each week. Topics: women’s film production, the possibility of a female/feminist aesthetic, theories of male and female spectatorship, and the gendered quality of film/television genres. Criticism by Berger, Holleski, Kaplan, Mulvey, Doane, Penley, Koch, Schüpmann, Silverman, de Lauretis; and films by Anders-Brahms, von Trotta, Arzner, Hitchcock, lassbinder.

4 units, Win (Kenkel)

72A. Critical Theory of the News Media — (Same as 172.) Introduction to the theory and history of the news media in Europe and the U.S., emphasizing the tradition of Critical Theory. Topics: the news media as political and economic institutions, the history of the doctrine of objectivity, and multiculturalism and the news media. Students write critiques of the media and media theory, and undertake projects of media analysis. Readings in texts by Habermas, Negt/Kluge, Horkheimer/Adorno, Chomsky, D. Hallin, D. Schiller, S. Wolin, H. M. Enzensberger, Brecht, Baudrillard.

4 units, Spr (Strium)

175A. Modernization, Technology, and Culture in Germany, 1900 to 1945 — (Same as 175/275.) Interactions of material life, technology, and culture in Germany 1900-1945. Lectures, readings, films, and reports are organized around the identification and sorting out of modernist and anti-modernist, rational and anti-rational, technocratic and anti-technocratic strands; and technology as a source and artifact of social, political and cultural movements. Topics: industrialization, urban development, new means of transportation and communication, literature and technology, film and technology, “Amerikanismus,” military technology, engineering culture of National Socialism.

4 units, Aut (Lowood)

179A. Questioning National Identity — Literary, cinematic, and philosophical texts from the 18th century to the present which call into question the construction of a national identity. Emphasis on the German-Jewish symbiosis; the writings of the Frankfurt School; Holocaust, history, and trauma; postmodernism; multiculturalism and the politics of representation. Authors and figures: Herder, Fichte, Wagner, Adorno, Benjamin, Luther, Kafka, Freud, Scholem, Schmitt, Pabst, Riefenstahl, the Mitscherlichs, Koeppen, Habermas, Grass, Ozakin. Readings in English; German concentrators read the majority of texts in the original.

4 units, Spr (Hanssen)

268A. Hesse, Kafka, Mann — (Same as 168A.)

3-5 units, Win (Gillespie)

292A. The Existentialist Novel, 1910-42 — Readings: Rilke, Malte Laurids Brigge; Unamuno, Miss; Conrad, Victory; Kafka, The Castle; Hesse, Steppenwolf; Sartre, Nausea; Camus, The Stranger.

3-5 units, Spr (Gillespie)

INTRODUCTORY

First- and second-year language courses are under the direction of Professors Robinson (Autumn) and Andersson (Winter and Spring).

Note — Students registering for the first time in a first- or second-year course must take a placement test if they have studied German before entering Stanford.

FIRST-YEAR

1.2.3. German Language and Culture — Comprehensive, balanced introduction to listening and speaking, and reading and writing.

5 units, Aut, Win, Spr (Staff)

IX. Accelerated German for the Berlin Program — Enables students going to Berlin to satisfy the two-quarter language requirement in one quarter. Equivalent to German 1 and 2.

8 units, Aut (Staff)

2C. Conversational German — Recommended for students going to the Stanford Center in Berlin. Enables students to understand and express themselves in simple spoken German, focusing on life in Germany. Materials from Berlin are the basis of instruction. Prerequisite: at least one quarter of first-year German.

2 units, Aut, Win, Spr (Staff)

4. Review of First-Year German — For those who need to solidify their basic command of the language and/or have not had contact with the language for a considerable period of time.

3 units, Aut (Petig)

5. Intensive First-Year German — Equivalent of 1, 2, and 3 combined. Enrollment limited.

12 units, Sum (Staff)

10. Elementary German for Seniors and Graduate Students — Intensive course designed for students who need to acquire reading ability in German for the Ph.D. and/or for advanced research in their own field. No auditors.

4 units, Win, Sum (Petig)

11P. Individually Programmed Beginning German — For those who wish to complete more or less than 5 units a quarter, have a spotty background, have scheduling conflicts, or prefer to work independently. Students proceed at their own pace, working on their own with the text and tapes. The instructor is available for consultation on a regular basis. Conversation classes may be attended for listening and speaking practice.

3-12 units, Aut, Win, Spr (Staff)
HAUS MITTELEUROPA

20A. Beginning Conversation
1 unit, Aut, Win, Spr (Staff)

20B. Intermediate Conversation
1 unit, Aut, Win, Spr (Staff)

20C. Advanced Conversation
1 unit, Aut, Win, Spr (Staff)

20L. Speaker’s Series
1 unit, Aut, Win, Spr (Staff)

20M. Filmkunst aus Mitteleuropa
1 unit, Aut, Win, Spr (Staff)

20T. Teaching German Conversation
1 unit, Aut, Win, Spr (Staff)

20V. Video Series
1 unit, Aut, Win, Spr (Staff)

20X. Meet the Mitt—(For Haus residents only.)
1 unit, Aut, Win, Spr (Staff)

Other in-house courses will be announced.

SECONĐ-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 (Turneaure, 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 (Strachota, Staff)

22. Intermediate German II—Continuation of 21, with greater emphasis on reading and writing skills. Final course in the introductory sequence. Suggested continuation: 21C, 101, 105, 130, or 150 series. Prerequisite: 21.
4 units, Aut, Win (Staff)
Spr (Turneaure, Petig)

52. A.-F. Readings in Other Disciplines—Open to undergraduates and graduate students. For students with a knowledge of German (one year or equivalent) who want to acquire reading proficiency in various disciplines. Excerpts from scholarly works and professional journals. Students may introduce material they need to read for their course work or research. Some departments accept the course in lieu of the Ph.D. reading exam.
3-4 units, not given 1995-96

INTERMEDIATE

100. Advanced Listening and Speaking Skills—Designed to increase fluency and precision in speaking and to improve listening comprehension. Audio and video tapes, fictional and expository texts, vocabulary building exercises.
3 units, Aut, Win (Strachota)

101. Composition and Idiomatic Usage—Short fictional and expository readings, discussions, and essays; grammar review. Vocabulary building emphasizing various German equivalents of common English words and expressions. Speaking and individual feedback.
3-4 units, Win (Turneaure)

102. Advanced Language Study II—Continuation of 101.
3-4 units, Spr (Turneaure)

105. Business German—Readings/discussions on German texts dealing with the business world, i.e., economics, banking, stock market, import-export trade, Common Market. Written exercises. Audio- and videotapes for listening comprehension and guided conversations. Prerequisite: 22 or equivalent.
3-4 units, Spr (Petig)

110. German Newspapers—Articles of current interest in German newspapers read and discussed in German. May be taken twice for credit. Prerequisite: 22 or equivalent.
3-4 units, Aut (Turneaure)
Spr (Strachota)

111. Television News from Germany—Aim is listening comprehension of contemporary German video material and as an introduction to current events in Germany. Students listen to several German newscasts per week, analysed and discussed in class; also, feature films two or three times during the quarter. (In German)
2 units, Win (Staff)

120. Modern Short Prose—Short prose texts from Bachmann, Böll, Brecht, Kafka, T. Mann, Rilke, Wolf, and others. Emphasis is on readings that reflect historical events and cultural tendencies of 20th-century Central Europe. (In German) DR:7(2)
4 units, Aut (Turneaure)

122. German Literature: Poetry, Prose, and Drama from 1770 to the Present—Introduction to key concepts of major literary periods and literary criticism. Readings by Brecht, Büchner, Eichendorff, Frisch, Goethe, Heine, Hoffmann, Hölderlin, Kafka, Kleist, Thomas Mann, Nietzsche, Novalis, Rilke, Schiller, and Wolf. (In German) DR:7(2)
4 units, Spr (Turneaure)

130. Central Europe: Geography, Institutions, and Society—(Same as 30A.) Prerequisite: 22, or consent of instructor. DR:9(5)
4 units, Aut (Lohnes)

131-133. German literature and culture from the 18th century to present. Topics vary each year and courses may be repeated with consent of the instructor. Readings in German.
131. 18th-Century Literature and Culture: Modernity and the Crisis of Self — The effects of the crisis of traditional authority on the concept and substance of the self, as seen through literature, philosophy, painting, and music. The project of enlightenment, the concept of modernity, romantic subjectivity, constructions of race and gender, and post-conventional identity. Works by Goethe, Lessing, Kant, Fichte, Wackenroder, Tieck, Novalis, Hegel, Beethoven, Caspar David Friedrich. 4 units, Aut (Strum)

132. 19th-Century Literature and Culture: Romanticism in German Culture, 1798-1848 — Organic metaphors, romantic irony, conceptions of the nature of art, and reactions to romanticism in German writing from the first half of the 19th century. Literary readings from Schlegel, Novalis, Tieck, Eichen dorff, Hoffman, Goethe, and Heine complemented by the visual arts, political writings, and short philosophical texts. 4 units, Win (Heins)

133. 20th-Century Literature and Culture: German Expressionism — The Subject in Crisis — Expressionist painting, drama, poetry, and film through WWI. Thematization of the metropolis, violence, utopia, revolution, and death as elements of subjective protest or assertion. Plays and poems by Goering, Hasenclever, Kaiser, Heym, Becher, Ball, Jünger; paintings by Nolde, Kandinsky, Kokoschka, Beckmann; and films such as The Cabinet of Dr. Caligari, The Golem. 4 units, Spr (Kenkel)

138. Introduction to Germanic Languages — (Same as 38A.) DR:9(4) 3 units, Aut (Robinson)

172. Critical Theory of the News Media — (Same as 172A.) 4 units, Spr (Strum)

175. Modernization, Technology, and Culture in Germany, 1900 to 1945 — (Same as 175A, 275.) 4 units, Aut (Lowood)

199. Individual Reading — 36 hours of reading per unit, weekly conference with instructor. May be repeated for credit. Enrollment by consent of the department. Prerequisites: 22, consent of instructor. 1-2 units, Aut, Win, Spr (Petig, Staff) by arrangement

ADVANCED UNDERGRADUATE AND GRADUATE

201. Language and Style — Students write weekly one-page compositions, each on a different level of style, e.g., written representation of spoken language, informal and formal letters, journalistic and expository prose, and fiction. Examples are read and discussed, and grammatical problems analysed. (In German) 2 units, Win (Staff)

202. Language and Style — Continuation of 201. 2 units, Spr (Staff)

211. Basic Structures of German and English — Survey of the main features of German syntax, contrasted with English. Material is from the Stanford Corpus of Spoken German. 3 units, Aut (Petig)

231-239. German Literature and Culture — (Same as 331-339.) The major periods of German literature from the early Middle Ages to the present. Undergraduate prerequisite: consent of instructor.

232. German and European Baroque Drama — (Same as 332.) Plays by Bidermann, Lope de Vega, Calderon, Corneille, Rotrou, Gryphius, Lohenstein, and Webster. Foreign literature majors and comparatists read original texts in their areas of interest; open to generalists using translations. 3-5 units, Spr (Gillespie)

233. 18th-Century Narratives of Development — (Same as 333.) Narratives of individual development in literature and philosophy, emphasizing the aesthetics and politics of pedagogy, the concept of experience, and the grounding of identity. Readings include Rousseau, Wieland, Moritz, Schiller, Goethe, and Novalis. 3-5 units, Spr (Strum)

236. German Sentimentality, 1750-1785 — Empfindsamkeit in German culture. The epistolary novel, the Bürgerliches Trauerspiel, and poetry. Sentimental writers' and readers' circles, landscape gardening, and physiognomics. The critique of sentimentality. Political and socio-historical issues frame discussions of the place of "sensitivity training" in emerging conceptions of humanity. Possible authors: Gellert, Lessing, LaRoche, Goethe, Jacob, Schiller, Hirschfeld, Lavater, and Nicolai. 3-5 units, Spr (Strum)

239. Post-Unification Germany — Focuses on the political, literary, and cultural debates that have marked Germany since the Wende. Authors and figures: Jurek Becker, H. M. Enzensberger, Günter Grass, Jürgen Habermas, Elfriede Jelinek, Botho Strauss, Margarete von Trottta, Martin Walser, Wim Wenders, Christa Wolf. 3-5 units, Win (Hanssen)

241-243. The history of German thought from 1750 to the present and its significance for an understanding of modern culture. Authors: Lessing, Herder, Kant, Schiller, Hegel, Marx, Nietzsche, Lukács, Husserl, Heidegger, Adorno, Habermas. In English 241. Deutsche Geistesgeschichte I — From Leibnitz to Fichte. Revolutionary changes in
understanding the history, human knowledge, the nature of human beings, and art in 18th century. Readings of texts by Lessing, Herder, Kant, Goethe, Schiller, Fichte.

3-5 units, Aut (Kenkel)

242. Deutsche Geistesgeschichte II — German thought from the relegitimation of philosophical reason after Kant’s critique of metaphysics, to the rejection of philosophical reason after Hegel. Topics: the concept of the dialectic, the birth of social theory, and the end of systematic philosophy. Texts by Fichte, Hegel, Marx, Kierkegaard, and Nietzsche.

3-5 units, Aut (Kenkel)

243. Deutsche Geistesgeschichte III — Movements in German thought in the 20th century through readings and rhetorical analysis of representative texts from Freud, Heidegger, Lukács, Adorno, Benjamin, Marcuse, Gadamer, Habermas, and Kittler. Schools such as psychoanalysis, hermeneutics, phenomenology, Critical Theory, and discourse analysis; issues such as technology, politics, and the dynamics of cultural reception.

3-5 units, Win (Strum)

255B. Seminar on Wolfram von Eschenbach’s Parzival

3-5 units, Win (Andersson)

256. Readings in Protogermanic

3-5 units, Aut (Robinson)

264. Poetry of Rainer Maria Rilke — Open to non-majors, with approval of instructor. Close reading of Rilke’s German and, secondarily, his French lyrics selected from all major phases, the Sonnets to Orpheus, and the Duino Elegies. Rilke’s work in relation to Impressionism, Symbolism, Expressionism, and other tendencies in literature and painting, and his place in Modernism. The reception of Rilke, in translation. Comparison of selected original poems and versions in English, Spanish, etc.

3-5 units, Win (Gillespie)

271. Feminist Media Theories — (Same as 171A.)

4 units, Win (Kenkel)

275. Modernization, Technology and Culture in Germany, 1900 to 1945 — (Same as 175A, 175.)

4 units, Aut (Lowood)

276. Poetry Novalis to Nietzsche — (Same as 276.)

3-5 units, Aut (Gillespie)

291K. Berlin/New York/Hollywood: German Exile Culture in America — How German exiles in America came to terms with fascist Germany, their own German identity, and their experience as outsiders in America. The exiles’ analysis of and influence on American culture. Theoretical work of Arendt, Adorno, Horkheimer, Marcuse; and the cultural production of exiled filmmakers, actors, novelists, and playwrights (Marlene Dietrich, Fritz Lang, Heinrich and Thomas Mann, Bertolt Brecht).

4 units, Aut (Kenkel)

298. Individual Work — Open only to German majors and to students working on special projects, including written reports for internships. Honors students use this number for the honors essay. May be repeated for credit.

1-15 units each quarter (Staff) by arrangement

300. Methods and Materials for German Studies — Techniques and library resources for investigating German literature and culture, particularly in its historical dimensions. Readings/assignments on the multiple aspects of the production of texts in historical context, emphasizing the location and interpretation of relevant cultural, economic, social, and literary sources. Bibliography; non-canonical and extra-literary sources; film and other non-print media; archives and special collections.

3 units, Win (Lowood)

301. Individual Work — Primarily for work on the A.M.-level qualifying paper.

units by arrangement (Staff)

302. Methods of Teaching German — (Same as Education 291.) Overview of teaching methodologies and approaches; observation of classes and discussion of classroom practices; analysis and evaluation of materials.

2-3 units, Aut (Petig)

332. German and European Baroque Drama — (Same as 232.)

3-5 units, Win (Gillespie)

333. 18th-Century Narratives of Development — (Same as 233.)

3-5 units, Spr (Strum)

376. Poetry from Novalis to Nietzsche — (Same as 276.)

3-5 units, Aut (Gillespie)

ADVANCED GRADUATE

400. Dissertation Research — Exclusively for graduate students in German working on dissertations.

1-12 units, Aut, Win, Spr, Sum (Staff) by arrangement

AFFILIATED DEPARTMENT OFFERINGS

COMPARATIVE LITERATURE

60. Law and Literature

5 units, Win (White)

141. Self as Other: Interpellating Minority Subjectivities

5 units, Win (Palumbo-Liu)
142. Ethnic Memory and Cultural Nationalism
   5 units, Spr (Palumbo-Liu)

192H. Opera and the Humanities
   5 units, Aut (Linderberger)

201. Epic and Empire
   5 units, Spr (Parker)

   1-2 units, Aut (Gambarara)

324E. Fascism and Culture
   5 units, Spr (Schnapp)

PHILOSOPHY

226. Kant on Self Consciousness
   3 units, Aut (Smit)

227A,B,C. From Kant to Hegel
   4 units, Aut, Win, Spr (Foerster)

242C. Kant and Foundations of Science
   3 units, Spr (Suppes, Guttmann)

OVERSEAS STUDIES

These courses are approved for the German major and taught at the campus indicated. Students should discuss with their major advisers which courses would best meet educational needs. Course descriptions can be found in the “Overseas Studies” section of this bulletin or in the Overseas Studies Program office, 126 Sweet Hall.

BERLIN

2B. Special Intensive German
   10 units, Aut (Staff)

3B. German Language and Culture — Offered depending on demand.
   6 units, Aut (Friesel-Kopecki)
   Win (Staff)
   Spr (Wohlfeil)

22B. Intermediate German
   4 units, Aut, Win (Wohlfeil)
   Spr (Friesel-Kopecki)

101B. Advanced German
   4 units, Aut, Win, Spr (Friesel, Kopecki)

139B. Introduction to the German Dialects — (Same as Overseas Studies 139.) DR:9(4)
   4 units, Spr (Robinson)

159B. Berlin Sociolinguistics — (Same as Overseas Studies 159.)
   2-4 units, Spr (Robinson)

166B. Women, Literature and Transitions in Germany — DR:8(3)
   4 units, Aut (Hörnigk)

177A. Culture and Politics in Modern Germany — DR:9(5)
   4-5 units, Win (Kramer)

177B. Nationalism and Political Culture in Contemporary Germany — DR:9(5)
   4 units, Spr (Tempel)

179B. Split Images: Post-War German Film — (Same as Overseas Studies 179.) DR:7(2)
   4 units, Aut (Kramer)

195. German Theater — (Same as Overseas Studies 101A.) DR:7(2)
   4-5 units, Spr (Kramer)

HISTORY


Chair: Norman Naimark


Associate Professors: Joel Beinin, Gordon H. Chang, Kennell A. Jackson Jr. (on leave Winter), Nancy S. Kollmann, Aron Rodrigue

Assistant Professors: Philippe Buc, Gabrielle Hecht (on leave Winter, Spring), James E. Ketelaar (Kyoto), Ellen G. Nesar, Mary Louise Roberts, Karen Sawislak (on leave), Amit Weiner

Courtesy Professors: Paul David, Susan M. Treggiari, Gavin Wright

Senior Lecturer: Joseph J. Corn

Modern Europe Lecturers: Alastair Bellany, Stephen Hastings-King, Elizabeth Rothrauff, Christopher Schmidt-Nowara, Krystyna von Henneberg

Lecturers: Todd Benson, Joshua Feinstein, Lisa Pollard, Jeremy Stahl, Bruce Thompson, Joseph Zizek

Acting Assistant Professor: Laura Smoller

Visiting Professors: Herbert S. Klein, Ronald G. Suny

Visiting Associate Professor: Charles W. Hayford

Fellow: David Henkin
The Department of History offers courses of general cultural and educational value. It seeks not only to provide knowledge in special historical fields but also to equip the student for duties as a citizen and to give instruction which will aid in law; journalism, library work; local, state, and national public service; and business.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The program for the undergraduate major emphasizes both breadth of training and concentration of studies in a selected field of history.

Each candidate for the A.B. in History should: (1) declare a major in the Spring Quarter of the second year or the Autumn Quarter of the third year of study; (2) be enrolled, if possible, in the department for at least six quarters, counting the first quarter of registration.

As foundation requirements, candidates must (1) complete twelve courses in History and receive a letter grade indicator (LGI) of 'C-' or higher; (2) complete four small group courses including one introductory seminar, two colloquia and one senior research seminar, preferably in the field of concentration.

Because capacity to write with ease and lucidity is an important skill, each major is required to do a substantial amount of writing (at least eight pages) in at least eight approved history courses. A minimum of six courses must be taken from members of the Department of History. Directed reading resulting in a substantial amount of writing is awarded a letter grade; other directed reading courses, unless used in conjunction with the honors program or with an undergraduate research seminar, are given only for Satisfactory/No Credit and do not count toward the fulfillment of major requirements.

To ensure chronological and geographical breadth, at least two courses must be completed in a "premodern" chronological period and in each of three geographical fields: Field I (Africa, Asia, and Middle East); Field II (the Americas); Field III (Europe, including Western Europe, Eastern Europe, and Russia). Courses fulfilling the "premodern" chronological period may also count for fields I-III.

To develop some measure of expertise and to provide the student's course of study with both a focus and a destination, four courses (of which one must be a small group course in addition to the undergraduate research seminar) must be taken in one of the following fields of concentration: Africa, Asia, Eastern Europe and Russia, Europe before 1700, Europe since 1700, Latin America, the United States, Middle East, or a thematic subject treated comparatively, such as war and revolution, work, gender, family history, popular culture/high culture, etc. The proposed concentration must be approved by the major adviser; a proposal for a thematic concentration must have the approval of both the adviser and the department's Committee on Undergraduate Studies.

The department also encourages students to think seriously about pursuing plans of study that involve acquisition of foreign languages and/or study at one of our overseas campuses. Such studies are not only valuable in themselves, they can also provide an opportunity for independent research and a foundation for senior theses.

Since History majors are required to complete an introductory seminar exposing students to the practices of the historian and an undergraduate research seminar in which the student conducts research, completion of the major requires planning. Following consultation with their adviser, majors must file a plan of study with the department.

HONORS PROGRAM

For a limited number of majors, the department offers a special program leading to honors in History. Students accepted for this program, in addition to fulfilling the general requirements stated above, begin work on an essay in Spring Quarter of the junior year and complete the essay by mid-May of the senior year. Students normally take 12 to 15 units of honors work, excluding the colloquium, to be distributed as best fits their program. Because students in the honors program conduct a year-long program of independent research, they are not required to take an undergraduate research seminar.

To enter this program, the student must be accepted by a member of the department who agrees to advise on the research and writing of the essay, and must enroll in the Spring Quarter honors seminar. An exception to the latter requirement may be made for those studying overseas Spring Quarter of the junior year, but such students should consult with the director of the honors program, if possible, prior to going overseas. Under exceptional circumstances, students are admitted to the program in the Autumn Quarter of the senior year.

In considering an applicant for such a project, the adviser and director of the honors program take into account general preparation in the field of the project and expect an LGI of at least 'B+' in the student's previous work in history and in the University. Students satisfactorily completing the program are eligible for honors in History, depending upon the quality of their work. To enter the honors program, apply at the Department of History office.

James Birdsall Weter prizes are awarded each year for the outstanding honors essays.
SECONDARY (HISTORY) TEACHER’S CREDENTIAL

Applicants for the Single Subject Teaching Credential (Secondary) in the social studies may obtain information regarding the requirements by applying to the Credential Administrator, School of Education.

COTERMINAL A.B. AND A.M. PROGRAM

The department admits each year a limited number of undergraduate History majors to work for coterminal A.B. and A.M. degrees in History. Applications for admission should be submitted by February 15 of the junior year. Applicants must meet the same general standards as those seeking admission to the A.M. program; they must submit a written statement of purpose, a transcript, and three letters of recommendation, at least two of which should be from members of the Department of History faculty. The decision on admission rests with the Graduate Admissions Committee. Students must meet all requirements for both degrees. They must complete 15 full-time quarters (or the equivalent), or three full-time quarters after completing 180 units, for a total of 216 units. During the senior year they may, with the consent of the instructors, register for as many as two graduate courses. In the final year of study, they must complete at least three courses that fall within a single Ph.D. field.

GRADUATE PROGRAMS

ADMISSION

Applicants for admission to graduate work must take the General Test of the Graduate Record Examination. It may be taken at most American colleges and in nearly all foreign countries. For details see the Guide to Graduate Admission, available from Graduate Admissions, the Registrar’s Office.

Students admitted to graduate standing do not automatically become candidates for a graduate degree. With the exception of students in the terminal A.M. program, they are admitted with the expectation that they will be working toward the Ph.D. degree, and may become candidates to receive the A.M. degree after completing three quarters of work.

MASTER OF ARTS

The department requires the completion of nine courses (totaling not less than 36 units) of graduate work; seven courses of this work must be Department of History courses. Of the seven, one must be a seminar and three must be either graduate colloquia or graduate seminars. Directed reading may be counted for a maximum of 10 units. A candidate whose undergraduate training in history is deemed inadequate must complete nine courses of graduate work in the department. The department does not recognize for credit toward the A.M. degree any work that has not received the L.G.I. of ‘A,’ ‘B,’ or ‘+.’

TERMINAL A.M. PROGRAM

Applicants who do not wish to continue beyond the A.M. degree are admitted to this program at the discretion of the faculty in individual fields (U.S., modern Europe, and so on). Students admitted may not apply to enter the Ph.D. program in History during the course of work for the A.M. degree.

A.M. IN TEACHING (HISTORY)

The department cooperates with the School of Education in offering the Master of Arts in Teaching degree. For the general requirements, see the “School of Education” section of this bulletin. For certain additional requirements made by the Department of History, contact the department office. Candidates must possess a teaching credential or relevant teaching experience.

DOCTOR OF PHILOSOPHY

Students planning to work for the doctorate in history should be familiar with the general degree requirements of the University outlined in the “Graduate Degrees” section of this bulletin. Those interested in applying for admission to the A.M. and Ph.D. programs should contact Graduate Admissions, the Registrar’s Office, Old Union, in order to receive an application. Applications become available in September of the year prior to intended enrollment. The application filing deadline is January 1. Applicants must file a report of their general scores on the Graduate Record Examination and submit a writing sample of 10-25 pages on a historical topic. Successful applicants for the A.M. and Ph.D. programs may enter only in Autumn Quarter.

Upon enrollment in the graduate program in History, the student has a member of the department designated as an adviser with whom to plan the Ph.D. program. Much of the first two years of graduate study is spent taking courses, and, from the outset, the student should be aware that the ultimate objective is not merely the completion of courses but preparation for general examinations and for writing a dissertation.

Admission to the Department of History in the graduate division does not establish any rights respecting candidacy for an advanced degree. At the end of the first year of graduate study, students are evaluated by the faculty and given a progress report. A final decision as to whether she or he will be allowed to continue to work towards the Ph.D. is made in the Winter Quarter of the student’s second year.
After the completion of certain further requirements, students must apply for acceptance for candidacy for the doctorate in the graduate division of the University.

REQUIREMENTS

1. In consultation with the adviser, students select an area of study from the list below in which to concentrate their study and later take the University oral examination. The major concentrations are:
   - Europe, 300-1400
   - Europe, 1400-1789
   - Europe since 1700
   - Jewish History
   - Russia
   - Eastern Europe
   - Middle East
   - East Asia before 1600
   - East Asia since 1600
   - Africa
   - Britain and the British Empire since 1460
   - Latin America
   - The United States (including Colonial America)
2. The department seeks to provide a core colloquium in every major concentration in which students normally enroll during the first year of graduate study.
3. Students are required to take two research seminars, at least one in the major concentration. Normally, research seminars are taken in the second year.
4. Each student, in consultation with the adviser, defines a secondary concentration. This concentration should represent a total of four graduate courses or their equivalents, and it may be fulfilled by working in a historical concentration or an interdisciplinary concentration. The historical concentrations include:
   a) One of the concentrations listed above (other than the student's major concentration).
   b) One of the concentrations listed below, which falls largely outside the student's major concentration:
      - The Ancient Greek World
      - The Roman World
      - Europe, 300-1000
      - Europe, 1000-1400
      - Europe, 1400-1600
      - Europe, 1600-1789
      - Europe, 1700-1871
      - Europe since 1848
      - England, 450-1460
      - Britain and the British Empire, 1460-1714
      - Britain and the British Empire since 1714
      - Russia to 1800
      - Russia since 1800
      - Eastern Europe to 1800
      - Eastern Europe since 1800
      - Jewish History
   c) Work in a national history of sufficiently long time to span chronologically two or more major concentrations. For example, a student with Europe since 1700 as a major concentration may take France from about 1000 to the present as a secondary concentration.
   d) A comparative study of a substantial subject across countries or periods. The secondary concentration requirement may also be satisfied in an interdisciplinary concentration. Students plan these concentrations in consultation with their advisers. Interdisciplinary concentrations require course work outside the Department of History, which is related to the student's training as a historian. Interdisciplinary course work can either add to a student's technical competence or broaden his or her approach to the problems of the research concentration.
5. Each student, before conferral of the Ph.D., is required to satisfy the department's teaching requirement.
6. There is no University or department foreign language requirement for the Ph.D. degree. A reading knowledge of one or more foreign languages is required in concentrations where appropriate. The faculty in the major concentration prescribes the necessary languages. In no concentration is a student required to take examinations in more than two foreign languages. Certification of competence in commonly taught languages (that is, German, French, Spanish, Portuguese, Russian, and Latin) for candidates seeking to fulfill the language requirement in this fashion is done by the appropriate language department of the University. Certification of competence in other languages is determined in a manner decided on by faculty in the major concentration. In either case, certification of language competence must be accomplished before a student takes the University oral examination.
7. The student is expected to take the University oral examination in the major concentration early in the third graduate year.
8. The student must complete and submit a dissertation which is the result of independent...
work and is a contribution to knowledge. It should evidence the command of approved techniques of research, ability to organize findings, and competence in expression. For details and procedural information, inquire in the department.

JOINT Ph.D. IN HISTORY AND HUMANITIES

The Department of History participates in the Graduate Program in Humanities leading to a joint Ph.D. degree in History and Humanities. See the “Humanities Special Programs” section of this bulletin.

RESOURCES

The above section relates to formal requirements, but the success of a student's graduate program depends in large part on the quality of the guidance which he or she receives from the faculty and on the library resources available. Prospective graduate applicants are advised to study closely the list of History faculty and the course work which this faculty offers. As to library resources, no detailed statement is possible in this bulletin, but areas in which library resources are unusually strong are described below.

The rich, and in some respects unique, collection of the Hoover Institution on the causes, conduct, and results of WW I and WW II are being augmented for the post-1945 period. The materials include government documents, newspaper and serial files, and organization and party publications (especially British and German Socialist parties). There are also important manuscript collections, including unpublished records of the Paris Peace Conference of 1919 and the Herbert Hoover archives, which contain the records of the Commission for Relief in Belgium; the American Relief Administration; the various technical commissions established at the close of WW I for reconstruction in Central and Eastern Europe; the personal papers of Herbert Hoover as United States Food Administrator; and other important personal papers. Other materials for the period since 1914 relate to revolutions and political ideologies of international importance; colonial and minority problems; propaganda and public opinion; military occupation; peace plans and movements; international relations; international organization and administration including the publications of the United Nations, as well as principal international conferences. The Hoover Institution also possesses some of the richest collections available anywhere on the British labor movement; Eastern Europe including the Soviet Union, East Asia (runs of important newspapers and serials and extensive documentary collections, especially for the period of WW II); and Africa since 1860, especially French-speaking Africa, the former British colonies, and South Africa.

The University Library maintains strong general collections in almost all fields of history. It has a very large microtext collection, including, for instance, all items listed in Charles Evans' American Bibliography, and in the Short-Title Catalogues of English publications, 1474-1700, and virtually complete microfilmed documents of the Department of State to 1906. It also has a number of valuable special collections including the Borel Collection on the History of California; many rare items on early American and early modern European history; the Brasch Collection on Sir Isaac Newton and scientific thought during his time, and other such materials.

FINANCIAL SUPPORT

Students who are admitted with financial support are provided four years of support through fellowship, teaching and research assistantships, and tuition grants. Applicants who have completed the A.M. degree from another institution may be eligible for three years of support. Applicants should indicate on the admissions application whether they wish to be considered for such support. No separate application for financial aid is required.

COURSES

See the Time Schedule for changes in course offerings each quarter. The department also maintains a bulletin board with updated information.

INTRODUCTORY

1,2,3. Europe: From Antiquity to the Present — 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: Late Antiquity to 1500 — Themes of group identity, power, and religion, surveying the transformations of European society and power-structures from Augustus to Mach-
javeli. How did groups fashion and refashion themselves through contact with other groups, the pressures of politics, and the utilization of sacred norms? How did religions influence societies and how were religions transformed by societies? DR:1 (three-quarter sequence)

5 units, Aut (Buc) lectures MTW 9 plus two-hour colloquium

2. Europe and Beyond, 1500-1789 — Survey of the intellectual and social currents from the voyages of Columbus to the American Revolution. Readings: Shakespeare, Locke, Wollstonecraft, Rousseau, and Jefferson. DR:1 (three-quarter sequence)

5 units, Win (Lounge, Rakove) lectures MTW 9 plus two-hour colloquium

3. Europe and Beyond: The Modern Age, 1789-1989 — 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 (Roberts) lectures MTW 9 plus two-hour colloquium

5. Potter House Seminar on International Affairs — Issues of ethnic conflict, economic development, and the new world (dis)order in E. and S. Asia, the Middle East, Eastern Europe and the former Soviet Union, and Latin America. Experts on various regions and issues speak each week.
1 unit, Aut (Beinin) Th 6:30-8 p.m.

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 (Kollmann) not given 1995-96

24B. Russian Civilization II: 18th to 20th Centuries — Interdisciplinary approach to Russian history and culture; examines literature, society, institutions.
5 units (Emmons) not given 1995-96

80. Culture, Society, and Politics in Latin America — Introduction to the economic, political, and social history of Latin America. Emphasis is on the interaction between economic change, social structure, and political movements. DR:9(5*)
5 units, Spr (Klein) MW 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, constructing a coherent story from them, interpreting their larger implications, and in discovering why it is possible to agree on the facts but to disagree on what they mean. These courses are numbered 1 through 99 followed by the letter "S."

11S. Introductory Seminar: The Medieval City — Conflict and Community in Premodern Europe — Center of culture and art, bustling economic hub, or wretched hive of scum and villainy? The medieval city embraced all three elements. The social and cultural milieu of the medieval European city (c. 1000-1500) with its inherent conflicts and paradoxes. Sources and topics: violence and civic turmoil, public spectacle and ritual, marginal denizens (prostitutes, poor, Jews), the profit economy, environment of women and children, urban space.
5 units, Aut (Ott) W 1:15-3:05

13S. Introductory Seminar: Hermits, Monks, Mystics, and Self-Flagellants—The Diversity of Religious Experience in the Middle Ages — The religious landscape of medieval Europe might include monks, nuns, or those who opted for more dramatic forms of devotion (anorectic saints and flagellants). Changing and conflicting definitions of the "religious" from the 4th to the 14th centuries, origins and diversification of monastic life, apocalyptic and millenarian thought, using the Scripture, political action? In the Middle Ages, either. The medieval end! A religious statement or a call to social and political action? In the Middle Ages, either. The origins, development, and "uses" of medieval apocalyptic and millenarian thought, using the Scripture, learned treatises, "biographies" of Antichrist, plays, and art. Topics: Jewish apocalypticism, Christian expectations of the End, the figure of Antichrist, opponents of millenarianism, and the uses of apocalyptic language against the Muslims, for political rhetoric, and as a vehicle for radical social criticism. Modern uses of apocalyptic language.
5 units (Smoller) not given 1995-96

15S. Introductory Seminar: The Medieval Church and Violence — Opposition to and sanctification of war and violence, including early Christian pacifism, the origins of the idea of crusade and of knighthood, and the fate of the Peace Movement of the 11th century. Using primary sources and secondary works, assesses ecclesiastical participation in military action and peace-making, and its
causes and effects on the political and cultural order.

DR:9(S)
5 units, Spr (Buc) T 1:15-3:05

16S. Introductory Seminar: The Society of Renaissance Florence — Florentine documents of the Renaissance (census and court records, letters, and diaries) are analyzed with the help of computers. Students develop their own interpretations of what Florentines were like. Emphasis on social structure and everyday people.
5 units, not given 1995-96

20S. Russia and Non-Russians: Ethnicity and Nationalism in Imperial Russia and the Soviet Union Since 1895 — Evaluates the utility of bringing an ethno-national perspective to the study of Russian and Soviet history by exploring topics drawn from the Imperial and Soviet experiences of the past century. Topics: the nature of "nationhood"; continuities and the lack thereof in tsarist and Soviet policies towards non-Russian groups; historiographical debates over the nature of such policies; distinctions among non-Russian groups; the place of Russian nationalism; the problem of studying groups without "voices" of their own; and the role of ethnicity and nationality in the disintegration of the U.S.S.R.
5 units, Spr (Northrop)

23S. Women and Gender in Early Modern Russia — Gender relations in 16th- and 17th-century Russia: prescriptions and practice of family life, women's roles, sexuality, property, and inheritance. Emphasizes analysis of primary sources and critical reading of secondary works.
5 units, Win (Kollmann) T 1:15-3:05

25S. Ivan the Terrible in Russian Historiography — Uses primary sources from 16th-century Russia, in translation, and secondary works from 19th- and 20th-century historians to explore views of Ivan; students prepare their own interpretation of Ivan and analysis of historiography in research essay.
5 units (Kollmann) not given 1995-96

30S. Introductory Seminar: Medicine, Culture, and Gender — The development and construction of modern medicine in Western Europe and the U. S. from the late 18th century to today, emphasizing how medicine shaped and was shaped by modern gender categories. How has medical knowledge interacted with other kinds of knowledge? How has medical knowledge and practice informed values and morality? What have the social, cultural, and political roles of doctors been? How has our understanding of disease changed in the last two centuries? What views and assumptions are due to medicine's history? Drawings, speeches, pamphlets, manuals, newspaper articles, oral histories, treatises, novels, and films.
5 units, Win (Watson)

31S. Introductory Seminar: The France of Louis XIV — The Annales historians' particular "menage a trois" (source, problem, technique) for transforming the past into history. Issues: the chances of escaping starvation, how people "made it" during the Old Regime, Fouquet's guilt or innocence, what mattered at the court, why peasants rebelled, how people lived their religion. Prerequisites: 1, 2, 3, or equivalent year-long survey course in European history.
5 units, Aut (Loungee) T 1:15-3:05

5 units (M. L. Roberts) not given 1995-96

39S. Introductory Seminar: Revolution and Nationalism — The Emergence of Modern Greece — Exploration of multiple visions of national identity and the nation as they were developed by the framers of the modern Greek state. The function of language, religion, culture, territoriality, education, and conceptions of history in constructing and defining the modern nation-state. Assumptions about history, historiography, and identity.
5 units, Aut (Mavromihalis) Th 1:15-3:05

49S. Introductory Seminar: Slavery in Africa — Were slaves in Africa treated the same as slaves in the New World? What consequences did Africa's trans-Atlantic slave trade have on the African institution of slavery? Evidence for slavery in Africa and how historians have used this to study the Africa and the S. Atlantic slavery systems. How historians have analyzed the volume and flow of the slave trade from Africa.
5 units, Win (Hawthorne)

56S. Introductory Seminar: Advertising and Consumer Culture in the United States — The history of modern materialism through the study of advertising. Theoretical and critical perspectives on consumption and recent historical interpretations of advertising and consumer culture in the U.S., focusing on the problems of using advertisements as sources for historical analysis.
5 units (Corn) not given 1995-96

58S. Introductory Seminar: Women in the Modern African-American Freedom Struggle — Participate in the research of the Martin Luther King, Jr. Special Project, with emphasis on the role of women.
5 units (Carson) not given 1995-96

75S. Introductory Seminar: Technology in 20th-Century America — Technology and technologi-
cal innovation have been sources of national pride and despair in 20th-century America. Ways that technology and, "technological values" have been contested in the U.S. How Americans reconcile their image of the republic as an arcadian paradise with 20th-century innovation. How American "heroes" (pioneers, military leaders, etc.) grafted onto the image of the technologists. Could a nation that glorified the individual adapt to large-scale projects? Was technology seen as a threat to or a promise for the nation's morality and economic well being? What ideas about gender, nature, power, and progress were latent in the representations of technological America?

5 units, Spr (Berlin)

77S. Introductory Seminar: Frontiers and Trans-Frontier Regions in the Americas
5 units (Wirth) not given 1995-96

85S. Introductory Seminar: Jews and Moslems — The relationship between Jews and Moslems from the earliest times to the middle of the 20th century. The religious, political, and social aspects of this evolving relationship examined through the analysis of primary documents in translation. Themes: early Islam and the Jews, the "Golden Age" in Spain, Jews in the Ottoman Empire, Jews and Moslems in the Age of Imperialism, the end of Jewish life in the lands of Islam in the 20th century. DR:2(*)

5 units, Spr (Neskar) not given 1995-96

90S. Introductory Seminar: Legends, Aristocrats, and Hero-Types — A Cultural History of Classical Japan — Japanese texts from the 8th to the 13th centuries. The practicalities of utilizing cultural texts ("historical" and "non-historical") as primary sources in historical inquiry. Key aspects of Japanese history and culture during a "golden age." Excerpts from 8th-century collections of poetry and local mythology, 10th- and 11th-century fiction (The Tale of Genji), courtier diaries, national histories, and 13-century ballads of martial history, etc.

5 units, Spr (Pflueger)

93S. Introductory Seminar: Piracy, Trade, and Diplomacy — Japan and East Asia, 1500-1900 — Commercial and diplomatic relations between especially Japan, Korea, and China from 1500-1900. Primary sources on trade, piracy, and diplomacy are analyzed and discussed.

5 units, Aut (Hellyer) Th 1:15-3:05

94S. Introductory Seminar: From Raping Nanjing to Bombing Hiroshima — Race, Gender, and Remembering the Pacific War — Modern warfare is not merely geopolitical strategy in the national interest. How were marks other than nationality deployed as weapons and identities in the 15-year War in the Pacific? Race, gender, and historical memory suggest the complexity of violence waged in the name of the nation, and the difficulties of remembering such violence in the present. Topics: U.S. propaganda films, the Rape of Nanjing, "comfort women," bombing of Hiroshima, the Tokyo War Crimes Trial, etc. Government documents, testimonies, autobiography, poetry, newspaper accounts, comic books, films, and documentaries. Visual materials in final projects.

5 units, Win (Lockyer)

96S. Searching for Self: Biographies and Autobiographies in China
5 units, Spr (Neskar) M 1:15-3:05


5 units (Mass) not given 1995-96

ADVANCED UNDERGRADUATE

100 through 199 are primarily lecture courses. The Sophomore Dialogues and Seminars Program provides opportunities for second-year students to work closely with faculty as they explore their potential or recently-declared major course of study. All Dialogues Tutorials and some Sophomore Seminars require a brief application. Refer to the Time Schedule or contact the Dialogues and Seminars office (123 Sweet Hall, telephone 415-723-4504) for applications and information.

HISTORY OF TECHNOLOGY

115. Technology and Culture in 19th-Century America — (Same as History and Philosophy of Science 121; Science, Technology, and Society 121.) Social and cultural aspects of technological change from the American Revolution through WW I. Emphasis on technologies of production and consumption (armory practice, department stores); of temporal and spatial transformation (telegraphic time signals, railroads), simulation and reproduction (photography, phonograph), and communication and control (telephone, scientific management). DR:9(5)

4-5 units, Win (Corn) TTh 10 optional section Th 4:15-6:05

EASTERN EUROPE AND RUSSIA

119. Aristocracies and Absolutism: Early Modern Eastern Europe, 1400-1800 — Societies and culture of E. Europe (Belorussia, Bolesnia, Hungary, Poland, Ukraine) in the late medieval and early modern periods. The conflict of aristocratic parliamentary governments with absolutist states (Austria, Hungary Prussia, Russia). Eastern Europe's development contrasted to the Russian historical experience. DR:9(5)

5 units, Spr (Kollmann) MTWTh 10

120B. Imperial Russia, 1700-1917 — Russian history from the abolition of serfdom to the first Soviet
five-year plan and the collectivization of agriculture. The Russian Revolution of 1917 considered in this broader context. DR:9(5)

5 units, Win (Emmons) TTh 1:15-2:45

120C. History of the Soviet Union — The Soviet polity from establishment to collapse in 1991. The transformation of imperial institutions and policies, visions and practices of revolution, social engineering, change through the transformative drives of collectivization of agriculture, industrialization, cultural revolution and terror, the experience of WW II, and the routinization of revolutionary ethos and decline in the postwar period.

5 units, Spr (Weiner) MTWTh 11

121. Russian Jewish History, 1772-1917 — The social, economic, cultural, and political trends in Russian Jewish life from the Polish partitions until the 1917 Revolution: popular and elite culture, changing family and social patterns, government attitudes toward Jews, perceptions of Jews in Russian culture, Jewish political cultures, and political radicalism. Emphasis is on regional differences and their impact on the character of Jewish life in the areas of Belorussia, Lithuania, Ukraine, etc.

5 units (Zipperstein) not given 1995-96


5 units, Aut (Naimark) MTWTh 11

MEDIEVAL AND RENAISSANCE EUROPE

109. The Age of the Renaissance — The artistic and intellectual innovations of the age in relation to the economic, social, and political institutions of Renaissance Italy. The Black Death, family life, criminality, and power relations between men and women and between different social classes. DR:9(5)

5 units, not given 1995-96

111. The Black Death and Medieval Responses to Plague: The AIDS of the 14th Century — What is the legacy of epidemic disaster? The plague that killed one-third of Europe’s population in 1348-49 and continued to haunt Europe through the 17th century. The modern experience of AIDS. How the experience of plague transformed the economy, society, thought, and practice of medicine. The impact of plague on modern thought in inspiring a history in which the major players are microbes and rats; and as metaphor (in Camus’s The Plague and Bergman’s The Seventh Seal).

5 units, Spr (Smoller) MTWTh 10

WESTERN EUROPE

127D. 20th-Century Germany — Germany’s tortured path from WW I through nazism and the Holocaust, to the fall of the Berlin Wall. Search for national identity, roots of fascism; impact of war on society, gender relations, and art. DR:9(5)

5 units, Spr (Feinstein)

130. From Enlightenment to Revolution: France in the 17th and 18th Centuries

5 units (Baker) not given 1995-96

131. European Culture and the Two World Wars — Drawing on autobiographies and memoirs, novels and poetry, painting and sculpture, plays and films, compares and contrasts artists’ responses to the experiences of traumas, defeat, exile, and occupation following in the wake of both wars.

5 units, Aut (Thompson) MWF 11

136A. European Thought and Culture in the 19th Century: From Romanticism to Modernism — Major European thinkers and intellectual movements from the Enlightenment to Modernism. Readings: Matthew Arnold, Jane Austen, Karl Marx, John Stuart Mill, Friedrich Nietzsche, Emile Zola, etc. DR:8(3)

5 units, Win (Robinson) MTWTh 10

136B. European Thought and Culture in the 20th Century: From Freud to Foucault — Important European thinkers and intellectual movements of the 20th century, from Freud to Foucault. DR:8(3)

5 units (Robinson) not given 1995-96

137. The Holocaust — (Same as 337.) The emergence of modern racism and radical antisemitism. The Nazi rise to power and the Jews. Antisemitic legislation in the 1930s. WW II and the beginning of mass killings in the East. Deportations and ghettos. The mass extermination of European Jewry. DR:9(5)

5 units, Aut (Rodrique) MW 1:15

HISTORY AND PHILOSOPHY OF SCIENCE

133. The Darwinian Revolution — (Same as History and Philosophy of Science 152; Science, Technology, and Society 130.) Conceptual developments leading to establishment of the major unifying paradigm of biological science, the theory of evolution by natural selection. Biological thought before Darwin (1800 to 1836). Voyage of the Beagle and the formation of Darwin’s thought in terms of its broader intellectual and social context. The Origin of Species. Descent of Man. Difficulties the theory had to overcome and their resolution in the union of evolutionary biology and population genetics in the 1930s and 40s. DR:9(4)

4 units, Aut (Lenoir) TTh 11-12:50

133A. The Rise of Scientific Medicine — (Same as History and Philosophy of Science 154.) Intellectual, social, and institutional dimensions of the rise
of scientific medicine in the 19th and 20th centuries. How did medicine become "scientific?" What differences did science make to the practicing physician? Why did it displace other approaches to medicine? Focus is on medicine in Europe and the U. S. 1800 to the present. Topics: development of experimental physiology, bacteriology, pharmacology, biomedical technology, nuclear medicine, biomedical imaging, computers in medicine, and prospects for bedside gene therapies; effects of scientific developments in biomedical science and technology on medical practice and therapy; the professionalization of medicine in comparative European and American contexts.

4 units, Spr (Lenoir)

138B. Undergraduate Colloquium: The Sociology of Scientific Knowledge — (Same as Anthropology 158, History and Philosophy of Science 155.) Classical problems in the sociology of knowledge as represented in the writings of Marx, Durkheim, and Mannheim. Recent work in the social construction of scientific knowledge. Emphasis on recent studies in the historical sociology of experimental science and lab practice. Using case studies and drawing on anthropological approaches in the works of Mary Douglas, Pierre Bourdieu, and others, explores a theory of practice and a critique of historically situated practical reason as the foundation of the sociology of scientific knowledge.

4 units (Staff) not given 1995-96

138D. Topics in the History of Mathematics: From Antiquity to the 17th Century — (Enroll in History and Philosophy of Science 140, Philosophy 140.)

4 units, Win (Knorr) TTh 2:15-3:30

139. Scientific Revolution — (Same as History and Philosophy of Science 145.) Philosophy and science 16th-17th centuries in Europe; the development of science from Copernicus to Newton. Emphasis is on historical and philosophical issues related to basic physical concepts (space, matter, force, inertia, etc.), celestial mechanics, scientific method, and the development of science in its social and cultural context.

4 units, Spr (Rider)

139A. History of Physics — (Same as History and Philosophy of Science 168.) Describes, analyzes, and interprets the major scientific changes which have characterized the 20th century. The introduction of the ideas of relativity, the surprising and pervasive role of quantum notions, rapidly alternating scientific fashions from nuclear physics to particle physics, from superconductivity to chaos. Emphasis on corresponding changes in sociology, demography, and the impact on philosophy and the changed role of physics in the 20th century.

3-5 units (Staff) not given 1995-96

BRITAIN

141. Yorkist and Tudor England — The Making of a Modern State — The transition from the late medieval realm to the Renaissance monarchy, Henry VIII, the English Reformation, and the new conservatism of the Elizabethan regime. DR:8(3)

5 units, Aut (Seaver) MTWTh 10

142. Revolutionary England, 1603-1689 — DR:9(5)

5 units (Seaver) not given 1995-96

144. Britain, 1688-1830 — DR:9(5)

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

145. 20th-Century Britain — Political development, the evolution of urban society and Britain's changing worldwide role. Topics: the impact of mass democracy, the effects of the two World Wars, the development of the welfare state, and recent challenges to the post-war consensus. Themes are a background against changing social relationships, standards of living, and popular culture. DR:9(5)

5 units, Spr (Tyack) MTWTh 11
AFRICA

148. Introduction to African History — African history from the discovery of early humans in E. Africa to the 1990s. Geared to students who want to master basics of Africa's past while engaging more advanced analysis. Films, novels, autobiographies, slides, readings. DR:2(*)
   5 units Aut (Jackson) MTWTh 9

148C. Africa in the 20th Century — DR:2(*)
   5 units, Spr (R. Roberts) MTWTh 10

149. Africa since 1935 — The Fascist Italian occupation of Ethiopia in 1935, the growth of African nationalism, and the coming of WWII. The dynamics of this period, with highlights from the 1980s.
   5 units (Jackson) not given 1995-96

149A. East Africa in History — Kenya, Uganda, Tanzania, Ethiopia, and Mozambique have had a rich, varied, and tumultuous history. Their history, culture, politics, and future prospects, beginning with earliest human communities.
   5 units (Jackson) not given 1995-96

THE UNITED STATES

152. Introduction to Material Culture: The History of the Built Environment — (Same as American Studies 152.) American history through the evidence of things, e.g., spaces, buildings, and landscapes of the "built environment." How to "read" such artifacts using methods and theories from anthropology, cultural geography, history, and other disciplines.
   5 units, Spr (J. Corn) TTh 1:15-3:05

154. Peace Studies — (Same as Political Science 133, Psychology 142, Education 173X.) Interdisciplinary, dealing with the challenges of pursuing peace in a world where the sources of conflict are many and regional, ethnic, and religious antagonisms are rising. The art of creating and maintaining peace is analyzed from historical, social, psychological, and moral perspectives. Goals: to illustrate the current and potential contributions of various academic disciplines and critical analyses to the study of peace; and to prepare students to think critically and to act responsibly and effectively on behalf of peace. Eight sections: challenges, enemies, theoretical understandings, justice, security, non-violence, public peace processes, peace and you.
   5 units, Spr (Bland, Dreikmeier, Holloway, Moses, Noddings, Ross) MTWTh 1:15
   and by arrangement

   5 units, Aut (Carson) MTWTh 10

158. History of Education in the United States — (Same as Education 201.) Analysis of selected turning points in education in relation to religion, political socialization, race relations, gender, immigration, and urbanization.
   3 units, Win (Tyack)

158B. American Education and Public Policy — (Same as Education 105.) Treats policy issues in education, drawing on history and political science. Who influences schooling and how? How have American schools responded to human diversity? What consequences does schooling have? What are the prospects for reform in public education? Lectures and small group discussions.
   3 units, Aut (Kirst, Tyack) MW 2:15

159. Introduction to Asian American History — The historical experience of people of Asian ancestry in the U.S. Immigration, labor, community formation, family, culture and identity, and contemporary social and political controversies. Readings: interpretative texts, primary material, and historical fiction. Lectures and discussion. DR:3
   4-5 units, Win (Chang) MTWTh 10

164. Introduction to Race and Ethnicity in the American Experience — (Same as American Studies 164.) How race and ethnicity have influenced the American experience and how prevailing attitudes about racial and ethnic groups over time have affected the historical and contemporary reality of the nation's major minority populations. Focuses on the past two centuries. DR:3
   5 units, Aut (Camarillo, Fredrickson) MTWTh 11-12:15

165A,B,C. United States History from the Revolution to the Present — General sequence emphasizing political, social, and institutional history. Provides a broad foundation in U.S. history on which to base further work in history, literature, economics, political science, religious studies, art history, etc. Three parts form an integrated whole; any portion may be taken independently. Recommended as a prerequisite for advanced work in American history.

165A. Colonial and Revolutionary America — In alternate years, emphasis is on the development of American society prior to the revolution, or on the political and social history of the Revolutionary era (1995-96).
   5 units, Aut (Rakove) MTWThF 9

165B. 19th-Century America
   5 units, Win (Fredrickson) MWF 11

165C. The United States in the 20th-Century: Great Issues and Problems — The major political, economic, social, and diplomatic developments in the U.S. since the end of the 19th century. Themes: debates over the proper economic and social role of government (the Progressive, New Deal, Great Society, and Reagan-Bush eras); ethnic and racial minorities in American society (during periods of mass immigration at the turn of the century and since 1965, and in the civil rights era of the 1950s
and 60s); the changing status of women (since WW II); shifting ideological bases, institutional structures, and electoral characteristics of the political system (the New Deal and post-Vietnam eras); and the determinants of U.S. foreign policy (in WW I, WW II, and the Cold War). DR:3 or 9(5)
5 units, Spr (Camarillo) MTWTh 11

166. History of Higher Education in the U.S. — (Same as 366.) From the founding of Harvard in 1636 to the present, with emphasis on institutional development, governance, and evolving purposes and clientele.
3-5 units (Lyman) not given 1995-96

172A. America since 1945 — Analyzes foreign policy and politics, and deals with social themes and intellectual history. DR:9(5)
4-5 units (Bernstein) not given 1995-96

173B. U.S. Women's History, 1820-1980 — The transformation of Victorian womanhood in the late 19th century, including the workforce participation of immigrant and black women and the educational and professional opportunities for middle-class white women, the impact of wars and depression on 20th-century women's lives, and the rebirth of feminism. DR:9f(5)
5 units (Freedman) not given 1995-96

173C. Introduction to Feminist Studies — (Same as Feminist Studies 101.) How gender inequality is created and perpetuated, and when feminist theory and movements emerge to respond to gender inequality. Topics: theories of inequality; history of feminism; international and multi-cultural perspectives on feminism; women's work, health, and sexuality; creativity, spirituality, and movements for social change. DR:9f(5)
5 units, Aut (Freedman) MW 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 (Stahl) MTWTh 10

179. History of Mexico — Mexican history from the 16th-century Spanish conquest through troubled nationhood in the 19th and 20th centuries, emphasizing the interaction between indigenous and Iberian cultures and then on Mexican efforts, with political independence, to come to terms with the industrialized world while retaining national autonomy. DR:9(5)
5 units (Bowser) not given 1995-96

180. 20th-Century Brazil — (Same as Latin American Studies 121.) Brazil is a continent-sized nation whose multi-ethnic society is at a crossroad as to how to achieve economic growth with social and regional equity, in an era of trading blocs. Brazilian efforts come to terms with its long colonial history based on export agriculture, slavery, and extractive industries, while developing an urban-based, industrial society. The Empire's demise in 1989, Brazil's rise as a middle range economic power, and the development of a dynamic national culture.
5 units, Spr (Wirth) MTW 9

MIDDLE EAST

5 units, Spr (Zipperstein) T WTh 10

185. Introduction to Islamic Civilization — Introduction to the societies and cultures in which Islam has been the dominant religious tradition, focusing on the Middle East. Topics: the faith of Islam; the career of the prophet Muhammad; Islamic political theory; Islamic law; Islamic philosophy and science; relations among Islam, Christianity, and Judaism; modern currents in Islam. DR:2(*)
5 units (Beinin) not given 1995-96

186A. Modern India: History, Society, Cultures — (Same as Anthropology 120.) Surveys Asia, concentrating on the period after the 16th century. The relationship between geography and society, economic activities, communal organization, religious, intellectual, and social life of Jews in medieval societies from the beginnings of Jewish settlement into the 16th cen-
tury, in Christendom, and under Islam. Rabbinic culture and medieval Jewish philosophy, Jewish self-perceptions and attitudes to non-Jews, Jewish-Christian polemics, Church attitudes and policies to the Jews, antisemitism, expulsion and anti-Jewish violence.

DR:9(5)
5 units (Rodrigue) not given 1995-96

188C. Jews in the Modern World — Jewish history in the modern period. Possible themes: the fundamental restructuring of all aspects of Jewish existence under the impact of the Enlightenment and legal emancipation at the end of the 18th century in Western Europe, the transformation of Jewish life in Eastern Europe under the authoritarian Russian regime, the experience of colonialism in the Sephardi world, and the range of new ideologies (Reform Judaism and various Jewish nationalisms), the persistence and renewal of antisemitism, the destruction of European Jewry under the Nazis, the rise of new Jewish centers in the U.S., and the emergence of the State of Israel.

DR:9(5)
5 units, Win (Zipperstein) TWTh 9

189A. Israel: 1880 to the Present — The beginnings of the Zionist Movement, the establishment of the State of Israel, and the development of Israeli society, culture, and politics. Analysis of the ideologies and institutionalization of the Zionist movement and Jewish nationalism in its various forms; Ottoman and Mandate Palestine and the growth of the Jewish settlement there, including social experimentation, relationships with the Palestinians and their responses to Zionism; the revolt against the British. Israel since independence; its institutions, international relations, and relations with Jewish communities outside of Israel.

DR:2(*)
5 units, Aut (Mancall) MTWTh 9

EAST ASIA

190. The United States and China in the 20th Century
5 units, Aut (Hayford) MTWTh 10

192A. Chinese History from the Earliest Times to the 9th Century — DR:2(*)
5 units, Win (Neskar) MTWThF 11

192B. Chinese History from the Mongols to the 19th Century — From the late Tang to the Taiping Rebellion. Emphasis on socio-economic rather than the political history to expose students to a sophisticated society very different than their own. Recommended: 192A. DR:2(*)
5 units, Aut (Kahn) MTWThF 11

192C. Modern China, 19th and 20th Century — The social and political setting from about 1800 to 1911 and the overthrow of the last imperial dynasty, the Republican period to 1949, and the Peoples’ Republic of China to the present. Structured around political history. Attention to social, economic, and cultural currents. Recommended: 192A, 192B, or Political Science 115.

DR:2(*)
5 units, Spr (Hayford) MTWTh 11

194A. Early and Medieval Japan to 1500 — Pre-historic origins of the people and culture, emergence of the first polity, Chinese influences, flowering of the native culture, the samurai, and feudal government.

DR:2(*)
5 units (Mass) not given 1995-96

194B. Late Medieval and Early Modern Japan — From the Warring States Period to the establishment and rise of the last Shogunal house, the Tokugawa. The social, religious, and political contours of the age.

DR:2(*)
5 units, Aut (Eskildsen) MTWThF 10

194C. History of Japan, the 19th Century
5 units, Win (Duus, Eskildsen) MTWTh 1:15

194D. The Rise of Modern Japan — Japanese history from 1840 to the present. Topics: the Meiji Restoration and its background, building a modern state, industrialization of the economy, the emergence of an imperialist power, the reorientation of postwar Japan, and the “economic miracle.” Socio-economic change and political developments.

DR:2(*)
5 units, Spr (Duus) MTWThF 1:15

UNDERGRADUATE COLLOQUIA AND RESEARCH SEMINARS

Colloquia consist of reading and discussion on specific historical themes. Short papers, reports, historiographical essays, and a final exam may be required. In all cases, colloquia are designed to examine issues of historical interpretation. Oral presentations are encouraged.

Undergraduate research seminars provide students with opportunities to conduct research using primary documents, engage in historiographical debate, or to interpret major historical events. Seminars may be offered for one or two quarters and they may be combined with a colloquium. In all cases, students write preliminary drafts of their research findings, present oral reports, and revise their papers.

Courses 200 through 299 are primarily for juniors and seniors majoring in history. Admission to seminars and colloquia is by consent of the instructor.

200A,B,C. Senior Honors
units by arrangement (Staff)

200D,E. Senior Research I and II
3-5 units (Staff)

200F. Senior Research III
5 units (Staff)

200H. History Honors Colloquium
3 units, Spr (Rakove)
Western powers, and dominant Western portrayals of Islam, Arabs, and the Middle East.

5 units (Beinin) not given 1995-96

204E. Sophomore Seminar: Race and Region in the American Past — Examination of comparative ethnic and racial group histories and exploration of the similarities and differences which characterize American race relations especially during the 19th and 20th centuries.

3-5 units, Aut (Camarillo) Th 2:15-4:05

204F. Sophomore Seminar: The Black Panther Party — Despite the Panther Party’s notorious during the 1960s and ’70s, the organization has received scant scholarly attention. Students can make a major contribution to the state of historical knowledge in this field because of the accessibility of many previously unavailable documentary sources.

5 units, Aut (Carson) M 2:15-4:05

204G. Sophomore Seminar: Who Are Jews? — The fluidity of identity in the 20th century. How Jews have understood themselves. Novels and analytic texts with an autobiographical underpinning. Discussions on how these texts illuminate the various, conflicting meanings of acculturation, assimilation, attachment, class, gender, religion and community.

5 units, Aut (Weiner) Th 1:15-3:05

204H. Sophomore Seminar: Singapore — Multiculturalism, Development, and Democracy — Singapore is a complex multi-cultural and multi-class society, a successful experiment in social and economic planning and welfare statism, a primary example of the “Asian Miracle.” It is now beginning to wrestle with problems of political structure and process, with the definition of its regional and global roles, and with its identity as a nation, a state, or a nation-state. Questions concerning development and the social, economic and cultural order and the political process. Reading includes biographies, examples of Singaporean social and political discourse, history, and literature.

5 units, Spr (Mancall) M 1:15-3:05

205A. Undergraduate Colloquium: Private Lives — Public Stories — Autobiographies and other sources. The changing contexts of women’s lives and the way women’s actions have shaped and responded to those contexts. DR:9f(5)

5 units, Spr (Lounge)

206S. Undergraduate Colloquium: The Churches and Kingdoms — Secular and Ecclesiastical Powers in Conflict and Dialogue — Open to advanced majors or by the consent of the instructor. Focus is on the cosmic issue of “Church and State” and how to translate it into “religion and politics.” Also, the mundane routine interaction between clergy and lay rulers. The Roman papacy, religious criticism and hallowing of government, the so-called “Gregorian reform” and its effects, the place of ecclesiastical
lordship in the world of the secular aristocracy.

5 units (Buc) not given 1995-96

207. Undergraduate Colloquium: Topics in Comparative Women’s History—Women and religion, sexuality and reproduction, women’s work, politics, colonialism, and feminism in Europe, the U.S., and part of Latin America and Africa. DR:9s5(5)

5 units (Freedman) not given 1995-96

210A Undergraduate Colloquium: The Language of Politics in the Middle Ages—The different methods through which political theory was articulated and communicated and a culture of politics created: language proper, and its grammar (as elaborated in biblical exegesis and used in other mediuns), gestures (and the theory of gestuality), royal proclamations, rituals (peace-making and conflict-resolution, royal funerals, advents, and coronations) and iconography.

5 units (Buc) not given 1995-96

211. Undergraduate Colloquium: Body, Gender, and Society in Medieval Europe—(Same as 311.) Secondary sources (historical, literary, theological, and anthropological studies). Issues: transformations in representations of the body, gender, sexuality, and in women’s place in society (or social representation) in Western Europe between the 3rd and 14th century. Were these processes related with one another and with social changes? Analytically straddle the realm between bodification of spiritual powers and control (or manipulation) of the body in society, from the cult of relics to asceticism. DR:9s5(5)

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

212. Undergraduate Colloquium: Homosexuals, Heretics, Witches, and Werewolves—Deviants in Medieval Society—(Same as 312.) Why were medieval heretics accused of deviant sexual practices? Who were the internal enemies of Christendom, real and imagined? What were Europeans afraid of? Examines the transformation of the persecuted Christians into a “persecuting society” by looking at heretical movements of the later Middle Ages, and real and imagined “deviants” (Jews, witches, werewolves, the Templars, and homosexuals).

5 units, Win (Smoller) W 1:15-3:05

214. Undergraduate Colloquium: Magic, Science, and the Occult in Medieval and Renaissance Europe—(Same as 314.) Horoscopes, gem stones, love potions, incantations. Were these magical tools or the reasonable application of medieval scientific thought? The relationship between magic and science in medieval and Renaissance Europe. Why were magic and science linked? How did people distinguish between good, permitted magic and bad, illicit magic? Was the church responsible for a rise of magic in the Middle Ages? How did people eventually distinguish between the scientific and the magical or occult? Selected primary sources are compared with modern interpretations of medieval and Renaissance astrology, alchemy, “natural” magic, witchcraft, invocation of spirits, and magical tales of chivalry and romance.

5 units, Aut (Smoller) T 1:15-3:05

221S. Undergraduate Research Seminar: War-time and Postwar Poland—The problems of German and Soviet occupation. Polish resistance during the war, and dilemmas of Polish politics, the end of the war and beginning of peace. The relationship between social changes and political movements. The complex nationality issues involving Germans, Jews, Poles, Russians, and Ukrainians.

5 units (Naimark) not given 1995-96

222A. Undergraduate Colloquium: National Identities in 20th-Century Ukraine—(Same as 322A.) The evolution and interaction between various national identities of stateless Ukrainian populations throughout the century until Ukraine reached statehood in 1991. Focus is on the core of the Ukrainian population, the Soviet Union, and Ukrainian populations in Poland, Czechoslovakia, Romania, and Hungary. Ethnic, regional, and political visions of national identities, the emergence of mass political movements and the rise of radical ideologies and regimes, the experience of mass political movements and the rise of radical ideologies and regimes, the experience of World War II and the unification of Ukrainian land and people, and the struggle for definitive national myths to the present.

5 units, Win (Weiner)

222S. Undergraduate Colloquium: Ethnic Cleansing in 20th-Century Europe

5 units, Spr (Naimark) T 2:15-4:05

223. Undergraduate Colloquium: Comparative Early Modern Nobilities: Russia, Poland, 19th and 20th Century

5 units (Kollmann) not given 1995-96

224. Undergraduate Colloquium: Stalinism in Eastern Europe—The origins and history of Stalinism in Eastern Europe. The ways E. European countries have confronted the Stalinist past. Readings focus on historical and literary representations of Stalinist theory and practice.

5 units (Naimark) not given 1995-96

225S. Undergraduate Research Seminar: Law and Society in Early Modern Russia

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

226. Undergraduate Colloquium: Problems in Soviet History and Historiography—Social and political transformation in the history of the Soviet Union (1917-1991). How that system was founded, evolved, and declined. The multiplicity of views by historians and social scientists and the variety of approaches used to analyze the character of the U.S.S.R.

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

228. Undergraduate Colloquium: Nazi Germany—Hitler’s Third Reich provides a paradigm for evil. The Nazis rise to power, social and cultural
developments leading to the Holocaust. Racial ideology, accommodation and resistance, the experience of women, science, aesthetics, current debates.

5 units, Win (Feinstein) T 1:15-3:05

228S. Undergraduate Research Seminar: War and Society in the 20th Century — Research paper on some problem in the relationship between modern wars and their social setting.

5 units (Sheehan) not given 1995-96

231A. Undergraduate Colloquium: Technology, State, and Social Order in Modern France — Intellectual, political, social, and cultural history of technocratic ideologies from the late 18th century to the present. How ideas of technological grandeur and prowess have molded the development of French national identity. Topics: Fourierism, state engineering, industrial work, large-scale technological development, and popular narratives of technological change.

5 units, Aut (Hecht) Th 1:15-3:05

231B. Undergraduate Colloquium: The French Revolutionary Tradition, 1789-1870 — What is a “revolutionary tradition?” Is it the political litany of canonical events (1789-1792-1830-1848-1870), the birth of Left, Right and a “modern political culture?” Is it simply an oxymoron? Political practices which emerged in the decade after 1789, and 19th-century appropriations and rejections (ideological, religious, symbolic) of this heritage. Secondary sources, novels and autobiographies, and selected films. Emphasis on 1789-1875, readings on the politics of commemoration and Bicentennial disputes. Is the French Revolution really over?

5 units, Spr (Zizek)

231S. Undergraduate Research Seminar: French Political Culture, 1700-1850

5 units (Baker) not given 1995-96

232A. Undergraduate Colloquium: France During WW II

5 units (Rodrigue) not given 1995-96

232S. Undergraduate Research Seminar: Rousseau

5 units (Baker) not given 1995-96

234A. Undergraduate Colloquium: Technology in 20th-Century America and Europe — (Same as History and Philosophy of Science 122; Science, Technology, and Society 122.) The history of 20th-century western technology. Topics: the rise of the engineering profession, labor and technological change, gender and technology, the emergence of technocratic ideologies, and the rise of large-scale technological systems.

5 units (Hecht) not given 1995-96

235A. Undergraduate Colloquium: Art and Society in 19th-Century Europe

5 units (Sheehan) not given 1995-96

235B. Paris and London, 1790-1990 — With the social and architectural histories of the two cities as background, this examines the relationship between social change and cultural innovation over the period.

5 units, Win (Thompson) W 1:15-3:05

236. Undergraduate Colloquium: The End of Europe

5 units, Spr (Lougee) Th 1:15-3:05

237B. Undergraduate Colloquium: Culture and Society in the European Enlightenment, 1715-1789 — 18th-century critical idioms (reason, public opinion, sociability, civilization) in their varied cultural, social, and national contexts. Topics: the meaning of “Enlightenment,” theories of knowledge and their application (Encyclopedism), salons and gendered sociability, print culture and its contents, modernity and Revolution. Secondary works, readings from Montesquieu, Voltaire, Diderot, Rousseau, Chesterfield, Hume, Kant and Lessing.

5 units, Win (Zizek)


5 units (Robinson) not given 1995-96

239. Europe 1880-1918: The Fin de Siecle and the Great War — (Same as Humanities 191R.) The period from 1880-1914 represents transition from an optimistic, naive age to one that knew moral relativism, total war, and material comfort and great genius. Through art, fiction, autobiography, psychology and cultural history, how the “age of innocence” ended and the 20th century began.

5 units, Aut (Roberts) MW 11-12:50

239A. Undergraduate Colloquium: Culture and Politics of Europe, 1945-1989 — Europe’s struggle to define itself after the shock and dislocations of two world wars. Cultural parameters of social and political change across nations and regions: Cold War, the Sixties, gender relations, decolonization and immigration, Europe on economic integration, right-wing extremism, and the fall of the Berlin Wall.

5 units, Win (Feinstein)

239S. Undergraduate Research Seminar: The Nuclear Age

5 units (Robinson) not given 1995-96

240. Undergraduate Colloquium: Shakespeare’s London — The Social and Cultural Consequences of Growth — Between 1500 and 1700 London grew from a late medieval town of 50-60,000 to a metropolis of more than 500,000, the largest city in Western Europe. The problems such unprecedented growth generated, ranging from Crown attempts to limit and control growth to the city magistrates’
measures to meet the needs of the growing number of the poor and the sick. The official image the city presented in its Lord Mayor’s shows and the image of urban life presented in the new popular theater.

5 units, Spr (Seaver) Th 1:15-3:05

241S. Undergraduate Research Seminar: From Reformation to Revolution in Early Modern England — Sources for England from 16th-century Protestant Reformation to the civil wars and revolution in the mid-17th century are unusually rich. The types of records (private diaries and letters to the official proclamations, and state papers) define the question that shapes the investigation. Critiques of a draft of the research paper.

5 units, Aut (Seaver) Th 1:15-3:05

242S. Undergraduate Research Seminar: Texts and British Society, 1750-1950 — Students choose a British text, artifact, or picture from the Stanford collections from a preslected list and discover British society by writing about it.

5 units (Stansky) not given 1995-96

246A. Undergraduate Colloquium: African History and African Novel

5 units (Jackson) not given 1995-96

246B. Undergraduate Colloquium: Mau-Mau Uprising — Kenya in 1950s

5 units (Jackson) not given 1995-96

246S. Undergraduate Research Seminar: East Africa in Transition — 1880s-1920s

5 units (Jackson) not given 1995-96

247. Greater Eas' Africa and its Historical Writing — (Same as 347.) Greater E. Africa contains Kenya, Tanzania, Uganda, Ethiopia, parts of Zaire, and Mozambique. From this area has come a dynamic historical literature (especially about women, the colonial period, and the purpose of history).

5 units, Spr (Jackson) Th 3:15-5:05


3-5 units (R. Roberts) not given 1995-96

247S. Undergraduate Research Seminar: Fieldwork in Africa — Oral History, Life, and Family History — (Same as 447A.) Oral histories in Africa and how they can be assembled in field research, with emphasis on women’s history.

5 units (Jackson) not given 1995-96

248. Undergraduate Colloquium: Popular Culture in Africa — African culture rarely appears in historical research. The classics in this field; case studies such as the role of the griot, women as diviners and seers, Euro-African dress and fashion, the image of Europeans in Africa, highlife music in Ghana, emblems in the Mau Mau rebellion, etc.

5 units (Jackson) not given 1995-96

248A. End of Slavery: Africa and the Americas — (Same as 348A.) Comparative social history of the end of slavery in the Caribbean, the American South, and Africa. Interpretations of the social transformations. Topics: motivations for abolition of slavery, meanings of freedom in different societies, and processes of adaption to new political economies of work.

5 units, Aut (Roberts) Th 3:15-5:30

248D. Law and Colonialism in Africa — (Same as 348D.) Law in colonial Africa provides an opportunity to examine the meanings of social, cultural, and economic change in the anthropological, legal, and historical approaches. Court cases as a new frontier for the social history of Africa. Topics: meanings of conflicts over marriage, divorce, inheritance, property, and authority.

5 units, Spr (Roberts) Th 2:15-5:05

2488. Undergraduate Research Seminar: Colonial States and Societies in Africa — (Same as 448A.)

10 units (R. Roberts) not given 1995-96

249. Undergraduate Colloquium: Religions, Cultures, and History in West Africa and the African Americas — The shared cultural and historical experience of W. Africans and Africans in the Americas, with religion as a site of cultural production. Focus is on W. and W. Central Africa, African Caribbean and Brazil, and African N. America, emphasizing the historical experience of the slave trade and diaspora. Part of a collaborative Bay Area exploration of linkages between Africa and the African Americas.

1, 3, or 5 units (R. Roberts) not given 1995-96


5 units, Aut (Jackson, Leben) TTh 1:15-3:05

250A. Undergraduate Colloquium: The Constitution in American Politics — Ideas of rights in American constitutionalism from the 17th century to the present. Topics: the English Declaration of Rights of 1689, the framing of the Revolutionary bills of rights of 1776 and 1789, the 14th Amendment, and the contemporary "rights revolution" and the debate over the virtues and vices of "rights-talk." The problem of ascertaining “the original meaning” of particular rights, including the 1st, 2nd, 9th, and 14th Amendments.

5 units (Rakove) not given 1995-96

251A. Undergraduate Colloquium: Poverty and Homelessness — Students participate in an interni-
ship with the Emergency Housing Consortium, the primary agency providing shelter for homeless people in Santa Clara and San Mateo counties, while learning about homelessness and poverty through required readings/discussions. Must interview with the instructor before enrolling.

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

252S. Undergraduate Research Seminar: Museums and History — How museums and historic sites have interpreted the past. History of museums, relationship of academic scholarship to popular exhibition, the politics of public memory, and the effect of museum display on the meaning of objects. Required field trips.

5 units, Aut (J. Corn) W 1:15-3:05 Th 1-5

253S. Undergraduate Research Seminar: Museum Practicum — Supervised curatorial work on exhibition at local museum. Prerequisites: 252S or equivalent, and consent of instructor.

1-3 units (J. Corn) not given 1995-96

254S. Undergraduate Research Seminar: U.S. Women's History — For History or Feminist Studies majors only. Students learn bibliographic, research, and writing skills through the study of 20th-century women's reform efforts, utilizing primary sources available in Green Library and culminating in a substantial research paper. Prerequisite: at least one U.S. history course, consent of instructor. Recommended: 173B.

5 units (Freedman) not given 1995-96

258. Undergraduate Colloquium: Modern America in Historical Perspective — The historical background, present character, and public implication of the status of women, race and race relations, ethnicity, the condition of the family, poverty, and current political culture. Prerequisites: 165C or equivalent, and consent of instructor.

5 units (Kennedy) not given 1995-96

259. Undergraduate Colloquium: Black and White in the United States and South Africa — (Same as 359.) The comparative history of black-white relations in the U.S. and S. Africa. Topics: white racist ideologic patterns of segregation, Ethnialism, Pan-Africanism and the Garvey Movement, nonviolent protest, and Black Power/Black consciousness. Prerequisite: 157 or 164, or equivalent.

5 units, Spr (Fredrickson)

259S. Undergraduate Research Seminar: The United States and the Vietnam War

5 units, Aut (Chang) TTh 1:15-4:05

260A. Undergraduate Colloquium: Perspectives on American Identity — (Enroll in American Studies 200.)

5 units, Win (Solomon) Spr (Gillam)

261. Undergraduate Colloquium: Nuclear Weapons — Theories and History — (Same as Political Science 246.) Case studies involving nuclear weapons and related international relations theory.

5 units (Bernstein, Holloway) not given 1995-96

262S. Undergraduate Research Seminar: Science and High Technology in Silicon Valley, 1930-1980 — Technological, political, economic, and spatial dimensions of the rise of Silicon Valley from the 1930s to the early 1980s. How did Silicon Valley arise? What sustained its growth? How did it function? How did it evolve? Archival research and oral history. Focus is on radiotubes, microwave devices, semiconductors, and computers; economies of skills; university-industry relations; political dissent and the counterculture; and the technoscientific policies of the Cold War state. Comparison with Route 128.

5 units, Spr (Lenoir) W 1:15-4:05

263. Undergraduate Colloquium: The Implications of Print in Early America — How transformations in the practices of reading, writing, and printing 1750-1850 functioned as forces and symbols of change in American life, including national politics, gender construction, race relations, and the economy.

5 units, Spr (Henkin)

263A. Undergraduate Colloquium: The Automobile Industry in 20th-Century America — (Same as Science, Technology, and Society 221.) Examines one of the nation's major industries from the perspective of its products, workers, and wide-ranging influences. Topics: origins and consequences of the industry's geographical concentration in Michigan; evolution of assembly line work and other forms of automotive labor; influence of automobiles on the built and natural environments; cars and government regulation; and recent challenges to the industry stemming from technological change, foreign competition, and environmentalism.

5 units, Aut (J. Corn) TTh 1:15-3:05

264S. Undergraduate Research Seminar: The Papers of Martin Luther King, Jr. and the Modern Civil Rights Movement — Supervised research projects using the resources of the King Papers Project at Stanford.

5 units (Carson) not given 1995-96

265. Undergraduate Colloquium: New Research in Asian American History — (Same as 365.)

5 units, Spr (Chang) W Th 1:15-3:05

265S. Undergraduate Research Seminar: Asian-American History — (Same as 465.) For undergraduate and graduate students with course work or self-study in Asian-American history. Selected topics, research, and independent writing. Readings of secondary and primary material, research exercises,
of cultural self-definition, class struggle, or coming, casual sex, or going to the theater) become sites of leisure activities (spectator sports, drinking, dancing, popular culture; representation of the city; race, ethnic, and class relations.

5 units (Sawislak) not given 1995-96

266. Undergraduate Colloquium: The Historical Study of Cities — How do historians portray and interpret the modern city? Historical accounts of urban growth, politics, social life, and spatial change in 19th- and 20th-century European and American cities. Topics: neighborhood formation; housing; municipal policy and finance; public health; city planning and urban form; popular culture; representation of the city; race, ethnic, and class relations.

5 units (Sawislak) not given 1995-96

267S. Undergraduate Research Seminar: American Migrations — Research and write an original study of one (or more) of the following: European or Asian immigration to the U.S. in the 19th and early 20th centuries; black migration out of the American South in the 20th century, especially during and after WW II; the “newest immigration” since 1965. Prerequisites: 165B, 165C, senior standing, and consent of instructor.

5 units (Kennedy) not given 1995-96

268S. Undergraduate Research Seminar: Politics and Political Ideas, 1760-1803 — Topics in the political and constitutional thought of the Revolutionary era, including the problems of recovering the “original meaning” of the Constitution.

5 units (Rakove) not given 1995-96

271. Undergraduate Colloquium: The History of American Indians Since 1934 — Native Americans from the passage of the Indian Reorganization Act in 1934 to the present. Topics: sovereignty, tribal governance, termination and relocation, AIM, the experiences of women, religious freedom, and self-determination.

5 units, Aut (Benson) W 3:15-5:05

274A. Undergraduate Colloquium: Body Works — Medicine, Technology, and the Body in Late 20th-Century America — (Same as History and Philosophy of Science 153/253; Science, Technology, and Society 253.)

5 units, Win (Lenoir)

275. Labor and Leisure in 19th-Century Urban America — Changing patterns of and attitudes toward work, rest, and play in the 19th century, especially in northern cities. How did industrialization and the reorganization of labor transform work for Americans of different genders, races, ethnicities, classes, and occupational status? To what extent and on what grounds did Americans turn work into an ennobling activity? How did “leisure” emerge as a distinct category of time or experience? How did leisure activities (spectator sports, drinking, dancing, casual sex, or going to the theater) become sites of cultural self-definition, class struggle, or commercial exploitation?

5 units, Win (Henkin)

276. Undergraduate Colloquium: The Creation of North America — Open to graduate students, responding to rapid changes in the world economy, Canada, the U.S., and Mexico are moving toward a free trade bloc while developing common interests in a shared regional space. This convergence is transforming relations between three sovereign states, each with its distinct political system, its own national history, cultures, and identities. The historical origins of the convergence, from the clash of European empires and native societies, to the development of viable nation states in Canada and Mexico as influenced by the American Civil War and the intersecting of frontiers and railroads, and the effects of WW II through the movement of peoples and development of complex identities today.

5 units, Spr (Wirth) T 3:15-5:05

277A. Undergraduate Colloquium: Ethnicity, Class, and Identity in Latin America — (Same as Latin American Studies 280.) The concept of ethnicity in Spanish American thought and action beginning with the conquest of the Indian population and the introduction of African slavery; the relationship between ethnic classification and the class structure within the context of miscegenation and economic development, and the emerging sense of Spanish American uniqueness in the 19th and 20th centuries, a period of political independence, the abolition of slavery, “scientific” racial theory as an explanation for underdevelopment, and (in some areas) a celebration of ethnic diversity.

5 units (Bowser) not given 1995-96

277S. Undergraduate Research Seminar: Ethnicity, Class, and Identity in Latin America — (Same as Latin American Studies 280.) Student selected research topics based on the historiographical discussions conducted in 277A. Prerequisite: 277A.

5 units (Bowser) not given 1995-96

278. Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America — (Same as Latin American Studies 183.) The methods and approaches of economic history. Emphasis is on the critical analysis of scholar studies of issues in Latin American economic growth addressed by economic historians, including the creation of national transport systems, the growth of industry, the economics of slavery, and the long term effects of export oriented growth.

5 units, Aut (Stahl)

280. Undergraduate Colloquium: Modern Mexico — Interdisciplinary analysis of Mexico since the Revolution of 1910. Studies of political economy written by historians, economists, anthropologists, and novelists. Prerequisite: consent of instructor in prior quarter. Recommended: prior study of Latin American history, politics, or economic development.

5 units (Haber) not given 1995-96
281A. Undergraduate Colloquium: Environmental History of the Americas—(Same as 381A.)
5 units, Win (Wirth) T 3:15-5:05

282. Undergraduate Colloquium: The Agrarian Origins of Underdevelopment in Latin America—(Same as Latin American Studies 187.) Introduction to the study of Latin American agrarian economic history. The relationship between the productive organization of agriculture and long run economic growth, focusing on Bolivia and Mexico during the 18th and 19th centuries. Works written by development economists, social historians, and economic historians. Prerequisite: consent of instructor during prior quarter.
5 units (Haber) not given 1995-96

283A. Undergraduate Colloquium: Slavery and Race Relations in the Americas—(Same as Latin American Studies 181.) Comparative economic and social history of Latin American and N. American slavery, 16th-19th centuries.
5 units, Win (Klein) W 3:15-5:05

285A. Undergraduate Colloquium: National Identity in Israel—The development of national identity in Israel from 1880 to the present. Focus is on literature and the arts as an instrument for examining national identity and as a means for creating it. Topics: theories of identity in general, the creation of national identity in new states, and Jewish/Israeli identity in particular; debates within particular historical events and changes in national self-identification.
5 units (Mancall) not given 1995-96

286. Undergraduate Colloquium: Economic and Social History of the Modern Middle East—The integration of the Middle East into the world capitalist market on a subordinate basis and the impact on economic development, class formation, and politics. Alternative theoretical perspectives on the rise and expansion of the international capitalist market are combined with possible case studies of Egypt, Iraq, and Palestine.
5 units (Beinin) not given 1995-96

287A. Undergraduate Colloquium: Modern Jewish Identity—DR:9†(5)
5 units, Spr (Rodrique) M 1:15-3:05

287S. Undergraduate Research Seminar: Topics in the Modern History of Egypt, Palestine, and Israel—(Same as 487.) Student-selected research topics with guided historiographical reading and discussions as an introduction.
5 units, Aut (Beinin) Th 1:15-3:05

288. Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict—(Same as 388.) The Palestine-Zionist conflict from 1882 to the present through reading and comparing representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948.
3 units, Spr (Blecher)

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, WW I, and the collapse of the Ottoman Empire.
DR:2(*)
5 units (Rodrique) not given 1995-96

289B. Undergraduate Colloquium: Zionism and Its Critics—The major texts produced by the Zionist movement, emphasizing its early years between the 1880s and the 1917 Balfour Declaration. As one of a range of forces in Jewish politics in these years, and later, Zionism was subjected to sustained scrutiny (by orthodox Jews, liberals, socialists, etc.). The movement and the criticisms engendered by it, within and beyond the Jewish world, especially in pre-state Palestine.
5 units (Zipperstein) not given 1995-96

290. Undergraduate Colloquium: United States and Japan—Case studies of cultural, political, and economic interaction between Japan and U.S. during the 20th century. Topics: early Japanese views of the U.S., the rise of Japanese imperialism and its consequences, the outbreak of the Pacific War, the American occupation of Japan, and emergence of postwar trade friction.
5 units (Duus) not given 1995-96

291A. Undergraduate Colloquium: Industrialization of Japan—(Same as 391A.) The emergence of Japan as an industrial economy since the middle of the 19th-century. Topics: proto-industrialization in the Tokugawa period, role of state entrepreneurship, emergence of a capitalist class, transfer of technology, creation of a working class, and social and intellectual consequences of industrialization. Post-1945 developments.
5 units (Duus) not given 1995-96

292. Undergraduate Colloquium: Postwar Japan—Discussion of various aspects of Japanese social history since 1945: the postwar emperor system, economic growth and urbanization, middle class culture, new religions, citizens' movements, the transformation of village life, the search for national identity, popular media.
5 units (Duus) not given 1995-96

5 units, Aut (Duus) T 3:15-5:05
292S. Undergraduate Research Seminar: China in the Western Imagination, 16th-20th Century — 500 years of reinvention of China in the Western mind. Through the use of Jesuit correspondence, diplomatic reminiscence, missionary memoirs, modern journalism, travelers’ accounts, and military logs, students construct a research project which explores subject (the viewer) and object (the viewed) in the early modern history of China. 5 units (Kahn) not given 1995-96

293A. Undergraduate Colloquium: The American Cultural Empire in China 5 units, Win (Hayford)

295. Undergraduate Colloquium: A History of Japanese Religion — Premodern in focus, examines Japanese religion in terms of doctrinal, political, social, military, and economic history. Primary sources in translation. Structures of belief and practice and the synchronic interaction of such with the contemporaneous ideological environment. 5 units (Ketelaar) not given 1995-96

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-Quing, i.e., 16th-19th centuries. Prerequisite: consent of instructor. 5 units, Spr (Kahn) T 1:15-3:05

297. Undergraduate Colloquium: Women and the Family in Chinese History 5 units (Neskar) not given 1995-96

298A. Undergraduate Colloquium: Visions of Utopia — Travelers to China, 9th-20th Century 5 units, Win (Kahn) T 1:15-3:05

299. Undergraduate Colloquium: The Institutions of Medieval Japan 5 units (Mass) not given 1995-96

GRADUATE

300W. Graduate Directed Reading units by arrangement (Staff)

301. Graduate Colloquium: Historiography of American Education — (Same as Education 301) 3-4 units (Tyack) alternate years, given 1996-97

301B. History of School Reform: Origins, Policies, and Outcomes — (Same as Education 220D) School reform as an interaction between the broad context (social economic, political, and ideological factors), schools as institutions, and the goals and behaviors of groups and individuals. Why and how some school reforms persist, why some fail or fade, and why some recur periodically. Focuses on early 1900s, 1950s, and ’60s, and current state-driven changes. Students investigate a particular reform: its sources, policy development and implementation, and the consequences, intended and unintended, using one or more of the analytic frameworks presented. 4 units (Cuban, Tyack)

302. Graduate Core Colloquium: The Interdisciplinary Study in the Humanities — (Enroll in Humanities Special Programs 315) 3-4 units, Win (Robinson) TTh 4:15-6:05

302A. Graduate Colloquium: Introduction to Problems of Historical Interpretation and Explanation — (Same as 202) 4-5 units, Spr (Emmons) Th 1:15-3:05

303. Graduate Colloquium: History, Memory, Identity — (Same as 203) 4-5 units, Aut (Weiner) Th 1:15-3:05

303C. Graduate Colloquium: The Process of Industrialization — Europe, The United States, and Latin America — (Same as Science, Technology, and Society 220) Introduction to comparative economic history for graduate students. The literature on the transition to industrial societies during the 19th and 20th centuries in a variety of national contexts. Readings from the institutionalist, cliometric, and Marxist schools of economic history. 4-5 units (Haber) not given 1995-96

304. Graduate Colloquium: Approaches to History — Required of all first-year History Ph.Ds. 1-3 units, Aut (Rodrigue)

304A. Graduate Colloquium: Historiography of Colonial Spanish America 4-5 units (Bowser) not given 1995-96

304B. Graduate Colloquium: Historiography of Colonial Spanish America 4-5 units (Bowser) not given 1995-96

304C. Graduate Core Seminar in Latin American Studies — Introduction to Spanish-American civilization. 4-5 units (Bowser) not given 1995-96

305. Graduate Colloquium: Graduate Workshop in Teaching — Introduction to teaching, lecturing, and curriculum development. 1 unit, Spr (Staff)

306. Graduate Colloquium: Private Lives — Public Stories — (Same as 285A) 4-5 units, Spr (Lougee)

306A. The Modern Tradition: Capitalism, Imperialism, and their Critics — The tradition of social theory that begins with Marx’s conceptualization of capitalism and Lenin’s theory of imperialism, elaborated by examining works arguing that gender and racial hierarchies are constitutive of capitalism. The dimension of ideological and cultural domination using writings of Marx, Gramsci and represen-
HISTORY 509

tatives of the cultural studies and subaltern studies schools including Start Hall, Gyan Prakash, Edward Said and Paul Gilroy. The debate over postmodernism/late capitalism, and theory and strategy after the Gulf War.

4-5 units, Aut (Beinin) W 12:30-3:05

307. Graduate Colloquium: Topics in Comparative Women's History — (Same as 207.)
4-5 units (Freedman) not given 1995-96

307A. Graduate Core Colloquium in Medieval History
4-5 units, Aut (Buc) F 1:15-4:05

309. Graduate Colloquium: The Renaissance
4-5 units, not given 1995-96

310. Graduate Colloquium: The Language of Politics in the Middle Ages
4-5 units (Buc) not given 1995-96

311. Graduate Colloquium: Body, Gender, and Society in Medieval Europe — (Same as 211.)
4-5 units, Win (Buc) Th 1:15-3:05

312. Graduate Colloquium: Homosexuals, Heretics, Witches, and Werewolves — Deviants in Medieval Society — (Same as 212.)
4-5 units, Win (Smoller) W 1:15-3:05

314. Graduate Colloquium: Magic, Science, and the Occult in Medieval and Renaissance Europe — (Same as 214.)
4-5 units, Aut (Smoller) T 1:15-3:05

320A. Graduate Colloquium: Topics in Early Modern Russian History
4-5 units, Aut (Kollmann) T 1:15-3:05

322A. Graduate Colloquium: National Identities in 20th-Century Ukraine — (Same as 222A.)
4-5 units, Win (Weiner)

324. Graduate Colloquium: Stalinism in Eastern Europe — (Same as 224.)
4-5 units (Naimark) not given 1995-96

325A. Graduate Colloquium: The Nation and Its Others — Recent literature on the formation of nations and the development of nationalism. Other forms of subnational and supranational collective organization (e.g., class, diaspora). Theories of the nation have moved from ideas of the essential, primordial quality of nations through social construction featuring the processes of modernization and a more cultural, discursive approach emphasizing the role of imagination and invention.
4-5 units, Aut (Hecht) T 1:15-3:05

326. Graduate Colloquium: Problems in Soviet History and Historiography — (Same as 226.)
4-5 units, Win (Suni) Th 3:15-5:05

330. Graduate Colloquium: Institutions of Enlightenment — (Same as 430A.) The cultural foundations upon which the Enlightenment instituted a public sphere and constituted its relationship to the private (or intimate) sphere, emphasizing France and Britain.
4-5 units (Baker, Bender) not given 1995-96

331A. Graduate Core Colloquium: Europe in the 15th and 16th Century
4-5 units, not given 1995-96

331B. Graduate Core Colloquium: Europe in the 17th and 18th Century
4-5 units (Lougee) not given 1995-96

331C. Graduate Core Colloquium on Modern Europe: Enlightenment-Revolution
4-5 units (Baker) not given 1995-96

331D. Graduate Core Colloquium on Modern Europe — European-Intellectual
4-5 units, Aut (Robinson) W 2:15-4:05

331E. Graduate Core Colloquium on Modern Europe: Modern Germany
4-5 units (Sheehan) not given 1995-96

331F. Graduate Core Colloquium on Modern Europe: 20th-Century France
4-5 units, Win (M. L. Roberts) W 2:15-4:05

331G. Graduate Core Colloquium on Modern Europe
4-5 units, Spr (Emmons) W 2:15-4:05

332. Graduate Colloquium: The Old Regime and the French Revolution
4-5 units (Baker) not given 1995-96

332A. Graduate Colloquium: France During WWII — Same as 232A.)
4-5 units (Rodrigue) not given 1995-96

334A. Graduate Colloquium: Technology and Society
4-5 units (Hecht) not given 1995-96

336A. Graduate Colloquium: Technology, Work, Culture in Comparative Perspective — (Same as History and Philosophy of Science 243.) Changes in the nature, culture, and organization of work in the 19th and 20th centuries. Readings on kinds of work (industrial, domestic, slave), the working body, gender and skill, and the relationships between technological and sociological change.
4-5 units, Aut (Hecht) T 1:15-3:05

337. The Holocaust — (Same as 137.)
4-5 units, Aut (Rodrigue) MW 1:15-3:05

341A. Graduate Colloquium: Topics in the History of Early Modern England
4-5 units (Seaver) not given 1995-96

341B. Graduate Colloquium: Topics in the History of Early Modern England
4-5 units, Win (Seaver) Th 1:15-3:05

342. Graduate Colloquium: Topics in the Social and Cultural History of Early and Modern England
4-5 units (Seaver) not given 1995-96
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Term(s)</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>344A</td>
<td>Graduate Colloquium: Problems in Modern British Society</td>
<td>4-5</td>
<td>Aut</td>
<td>(Stansky) T 3:15-5:05</td>
</tr>
<tr>
<td>346A</td>
<td>Graduate Colloquium: African History and African Novel</td>
<td>4-5</td>
<td>(Jackson)</td>
<td>not given 1995-96</td>
</tr>
<tr>
<td>347</td>
<td>Graduate Colloquium: Greater East Africa and its Historical Writing</td>
<td>4-5</td>
<td>Spr</td>
<td>(Jackson) Th 3:15-5:05</td>
</tr>
<tr>
<td>347B</td>
<td>Graduate Core Colloquium in African History — The Colonial Period</td>
<td>4-5</td>
<td>Win</td>
<td>(R. Roberts) Th 2:15-5:05</td>
</tr>
<tr>
<td>348</td>
<td>Graduate Colloquium: Popular Culture in Africa</td>
<td>4-5</td>
<td></td>
<td>(Jackson) not given 1995-96</td>
</tr>
<tr>
<td>348A</td>
<td>Graduate Colloquium: End of Slavery — Africa and the Americas</td>
<td>4-5</td>
<td>Aut</td>
<td>(Roberts) Th 3:15-5:30</td>
</tr>
<tr>
<td>348D</td>
<td>Graduate Colloquium: Law and Colonialism in Africa</td>
<td>4-5</td>
<td>Spr</td>
<td>(Roberts) Th 2:15-5:05</td>
</tr>
<tr>
<td>349</td>
<td>Graduate Core Colloquium: Precolonial Africa</td>
<td>4-5</td>
<td></td>
<td>(R. Roberts) not given 1995-96</td>
</tr>
<tr>
<td>349B</td>
<td>Graduate Colloquium: African Social History Workshop</td>
<td>1</td>
<td></td>
<td>(R. Roberts) not given 1995-96</td>
</tr>
<tr>
<td>350</td>
<td>Graduate Colloquium: American Working-Class History</td>
<td>4-5</td>
<td></td>
<td>(Sawislak) not given 1995-96</td>
</tr>
<tr>
<td>351A,B,C,D,E,F</td>
<td>Graduate Core Colloquium in American History</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>351A</td>
<td>Graduate Core Colloquium: American History — Part I</td>
<td>4-5</td>
<td>Aut</td>
<td>(Rakove) TF 2:15-4:05</td>
</tr>
<tr>
<td>351B</td>
<td>Graduate Core Colloquium: American History — Part II</td>
<td>4-5</td>
<td>Aut</td>
<td>(Fredrickson) TF 2:15-4:05</td>
</tr>
<tr>
<td>351C</td>
<td>Graduate Core Colloquium: American History — Part III</td>
<td>4-5</td>
<td>Win</td>
<td>(Chang) TF 2:15-4:05</td>
</tr>
<tr>
<td>351D</td>
<td>Graduate Core Colloquium: American History — Part IV</td>
<td>4-5</td>
<td></td>
<td>(Staff) not given 1995-96</td>
</tr>
<tr>
<td>351E</td>
<td>Graduate Core Colloquium in American History — Part V</td>
<td>4-5</td>
<td>Spr</td>
<td>(Freedman) TF 2:15-4:05</td>
</tr>
<tr>
<td>351F</td>
<td>Graduate Core Colloquium in American History — Part VI</td>
<td>4-5</td>
<td>Spr</td>
<td>(Carson) TF 2:15-4:05</td>
</tr>
<tr>
<td>352</td>
<td>Graduate Colloquium: Decision-Making in International Crises</td>
<td>4-5</td>
<td>Aut</td>
<td>(Bernstein) T 2:30-5</td>
</tr>
<tr>
<td>359</td>
<td>Graduate Colloquium: Black and White in the United States and South Africa</td>
<td>4-5</td>
<td>Spr</td>
<td>(Fredrickson)</td>
</tr>
<tr>
<td>361</td>
<td>Graduate Colloquium: Nuclear Weapons — Theories and History</td>
<td>4-5</td>
<td>(Bernstein, Holloway)</td>
<td>not given 1995-96</td>
</tr>
<tr>
<td>365</td>
<td>Graduate Colloquium: New Research in Asian American History</td>
<td>4-5</td>
<td>Spr</td>
<td>(Chang) W 1:15-3:05</td>
</tr>
<tr>
<td>374A</td>
<td>Graduate Colloquium: Body Works — Medicine, Technology, and the Body in late 20th-Century America</td>
<td>4-5</td>
<td>Win</td>
<td>(Lenoir)</td>
</tr>
<tr>
<td>376</td>
<td>Graduate Colloquium: The Creation of North America</td>
<td>4-5</td>
<td>Spr</td>
<td>(Wirth) T 3:15-5:05</td>
</tr>
<tr>
<td>377</td>
<td>Core Colloquium: Regionalism in America</td>
<td>4-5</td>
<td>Spr</td>
<td>(Wirth) not given 1995-96</td>
</tr>
<tr>
<td>381A</td>
<td>Graduate Colloquium: Environmental History of the Americas</td>
<td>4-5</td>
<td>Win</td>
<td>(Wirth) T 3:15-5:05</td>
</tr>
<tr>
<td>384</td>
<td>Graduate Core Colloquium in Jewish History</td>
<td>4-5</td>
<td>Aut</td>
<td>(Rodrigue, Zipperstein) W 2:15-4:05</td>
</tr>
<tr>
<td>386</td>
<td>Graduate Colloquium: Economic and Social History of the Modern Middle East</td>
<td>4-5</td>
<td></td>
<td>(Beinin) not given 1995-96</td>
</tr>
<tr>
<td>387A</td>
<td>Graduate Colloquium: Modern Jewish Identity</td>
<td>4-5</td>
<td>Spr</td>
<td>(Rodrigue) M 1:15-3:05</td>
</tr>
<tr>
<td>388</td>
<td>Graduate Colloquium: Palestine and the Arab-Israeli Conflict</td>
<td>4-5</td>
<td></td>
<td>(Beinin) not given 1995-96</td>
</tr>
<tr>
<td>389A</td>
<td>Graduate Colloquium: The Ottoman Empire</td>
<td>4-5</td>
<td></td>
<td>(Rodrigue) not given 1995-96</td>
</tr>
<tr>
<td>390</td>
<td>Graduate Colloquium: United States and Japan</td>
<td>4-5</td>
<td></td>
<td>(Duus) not given 1995-96</td>
</tr>
<tr>
<td>390A</td>
<td>Graduate Colloquium: Topics in Middle-Period Chinese History</td>
<td>4-5</td>
<td>Spr</td>
<td>(Neskar) W 1:15-3:05</td>
</tr>
<tr>
<td>390B</td>
<td>Graduate Colloquium: Aspects of Late Traditional Chinese History</td>
<td>4-5</td>
<td>Spr</td>
<td>(Hayford) T 1:15-3:05</td>
</tr>
<tr>
<td>390C</td>
<td>Graduate Colloquium: Topics in Late Traditional and Modern Chinese History</td>
<td>4-5</td>
<td>Spr</td>
<td>(Kahn) not given 1995-96</td>
</tr>
</tbody>
</table>
391A. Graduate Colloquium: Industrialization in Modern Japan – (Same as 291A.)
4-5 units (Duus) not given 1995-96

392. Graduate Colloquium: Postwar Japan
4-5 units (Duus) not given 1995-96

395A. Graduate Colloquium: Early and Medieval Japan
4-5 units (Mass) not given 1995-96

395B. Graduate Colloquium: Late Medieval and Early Modern Japan – Historical and historiographical issues, orthodox and heterodox, germane to the period and its modern interpretations.
4-5 units (Ketelaar) not given 1995-96

395C. Graduate Colloquium: Modern Japan
4-5 units, Spr (Duus) Th 3:15-5:05

399. Graduate Colloquium: The Institutions of Medieval Japan
4-5 units (Mass) not given 1995-96

ADVANCED GRADUATE

Courses numbered 400 to 499 are intended primarily for second- and third-year graduate students, but other qualified students may be admitted by consent of instructor.

400X. Graduate Research
units by arrangement (Staff)

402. Graduate Colloquium: Fieldwork Methods in African History
4-5 units (Jackson) not given 1995-96

406. Graduate Seminar: Medieval History
4-5 units (Buc) not given 1995-96

409. Graduate Seminar: Topics in the Renaissance
4-5 units, not given 1995-96

411. Graduate Seminar: Medieval History
4-5 units, Spr (Smoller) Th 1:15-3:05

420B. Graduate Seminar: Topics in Modern Russian History
4-5 units (Emmons) not given 1995-96

421 Graduate Seminar: Topics in Russian History
4-5 units (Emmons) not given 1995-96

426. Graduate Seminar: Problems in the History and Historiography of the Soviet Union – Introduces the major schools of interpretation of the Soviet phenomenon. Each session deals with a major work representative of a specific school. Chronological order from the first major interpretation of the Soviet polity by Trotsky to the current post-modernist theories. Emphasis is on the so-called Totalitarian School, arguably, the single most important theory to emerge from the field of Soviet Studies.
4-5 units, Spr (Weiner)

430. Graduate Seminar: The French Revolution
4-5 units (Baker) not given 1995-96

430A. Graduate Seminar: Institutions of Enlightenment – (Same as 330.)
4-5 units (Baker, Bender) not given 1995-96

430B. Graduate Seminar: Institutions of Enlightenment – Prerequisite: 430A.
4-5 units (Baker) not given 1995-96

433. Graduate Seminar: Modern Eastern Europe
4-5 units, Win (Naimark) T 3:15-5:05

433A. Graduate Seminar: European History
8-10 units (Sheehan) not given 1995-96

434A. Graduate Seminar: Topics in the History of Technology
4-5 units (Hecht) not given 1995-96

435. Graduate Seminar: Research Seminar in European History
4-5 units (M. L. Roberts) not given 1995-96

437. Graduate Seminar: Modern European Cultural and Intellectual History
8-10 units (Robinson) not given 1995-96

442. Graduate Seminar: Early Modern England
4-5 units (Seaver) not given 1995-96

445. Graduate Seminar: Research – Modern Britain
4-5 units, Win (Stansky) by arrangement

447. Graduate Seminar: East Africa in Transition: 1880s-1920s
4-5 units (Jackson) not given 1995-96

447A. Graduate Seminar: Fieldwork in Africa – Oral History, Life, and Family History – (Same as 247S.)
5 units (Jackson) not given 1995-96

448A. Graduate Seminar: Colonial States and Societies in Africa – (Same as 248S.)
8-10 units (R. Roberts) not given 1995-96

451. Graduate Seminar: 20th-Century America
8-10 units (Bernstein) not given 1995-96

452. Graduate Seminar: United States Social History
4-5 units (Sawislak) not given 1995-96

454. Graduate Seminar: Culture and Ideology in 19th-Century America
4-5 units (Fredrickson) not given 1995-96

456A. Graduate Seminar: United States in the 20th Century
4-5 units (Kennedy) not given 1995-96

456B. Graduate Seminar: United States in the 20th Century
4-5 units (Kennedy) not given 1995-96

465. Graduate Seminar: Asian-American History – (Same as 265S.)
4-5 units (Chang) not given 1995-96
468. Graduate Seminar: American Politics and Political Ideas, 1760-1870
4-5 units (Rakove) not given 1995-96

473. Graduate Seminar: Women's Family and Sexual History
8-10 units, Win, Spr (Freedman) W 1:15-4:05

474. Graduate Seminar: Race, Class, and Region in the U.S. since 1865
8-10 units, Win, Spr (Camarillo) W 2:15-4:05

476. Graduate Seminar on Brazil — (Same as Latin American Studies 380.)
4-5 units (Wirth) not given 1995-96

477. Graduate Seminar: Economic and Social History of Colonial Latin America
4-5 units, Win (Klein) T 1:15-3:05

478. Graduate Seminar: Economic and Social History of Latin America — (Same as Latin American Studies 379.) Open to non-Latin Americanists who are working on research projects that utilize quantitative data. Acquaints students with social science approaches to Latin American history.
4-5 units (Haber) not given 1995-96

485. Graduate Research Seminar in Modern Jewish History
8-10 units (Rodrique, Zipperstein)
not given 1995-96

487. Graduate Seminar: Topics in the Modern History of Egypt, Palestine, and Israel — (Same as 287S.)
4-5 units, Aut (Beinin) Th 1:15-3:05

490A.B. Graduate Seminar: Modern Chinese History
8-10 units (Van Slyke) not given 1995-96

493A.B. Graduate Seminar: Late Traditional Chinese History
8-10 units, Win, Spr (Kahn) T 1:15-3:05

498. Graduate Seminar: Japanese Historical Texts
4-5 units, Win (Mass) by arrangement

498A. Graduate Seminar: Japanese History Sources
4-5 units (Mass) not given 1995-96

AFFILIATED DEPARTMENT OFFERINGS

AMERICAN STUDIES

151. The Transformation of American Thought and Culture, 1865 to the Present
5 units, Win (Gillam)

CLASSICS

See Classics, Ancient History section, for descriptions of the following, all of which are accepted for credit toward a major in History.

101. History of Greece
4-5 units, Aut (Morris)

102. Greek and Roman History from Alexander to Caesar
4-5 units, Win (Morris)

103. Roman History II: The Empire
4-5 units, Spr (Gleason) MWF

114. History of Liberal Education from Greece to Renaissance
3-4 units, Win (Bloomer)

121. Slavery Ancient and Modern
3-4 units, Spr (Morris)

139. Medicine in Ancient Greece and Rome
3-4 units, Aut (Knorr)

334A.B. Democratic Athens
4-5 units, Aut, Win (Morris)

COMPARATIVE LITERATURE

300. Historical Consciousness
5 units, Win (White) T 3:15-6:05

ENGLISH

165A. Introduction to Medieval Culture

OVERSEAS STUDIES

These courses are approved for the History major and taught overseas at the campus indicated. Students should discuss with their major advisers which courses would best meet individual needs. Descriptions are in the “Overseas Studies” section of this bulletin or at the Overseas Studies office, 126 Sweet Hall.

BERLIN

129V. The History of German and European Economic Philosophy — (Same as Overseas Studies 100X.)
4-5 units, Aut (Kruger)

228V. Nationalism and Political Culture in Contemporary Germany — (Same as Overseas Studies 177B.)
4 units, Spr (Tempel)

229V. Architecture and the City, 1871-1990: Berlin as a Nucleus of Modernity — (Same as Overseas Studies 143U.)
4 units, Aut, Spr (Neckenig)

FLORENCE

106V. Italy: From an Agrarian to a Post-Industrial Society
4 units, Aut (Mammarella)

234V. Rebellion and Renewal: The Italian Renaissance
4-5 units, Aut (Biocca)
PROGRAM IN HISTORY AND PHILOSOPHY OF SCIENCE

Co-chairs: John Dupré, Timothy Lenoir
Committee-in-Charge: Barton Bernstein (History), Joe Corn (History), Paul David (Economics), John Dupré (Philosophy), Joan Fujimura (Anthropology), Peter Godfrey-Smith (Philosophy), Yair Guttmann (Philosophy), Gabrielle Hecht (History), Wilbur Knorr (Classics, Philosophy), Timothy Lenoir (History)

Professors: Barton Bernstein, John Dupré, Wilbur Knorr, Timothy Lenoir
Associate Professor: Joan Fujimura
Assistant Professors: Peter Godfrey-Smith, Yair Guttmann, Gabrielle Hecht
Affiliated Faculty: Hans Ulrich Gumbrecht (Comparative Literature), Henry Lowood (Stanford University Libraries)
Senior Lecturer: Joseph Corn
Lecturer: Robin Rider
Acting Assistant Professor: Laura Smoller
Consulting Professor: Max Dresden
Visiting Assistant Professors: Cathryn Carson, R. Ruth Linden
Fellow: Susan Kelly

The Program in History and Philosophy of Science is an interdisciplinary, non-degree program focusing on historical and contemporary aspects of science. At its regular monthly colloquium, invited speakers from history, philosophy, anthropology, sociology, the economics of science and technology, the sciences, and medicine address topics of broad concern to science and technology studies. The program works closely with the University Libraries’ Special Collections in the History of Science and cooperates with other departments and programs in the administration of undergraduate and graduate majors. Its undergraduate and graduate courses span the period from antiquity to the late 20th century. These courses can accommodate students with varying backgrounds in the natural sciences, humanities, and social sciences.

At the undergraduate level, students who wish to pursue studies in the history and philosophy of science and technology should major in the Departments of History or Human Biology, with a concentration in history of science, or in the Department of Philosophy which offers a specific degree in History and Philosophy of Science. A concentration in the anthropology of science can be arranged through the Department of Anthropology. Alternatively, students may consult with a member of the Committee-In-Charge to construct an individually designed major. This major must conform to the requirements for Individually Designed Majors (see the “Individually Designed Majors” section of this bulletin).

Graduate students who wish to combine studies in the history and philosophy of science and technology with majors in anthropology, history, or philosophy should consult those departments.

COURSES

60. Introduction to the History and Philosophy of Science — (Same as Philosophy 60.) Positivism, Popper, and the old “received view” of scientific theories; problems involving explanation and induction; Kuhn and subsequent attempts to rebuild moderate empiricist positions; case study in the dispute between early geneticists and Darwinians, and the inauguration of modern evolutionary theory. DR:8(3)
5 units, Spr (Godfrey-Smith) MWF 1:15

120/220. Constructing HIV/AIDS: The Epidemic’s Second Decade — Seminar explores the local, multiple, and changing meanings of the HIV/AIDS epidemic in the U.S. Topics: construction and representation of HIV/AIDS in medical and scientific discourse, popular culture, and the media; the lived experience of HIV/AIDS; activism; and the bureaucratization and professional-ization of HIV/AIDS work. How has the HIV/AIDS pandemic refigured ideas about disease and death in the West? How has the upward spiraling incidence of HIV infection shaped health-policy formation and health-services delivery? How has AIDS transformed meanings of sexualities and sexual differences? Students conduct a major fieldwork project in an AIDS service organization, community project, public-health agency, or activist organization.
5 units, Win (Linden) T 2:15-5:05

121. Technology and Culture in 19th-Century America — (Same as History 115; Science, Technology, and Society 122.) Social and cultural as-
pects of technological change from the American Revolution through WW I. Emphasis is on technologies of production and consumption (armory practice, department stores); of temporal and spatial transformation (telegraphic time signals, railroads), simulation and reproduction (photography, phonograph), and communication and control (telephone, scientific management). DR:9(5)  
4-5 units, Win (Knorr) TTh 2:15-3:30

106. Biopolitics and Culture of Breast Cancer — Research seminar exploring breast cancer from historical/cultural/feminist perspectives: what it “is,” why and how it develops, and what can and ought to be done to stem it. Meanings of breast cancer reside in the discourses and social practices of biomedicine and popular culture, and are fraught with cultural and material authority and relations of power, which continually reproduce themselves at micro and macro levels. Topics: Breast Cancer Act of 1972 and the “War on Cancer;” American Cancer Society and the transnational cancer industries; ideology of screening and “early” detection; primary prevention; debates about treatment, including mastectomies, chemotherapy, ABMT, radiation, tamoxifen trials, and experimental therapies; “discoveries” of BRCA1, BRCA2, p53, and AT genes; Women’s Health Initiative and women as sociopolitical bodies in research; emergence of legislative and treatment activism.
5 units, Spr (Lenoir)

138A. Ancient Period — DR:8(3)  
4 units, Aut (Knorr) MWF 2:15
138B. Cosmology: Middle Ages and Renaissance — DR:8(3)  
4 units, Win (Knorr) MWF 2:15
138C. Modern Period: Newton to Einstein — DR:8(3)  
4 units, Spr (Knorr) MWF 2:15

140. Topics in the History of Mathematics: From Antiquity to the 17th Century — (Same as Philosophy 140.) Origins and development of concepts and techniques in their social and philosophical context. Emphasis is on ancient Greek geometry, its adoption of the idea of proof and interaction with early philosophy, its application in optics and mechanics, its significance and limitations.
4 units, Win (Knorr) TTh 2:15-3:30

145/245. Scientific Revolution — (Graduate students register for 245; same as History 139.) Philosophy and science from the 16th through 17th centuries in Europe: the development of science from Copernicus to Newton. Emphasis is on historical and philosophical issues related to basic physical concepts (space, matter, force, inertia, etc.), celestial mechanics, scientific method, and the development of science in its social and cultural context.
4 units, Spr (Rider)

147/247. Science and High Technology in Silicon Valley, 1930-1980 — (Same as History 262S; Science, Technology, and Society 222.) Research seminar. Technological, political, economic, and spatial dimensions of the rise of Silicon Valley from 1930s-1980s. How did Silicon Valley arise? What sustained its growth? How did it function? How did it evolve? Archival research and oral history. Focus is on radiosets, microwave devices, semi-conductors, and computers; economies of skills; university-industry relations; political dissent and the counter-culture; and the techno-scientific policies of the Cold War state. Comparison with Route 128 and other high-tech regions.
5 units, Spr (Lenoir) W 1:15-4:05

152. The Darwinian Revolution — (Same as History 133; Science, Technology, and Society 130.) Conceptual developments leading to establishment of the major unifying paradigm of biological science, the theory of evolution by natural selection. Biological thought before Darwin (1800-1836). Voyage of the Beagle and the formation of Darwin’s thought in terms of its broader intellectual and social context. The Origin of Species. Descent of Man. Difficulties the theory had to overcome and their resolution in the union of evolutionary biology and  
5 units, Win (Lenoir)

154. The Rise of Scientific Medicine — (Same as History 133A.) Intellectual, social, and institutional dimensions of the rise of scientific medicine in the 19th and 20th centuries. How did medicine become “scientific?” What differences did science make to the practicing physician? Why did it displace other approaches to medicine? Focus is on medicine in Europe and the U.S. 1800-present. Topics: development of experimental physiology, bacteriology,
pharmacology, biomedical technology, nuclear medicine, biomedical imaging, computers in medicine, and prospects for bedside gene therapies; effects of scientific developments in biomedical science and technology on medical practice and therapy; the professionalization of medicine in comparative European and American contexts.

4 units, Spr (Lenoir)

155/255. The Sociology of Scientific Knowledge —
(Graduate students register for 255; same as Anthropology 158, History 133B.) Classical problems in the sociology of knowledge as represented in the writings of Marx, Durkheim, and Mannheim. Recent work in the social construction of scientific knowledge. Emphasis on recent studies in the historical sociology of experimental science and lab practice. Using case studies and drawing on anthropological approaches in the works of Mary Douglas, Pierre Bourdieu, and others, explores a theory of practice and a critique of historically situated practical reason as the foundation of the sociology of scientific knowledge.

4 units (Staff) not given 1995-96

156. Origins of Life — (Same as History 133D.) Undergraduate seminar. Assumptions underlying research and debate on the origins of life from 1850 to the present. The role of representations in authorizing frameworks for interpreting the origins of life. Two main lines of research, one originating with A. I. Oparin’s The Origins of Life (1924) emphasizing a biochemical-metabolic approach to life, the second emphasizing a genetic-informational approach beginning with H. J. Muller’s The Gene as the Basis of Life (1926). Tracing these two to the present, compares reductionist strategies with recent attempts to articulate a concept of “autopoesis”—the notion that living systems are self-assembling, self-enclosing networks of production.

4 units (Lenoir) not given 1995-96

158. Science, Technology, and Society — (Same as Anthropology 232.) Graduate seminar examines science as social activity; recent approaches to the social production of scientific knowledge and technologies as constructed through cultural practices and the organization of scientific work. Related issues in the studies of knowledge, culture, politics, work, and organizations.

5 units (Fujimura)

159. The Sociology of Scientific Knowledge — (Same as Anthropology 162A.) Current literature in socio-cultural studies of biotechnology. Issues of concern at the intersection of biology and technology (e.g., human genome project, bioinformatics, biodiversity, virtual reality, artificial life, cyborgs and representations, and products in biology, biotechnology, and medicine). Sociocultural questioning about the organization of scientific work, the universalization and formalization of knowledge, the transformation of societies via novel products, multicultural ways of knowing, definitions of life, and ethical and legal concerns.

5 units (Fujimura)

160. Gender and Science — (Same as Anthropology 160.) Seminar examines different perspectives on the study of gender and science, including biological, medical, and physical science. Topics: the historical and contemporary construction of gender and sex, feminist critiques of scientific theories and methods, the work (and lack of work) of women in science, and debates on gendered and feminist epistemologies. DR:8t(3) or 9t(5)

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

162. Topics in Socio-Cultural Studies of Biotechnology — (Same as Anthropology 162A.) Current literature in socio-cultural studies of biotechnology. Issues of concern at the intersection of biology and technology (e.g., human genome project, bioinformatics, biodiversity, virtual reality, artificial life, cyborgs and representations, and products in biology, biotechnology, and medicine). Sociocultural questioning about the organization of scientific work, the universalization and formalization of knowledge, the transformation of societies via novel products, multicultural ways of knowing, definitions of life, and ethical and legal concerns.

5 units, Aut (Fujimura)

165. Encounters with Scientific Geniuses —
3-4 units, Win (Dresden)

166. History of Physics — (Same as History 139A.) Describes, analyzes, and interprets the major scientific changes which have characterized the 20th century. The introduction of the ideas of relativity, the surprising and pervasive role of quantum notions, rapidly alternating scientific fashions from nuclear physics to particle physics, from superconductivity to chaos. Emphasis on corresponding changes in sociology, demography, and the impact on philosophy and the changed role of physics in the 20th century.

3-5 units (Staff) not given 1995-96

169/269. Physicists as Philosopher in the 20th Century — Seminar considers the interpretations of physics (particularly relativity and quantum mechanics) that physicists in the 20th century have provided for the public. The roles that physicists have played as cultural spokesmen and public figures, focusing on the German, American, and Soviet contexts. Who were the audiences for the physicists’ explanations? What sort of authority were they accorded on matters of philosophy and religion? How did their role and authority depend on cultural and political context?

4-5 units, Aut (Carson) Th 1:15-3:05

170. Physics After World War II
4 units (Carson)

199. Directed Reading
1-5 units (Staff)

232. Science, Technology, and Society — (Same as Anthropology 232.) Graduate seminar examines science as social activity; recent approaches to the social production of scientific knowledge and technologies as constructed through cultural practices and the organization of scientific work. Related issues in the studies of knowledge, culture, politics, work, and organizations.

5 units (Fujimura)

233. Feminist Theories of Science and Technology — (Same as Anthropology 246.) Feminist theories and studies of science, technology, and medicine, especially as they intersect with cultural studies of science and technology. Focuses critically and constructively on feminist epistemologies, and questions whether and how they challenge and shift the lens of current practices in science and technology. How gender is constructed by and constructs the techno-sciences.

5 units (Fujimura)

255. The Sociology of Scientific Knowledge —
(For graduate students; same as 155.)

4 units (Lenoir) not given 1995-96
269A. Workshop in Economics of Science and Technology — (Enroll in Economics 303A.)

299. Graduate Individual Work
1-5 units (Staff)

AFFILIATED DEPARTMENT OFFERINGS

COMPARATIVE LITERATURE
369. Seminar: Fragments of a Material History of Literature
5 units, Aut (Schnapp) T 3:15-6:05

ECONOMICS
303A. Workshop in Economics of Science and Technology

HISTORY
111. The Black Death and Medieval Responses to Plague: The AIDS of the 14th Century
5 units, Spr (Smoller) MTWTh 10

134A. The Industrial Revolution: Historical and Cultural Perspectives — (Same as Science, Technology, and Society 131.)
5 units (Hecht) not given 1995-96

214/314. Undergraduate Colloquium: Magic, Science, and the Occult in Medieval and Renaissance Europe — (Graduate students register for 314.)
5 units, Aut (Smoller)

231A. Technology, the State, and Social Order in Modern France
5 units, Aut (Hecht) Th 1:15-3:05

239S. The Nuclear Age — (Same as Science, Technology, and Society 163.)
5 units (Hecht) not given 1995-96

261/361. Undergraduate Colloquium: Nuclear Weapons — Theories and History
5 units (Bernstein, Holloway) not given 1995-96

334A. Graduate Colloquium: Technology and Society
4-5 units (Hecht) not given 1995-96

336A. Technology, Work, and Culture in Comparative Perspective
4-5 units, Aut (Hecht) T 1:15-3:05

361. Graduate Colloquium: Nuclear Weapons — Theories and History
5 units (Bernstein, Holloway) not given 1995-96

434A. Graduate Seminar: Topics in the History of Technology
4-5 units (Hecht) not given 1995-96

451. 20th-Century America
10 units (Bernstein) not given 1995-96

GERMAN STUDIES
175/175A. Modernization, Technology, and Culture in Germany 1900 to 1945
4 units, Aut (Lowood)

PHILOSOPHY
164. Central Topics in the Philosophy of Science
4 units, Win (Dupré) MW 10-11:15

165. Philosophy of Physics
4 units, Win (Guttman) T 2:15-5:05

167. Philosophy of Biology
4 units, Spr (Godfrey-Smith) Th 11-12:15

SCIENCE, TECHNOLOGY, AND SOCIETY
122. Technology and Culture in 20th-Century America and Europe — (Same as History 234A.)
5 units (Hecht) not given 1995-96

145. Women and Technology
5 units, Win (Courey)

PROGRAM IN HUMAN BIOLOGY

Emeriti: (Professors) Sanford Dornbusch (Sociology), Albert H. Hastorf (Psychology)
Director: William H. Durham

Professors: J. Myron Atkin (Education), W. Brian Arthur (Food Research), Clifford Barnett (Anthropology), Paul Basch (Health Research and Policy), William Dement (Psychiatry/Behavioral Science), Carl Djerassi (Chemistry), William H. Durham (Anthropology and Human Biology), Marcus Feldman (Biological Sciences), Russell Fernald (Psychology and Human Biology), H. Craig Heller (Biological Sciences), Herant Katchadourian (Psychiatry/Behavioral Sciences), Donald Kennedy (Biological Sciences), Richard Klein (Anthropology), Timothy Lenoir (History), Iris Litt (Pediatrics), Michael Marmor (Ophthalmology), Robert Sapolsky (Biological Sciences), Frank Stockdale (Medicine/Oncology), Arthur B. Wolf (Anthropology)

Associate Professors: Christos Constantinou (Urology), Anne Fernald (Psychology), James Fox (Anthropology), Joan Fujimura (Anthropology), John Rick (Anthropology)

Assistant Professors: Amato J. Giaccia (Radiation Oncology), Abby King (Medicine and Health Research Policy)

Other Teaching Faculty: Donald Barr, Carol Boggs, Gail Butterfield, Ben Crow, Anne Ehrlich, S. Shirley Feldman, Robert Franciscurus, Dolores Gallagher-Thompson, Hill Gates, William B. Hurlbut, Dominique Irvine, Elise Lenox, Ruth Linden, Gordon Matheson, Sherri
The Program in Human Biology is an inter-school, interdepartmental, undergraduate major. It provides an interdisciplinary perspective on the relationship between the biological and social aspects of humanity's origin, development, and prospects.

The program has three goals:

1. To provide a broad and rigorous introduction to the biological and behavioral sciences and their interrelationships.
2. To relate these sciences to the problems raised by the relationships of human beings to one another and to their environment.
3. To help each student achieve a high level of understanding of one aspect of the biological and behavioral sciences and its application.

The 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.

Human Biology majors are well prepared for advanced training in professional schools (e.g., education, law, medicine, public policy) and graduate programs in the behavioral, natural, and social sciences, depending on their choice of upper-division courses. Undergraduates in Human Biology may enter coterminous master's degree programs in a number of other University departments.

Additional information about the major may be obtained from the program's offices.

**UNDERGRADUATE PROGRAM**

**BACHELOR OF ARTS**

The A.B. in Human Biology (HB) requires a minimum of 84 units in the major divided between four levels of courses:

1. **Fundamental Program**: at least 38 units, to include:
   - Human Biology Core 30 units
   - Policy Course 3-5 units
   - Statistics 4-5 units
   - Internship (HB197) 4 units
   The Human Biology Core refers to HB 2A and 2B, 3A and 3B, and 4A and 4B. See “Required Courses” below for more information.

Effective 1993-94, Human Biology 4B fulfills the policy requirement of the major. Other courses which satisfy the policy requirement may be obtained from the program offices. A course used to fulfill the program's policy requirement may not be used in the student's foundation or area of concentration or as one of the three required upper-division courses.

Statistics may be selected from: Statistics 60, Psychology 60, Economics 80, or Biological Sciences 141.

The core, the policy course, and a statistics course must be taken for a grade by majors.

The internship requirement, an independent field experience project, is graded Satisfactory/No Credit only.

2. **Foundation Courses**: 20-unit minimum. Total units vary, depending on the focus of study selected by the student for the area of concentration. They may include practicums, labs, and introductory-level courses from across the University. A maximum of 10 pre-med units (from the chemistry, physics and calculus series, and biology lab courses) and 4 research units are allowed.

3. **Area of Concentration**: a minimum of five courses totaling at least 20 units. This in-depth area of study enables the student to focus on educational and post-baccalaureate goals. Courses must be numbered 100 or above. All but one course in the concentration must be listed by, or cross-listed with, other University departments, and three or more departments must be represented in the concentration. Each course must be taken for a minimum of 3 units. Final approval of the concentration rests with the student advisers and faculty adviser. All area of concentration courses must be taken for a grade. Examples of numerous possible areas of concentration are available in the Human Biology Student Handbook.

4. **Upper-Division Courses**: students must take three Human Biology upper-division courses numbered 100 to 189. Students are expected to enroll in courses outside of the area of concentration for breadth. Lab courses cannot be used to fulfill the upper-division requirement. One upper-division course may be taken Satisfactory/No Credit. Each course must be taken for a minimum of 3 units. All non-laboratory advanced courses (those numbered 100 to 189) fulfill the Human Biology upper-division requirement, including those that say “enroll in” another department.

A prospective major must consult with the student advisers to obtain detailed information about the program and guidance in the development of an individual course of study. At the time the major is declared, the student must submit a brief written statement of academic and long-term goals and a proposed roster of courses satisfying the requirements for the major. The proposal is reviewed by the student advisers who then help select
an appropriate faculty adviser. Final approval of the proposed course of study rests with the faculty adviser.

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.

HONORS PROGRAM

The honors program in Human Biology affords qualified majors the opportunity to work closely with faculty on an individual research project culminating in an honors thesis. Students may begin honors research from a number of starting points including: topics introduced in the Core or upper-division courses, independent interests stemming from an internship experience, or collaborating with faculty from the natural, social, or behavioral sciences. Students may apply to the honors program once they have completed the human biology core, have an overall Stanford LGI of 3.0, and meet other requirements detailed in the Honors Handbook. Interested students should consult resources in the Human Biology office including the Human Biology Honors Handbook, the honors program application available from the student services office, and appointments during office hours with Human Biology honors chair.

Specific courses of interest to honors students include: HB 191 (Honors Seminar for Juniors), 192 (Honors Seminar for Seniors), 193 (Research in Human Biology), and 194 (Honors). Most honors projects involve a total of 10 to 15 units of course work in 193 and 194.

Admission to the honors program is by application, normally in the junior year (and no later than the first Friday in December of the senior year). Students planning to conduct honors research are encouraged to attend the Honors Seminar for Juniors (191) and to begin research or preparation during their junior year. The honors thesis is normally completed by the middle of Spring Quarter of the senior year. Each honors student then presents a brief summary of honors research at the Human Biology Honors Symposium in May.

COURSES

The faculty and staff of Human Biology prepare a student handbook, available in the Human Biology office, which provides a detailed description of the Human Biology major and outlines possible areas of concentration. Because the handbook is published over the summer, it reflects the most up-to-date information for the academic year, and is the definitive guide for all Human Biology majors.

REQUIRED CORE

Required Core sequences (2A and 2B, 3A and 3B, and 4A and 4B) introduce the biological and social sciences, and most importantly, relationships between the two. Classes meet MTWTh from 9-10:50 throughout the academic year. Students must register concurrently for the A and B series and take the core in sequence. Students should initiate the core in Autumn Quarter of the sophomore year. Any deviation from the core sequence must have the consent of the program chair. Freshmen are not permitted to enroll. Majors must take core courses for a grade.

2A, B. Genetics, Evolution, and Ecology: Culture, Evolution, and Society — 2A: introduction to basic principles of classical and modern genetics, evolutionary theory, and population biology. Topics: micro- and macro-evolution, population and molecular genetics, population dynamics, and community ecology, emphasizing the genetics of the evolutionary process and applications to human populations. 2B: introduction to evolutionary study of human diversity. Hominid evolution, the origins of social complexity, social theory, and the emergence of the modern world system, emphasizing the concept of culture and its influence on human differences.

2A. Genetics, Evolution, and Ecology — DR:5(7)
5 units, Aut (Durham) MTWTh 9

2B. Culture, Evolution, and Society — DR:9(4 or 5)
5 units, Aut (Klein) MTWTh 10


3A. Cell Biology and Developmental Biology — DR:5(7)
5 units, Win (Stockdale, Staff) MTWTh 9

3B. The Human Life Cycle — DR:9(4 or 5)
5 units, Win (S. Feldman, Katchadourian) MTWTh 10

4A, B. The Human Organism: The Human Predicament — 4A: organ system physiology, beginning with coverage of basic principles of neurobiology and endocrinology, and the functions of body organs. The mechanisms of control, regulation, and integration of organ systems function. 4B: the relation of the biological sciences to public policy in resource management and conservation practices, the regulation of environmental and health risks.
agricultural production, the delivery of health services, the protection of biodiversity, and global climate change. Assigned policy challenges in lectures and section meetings. Reading on actual cases.

4A. The Human Organism — DR:5(7)
5 units, Spr (R. Fernald, Heller) MTWTh 9

4B. The Human Predicament — DR:9(4 or 5)
5 units, Spr (Kennedy) MTWTh 10

ADDITIONAL INTRODUCTORY OFFERINGS

2S,3S,4S. Bioethical Issues in Human Biology — Perspectives on moral, ethical, and religious issues associated with advances in the biological sciences and their impact on human life. Guest speakers with discussion format.
1-2 units, Aut, Win, Spr (Hurlbut)

3X. Practicum in Young Child and Family Development — Practicum experience at Children’s Health Council for 3.5 hours/week. Must be taken concurrently or subsequent to 3B. Enrollment limited to 35.
1 unit, Win, Spr (S. Feldman)

by arrangement

3Y. Practicum in Daycare and the Young Child — Practicum experience at Stanford Daycare Centers for 3.5 hours/week. Must be taken concurrently or subsequent to 3B. Enrollment limited to 10.
1 unit, Win (S. Feldman)

6. Human Origins — (Same as Anthropology 6.)
The human fossil record from the appearance of the first non-human primates in the late Cretaceous or early Paleocene, 80-65 million years ago, to the anatomically modern people in the late Pleistocene, between 100,000 and 50,000 years ago. Emphasis is on broad evolutionary trends and on the natural selective forces behind them. DR:5(7)
5 units, Win (Klein)

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

11. Sleep and Dreams — Multi-media lecture/survey format providing a background of current information and research on how sleep affects our daily life. Topics: physiology of non-REM and REM sleep, daytime sleepiness and performance, circadian rhythms, dreaming (i.e., content, psychophysiological correlates, lucidity, etc.), sleep disorders (insomnia, narcolepsy, sleep apnea, sleepwalking), jet lag, sleeping pills, sleep and mental illness, sleep deprivation, developmental and phylogenetic aspects, sleep and memory, and other areas.
3 units (Dement) not given 1995-96

30. Woman’s Health Research — (Enroll in Feminist Studies 145A.)
1 unit, Aut, Win, Spr (Litt)

60. Colloquium on Population Studies — (Enroll in Biology 146.)
1 unit, Win (M. Feldman)

SOPHOMORE SEMINARS

Enrollment limited and open to sophomores only. Applications required and available at 124 Sweet Hall.

96B. Contemporary Issues in Human Experimentation — Issues in using humans for experimentation in medical research. Principles of protection of subjects, process of obtaining informed consent, organization of protocols, evaluation of experimental design and scientific merit. Ethical/legal issues involving human subjects in terms of confidentiality, recruitment, and conflict of interest. Legislation addressing inadequate numbers of women and minorities in research projects. Focus is on research with the cognitively impaired, prisoners, and barriers to obtaining informed consent in issues of age, language, and factors that may affect the ability to give truly informed consent.
3 units, Aut (Constantinou) M 6-8 p.m.

96C. Adolescent Sexuality — The emergence of sexuality in the context of developmental tasks of adolescence and changing societal conditions. Topics: theoretical perspectives; methodological approaches and limitations to the study of sexuality; adolescents’ sexual behavior and beliefs; biological aspects, especially the role of hormones at puberty; social influences, particularly parents and peers; social (and gendered) constructions of sexuality and their relationship to sex roles during adolescence; gay and lesbian adolescence; AIDS and sexually-transmitted diseases; and teenage pregnancy and abortion. Prerequisite: 3B or Psychology 1.
3 units, Spr (S. Feldman) MW 3:15-5:05

96E. Studies of Animal Behavior — (Enroll in Psychology 181C.)
3 units, Aut (R. Fernald)

96F. The Human Hand: Evolution, Development, and Molecular Genetics — The structure and function of the human hand from evolutionary and developmental perspectives. Cultural perspectives on the importance of the hand in art, music, instrumentation, mathematics (base ten) and communication (including American Sign Language). Topics: structure of the hand in human and non-human primates, evolutionary and developmental approaches to pattern formation in the hand.
4 units, Win (Porzig) T 1:15-3:05
96G. Guilt: Multidisciplinary Perspectives — Concepts and experiences of guilt and shame from multidisciplinary perspectives. The conceptual and historical roots of our ideas of guilt and shame from the perspectives of major religious traditions (Judaism, Buddhism, and Christianity). Recent conceptions of guilt based on evolutionary theory and the social sciences. The experience of guilt at the individual level. The development of the sense of guilt in childhood, the manifestations of guilt in interpersonal relationships, the psychopathology of guilt, and cross-cultural differences in the experience of guilt.

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

96I. Biology and Culture in Language Development — (Enroll in Psychology 181E.) 3 units, Spr (A. Fernald) M 3:15-5:30

96J. Analyzing Global Development — A political and economic ‘atlas’ of global change. Students work in pairs to analyze national statistics and narrative materials on a particular global issue. How to find materials, and how to assess them critically. Readings on global change and presentations and discussion of student projects. What forces contributed to the creation of a global economy? Is there a new international division of labor? How has the idea of One World gained support? Is there global government?

5 units, Aut (Crow) TTh 3:15-5:05

97A. Approaches to Understanding the Life Course — The ways social scientists have attempted to understand an individual’s life and its “epochs.” Lewis Terman’s study of gifted children, who were followed throughout their lives.

1-2 units, Aut (Hastorf) W 1:15-3:05

ADVANCED COURSES

Open to non-majors with the proper prerequisites. Human Biology majors have preference when enrollment is restricted. All classes listed here fulfill the Human Biology upper-division requirement, including those that say “enroll in” another department.

103. Women, Fertility, and Work: The Biology/Culture Debate About Gender — Seminar on women’s efforts to bear and rear young children while contributing to familial and community production. How women and men share and balance these aspects of social reproduction in diverse societies. Theoretical approaches to the connection between biology and culture are tested, emphasizing interactional effects. The limits of theories of the cultural construction of femaleness, connections between gender and political economy, and how these cultures differently envision individual and collective responsibilities in women’s work and childcare. DR:2f(*)

5 units (Gates) not given 1995-96

105. Ethnogerontology — Key sociocultural aspects of aging process; issues involved in assessment and treatment of mental and physical health problems of identified ethnic groups. Guest lectures by Asian American, Hispanic American, and African American experts in ethnogerontology. Supervised fieldwork with elders of various cultural and ethnic backgrounds.

4 units, Spr (Gallagher-Thompson, Yeo)

107. Biology and Space Exploration — Evolution cast against space and time, and focusing on the emergence of life, intelligence, and civilization on Earth and elsewhere. Life that derives from the phenomenon of human space exploration and the biological, psychological, sociological, and ultimately, philosophical issues that emerge. Integrates information from astrophysics, biochemistry, chemistry, evolutionary biology, geology, paleontology, physiology, psychology, and sociology. Prerequisites: Human Biology core or consent of instructor.

3 units, Spr (Staff)

109. Human Behavioral Biology — (Enroll in Biology 150/250.) The biological bases of normal and abnormal human behavior are examined to train students in approaching complex behaviors in a multidisciplinary way. Relevant disparate disciplines: sociobiology, ethology, neuroscience, and endocrinology are integrated in examining behaviors such as aggression, sexual behavior, language use, mental illness.

5 units, Spr (Sapolsky) MWF 1-2:30 alternate years, not given 1996-97

110. Vertebrate Biology — (Same as Biology 110.) The evolution, form, function, and behavior of the vertebrates, from primitive fishes to birds and mammals, including humans. Prerequisite: Biology or Human Biology core.

3 units, Spr (Porzig)

110L. Vertebrate Biology Lab — (Same as Biology 110L.) Comparative anatomy structure of the vertebrates with emphasis on osteology. Representatives of each of the seven vertebrate classes are available in lab. Three hours per week plus review labs and field trips. Prerequisites: current or previous enrollment in Human Biology 110.

3 units, Spr (Porzig)

111. Human Physiology — (Enroll in Biology 112.) The functioning of organ systems, emphasizing mechanisms of control and regulation. Topics: structure and function of endocrine and central nervous systems, cardiovascular physiology, respiration, salt and water balance, exercise and gastrointestinal physiology. Lectures/discussion. Prerequisite: Biology or Human Biology core.

4 units, Win (Heller, Harris) MWF 9

115A. Humans and Viruses — Overview of human virology. Topics illustrate important concepts in biology and the social sciences, focusing on emerg-
World come from and how can this diversity be used to study human prehistory? Evidence from related fields (archaeology and human genetics). Topics: the origin of the Indo-European languages, the peopling of the Americas, and the evidence that all human languages share a common origin. DR:2(*)

3 units, Spr (Ruhlen)

119. Conservation Biology — Introduction to the science of preserving biological diversity, its principles, policy, and application. Topics: biology of small populations, extinction, minimum viable population analysis, habitat fragmentation, reserve design and management, the Endangered Species Act, and conflict mediation. Case studies and local field trips illustrate topics. Prerequisite: 2A, Biology 33, or consent of instructor.

4 units, Win (Boggs)

120. Human Nutrition — Introduction to human nutrition including the function, absorption, and metabolism of nutrients; dietary recommendations and standards; personal dietary assessment. Prerequisite: Human Biology core or consent of instructor.

4 units, Aut (Butterfield) MW 3:15-4:30

121. Ethical Issues in the Neurosciences — Multidisciplinary approach to ethical questions raised by recent advances in the neurosciences. How these advances relate to medical therapy, social policy, and broader considerations of human nature (consciousness, free will, personal identity, and moral responsibility). Discussion format with leading research scientists, legal experts, philosophers, and theologians. Topics: neurogenetics, fetal brain tissue therapy, medicalization of criminal behavior, cosmetic psychopharmacology, and the neurobiological basis of love, sexuality, and gender. Enrollment limited to 15. Prerequisites: Human Biology core, Biology core, or consent of the instructor.

5 units, Spr (Hurlbut) MW 7-9:30 p.m.

123. Development in Infancy — (Enroll in Psychology 130.) Development in the first two years of life. Topics: prenatal development and childbirth, perceptual development, cognitive development in infancy, parent-infant interaction, infant social cognition, the development of emotion, and preverbal communication. Prerequisites: 1, 111, or Human Biology core.

3-4 units (A. Fernald) not given 1995-96

124. Neural Basis of Sleep and Circadian Rhythms — (Enroll in Biology 149.)

3 units, Aut (Heller, Kilduff)

126. Advanced Vertebrate Development — Current themes in vertebrate developmental biology and techniques of reading and criticizing scientific literature. One three-hour evening section per week with lectures, discussion, and student presentations. Critically assesses experimental literature in basic biology.

3 units (Stockdale) not given 1995-96
128. Seminar in Human Developmental Biology and Medicine — Critical evaluation of current literature on human gametogenesis and early embryonic development. The social, medical, and health policy aspects of early human development. Topics: the medical ethics of in vitro fertilization and other assisted reproductive technologies, comparative biology of spermatogenesis and oogenesis, health policy approaches to infertility and over-fertility, cultural perspectives on gametes. A writing-based seminar. Enrollment limited to 12. Prerequisites: Human Biology core and Human Biology 156. 3 units, Win (Porzig)

129A. Controversies in Human Nutrition — Seminar on human nutrition. Exposure to statistics and experimental design. One hour oral presentations on subjects of students' choice, emphasizing critical reading of original scientific research. Summary paper required. Prerequisites: 120, consent of instructor. 3 units (Butterfield) not given 1995-96

129B. Controversies in Sports Nutrition — In-depth investigation of controversial issues in sports nutrition. Lectures, student presentations on controversial issues. Students evaluate original scientific literature and read material pertinent to each controversy to participate knowledgeably in the discussion. Prerequisites: 120 and 159, or consent of instructor. 3 units, Win (Butterfield)

130. Adam 2000: Images of Human Life in the Age of Biomedical Technology — Interdisciplinary approach to the social, moral, and aesthetic values which guide the use of biomedical technology. How advances in biology are reshaping our relationship with nature, attitudes toward the body, and ideas about the meaning and purpose of human life. Topics: use of medical technology to alter appearance and enhance performance, fetal tissue transplantation, biotherapy for criminal behavior, treatment of aging as a disease, and alteration of the body for space travel. Lecture/discussion format with distinguished guests from the scientific and religious communities. Limited enrollment. Prerequisites: Human Biology or Biology core, or consent of the instructor. 4 units, Win (Hurlbut)

131. Natural Resources Policy and Law — Focuses on federal public land and natural resources policy; mining, timber, and grazing law and policy; legal aspects of forest, range, park, wilderness, wetlands, and wildlife management; recreation and preservation; and related issues. The role of the courts, administrative discretion, the Endangered Species Act, and the tension between protecting resources and respecting property rights. Students research one aspect of law and policy governing the management of natural resources. Paper. 5 units, Win (Rosencrancz) W 2:15-4:05

132. Environments of East Asia and Oceania: Intensification, Degradation, and Transformation — Human/environmental interactions in two contrasting world regions: continental E. Asia (including Korea and Japan) and insular Oceania. Prehistoric, colonial, and contemporary effects of human action in terms of sustainability, intensification, and biodegradation under differing cultural regimes. Emerging ecological dilemmas and solutions in contemporary societies with very different structures, resources, and degrees of global integration. 4 units (Gates) not given 1995-96

134. Ecological Anthropology — (Same as Anthropology 164.) The relationship between human populations and their environments. How environment influences human behavior and culture, and how human populations shape the environment. Classical approaches within the field: cultural ecology, systems theory, optimization theory, evolutionary ecology, and population dynamics. Current research on indigenous systems of resource management, common property resources, and political ecology. DR:2(*) or DR:9(*) 3-5 units (Durham, Staff) not given 1995-96

136. Population Perspectives in the Third World — (Enroll in Food Research 136.) 5 units, Spr (Arthur)

137. Poverty, Technology, and Rural Industrialization — (Enroll in Science, Technology, and Society 270.) 5 units, Spr (Crow)

139. Conservation and Community Development in Latin America — (Same as Anthropology 161A, Latin American Studies 196.) The problems and potentials for linking management of protected areas (parks, reserves, wildlife sanctuaries, etc.) with local community development in Latin America. Case studies include national and private parks in Costa Rica, and biosphere reserves in Central and S. America. Emphasis on the impact of Western conservation efforts on indigenous peoples and the ways such efforts might be carried out with social, cultural, and economic benefits at the local level. 3-5 units (Durham, Irvine) not given 1995-96

142. The Impact of AIDS — Focuses on HIV, particularly disease pathology and spread of the virus, providing a solid foundation for understanding the impact of HIV on biology, medicine, and society. Biology, clinical features, cultural aspects, and intervention/prevention. Provides tools for thinking of ways to stop the transmission of HIV, emphasizing education and health policy. Cultural aspects of HIV, including perspectives from sociology, law, economics, ethics, and politics. Students use their knowledge to complete a service learning project such as teaching high school students about HIV as
part of a student speaker bureau. Extensive use of
guest speakers and experts on HIV.
5 units, Win (Siegel)
145. Third World Development—(Same as Sci-
cence, Technology, and Society 271.) Interdisci-
niplinary introduction to the issues of Third World
development, differences in approach, and contrib-
utions of different academic disciplines. The di-
versity of the developing world, the growing gap
between rich and poor, industrialization, agrarian
change, the role of the state in development, the
relationship between environment and development,
and questions relating to gender and development.
5 units, Aut (Crow) TTh 9-11
146. Perspectives on Sustainable Development in
Latin America—(Enroll in Latin American Stud-
ies 195.)
5 units, Win (Rosset)
148. Environmental Policy—Important environ-
mental issues of today and the future, how to deal
with them politically, and how to resolve conflicts
between environmental concerns and other social
needs. Focuses on the U.S.; international perspec-
tive when appropriate. Definition and description of
environment and environmental impact, history of
human impact on environment, causes of increased
human impact, history of environmental protection,
decision making and resolution of issues, future
environmental issues. Two discussion hours. En-
rollment limited to 15 Human Biology seniors.
Prerequisites: Human Biology core, or consent of
instructor.
3 units (A. Ehrlich) not given 1995-96
149. Indigenous Peoples and Environmental
Problems—(Same as Anthropology 169, Latin
American Studies 129.) Upper-division undergradu-
ate. The human consequences of contemporary en-
vironmental problems. The impact of market econo-
 mies, “development” efforts, and conservation pro-
grams on indigenous peoples with reference to the
Amazon, E. Africa, Alaska, and Central America.
The role of indigenous grassroots organizations in
combating environmental destruction and degrada-
tion of homeland areas.
3-5 units (Durham, Staff) not given 1995-96
150. Seminar: Gender-Specific Perspectives on
Birth Control—in most societies human fertili-
ty control responsibility rests predominantly with
women. Is this desirable and realistic, or should
changes be instituted? Groups of four to five stu-
dents of diverse backgrounds and different profes-
sional interests (medicine, law, economics, reli-
gion, sociology, political science) develop a series
of position papers dealing with new birth control
procedures suitable for populations of different cul-
tural and socioeconomic backgrounds with gender-
specific considerations. Part I: lectures, selecting
population groups and multi-disciplinary task forces,
and individual discussions with each task force. Part
II: library and field work, writing task force reports,
and oral presentations. Limited to 20 seniors; junior
standing considered in exceptional circumstances.
DR:†
6 units, Spr (Djerassi) TTh 1:15-4:05
151. The Rise of Scientific Medicine—(Enroll in
History and Philosophy of Science 154.)
4 units, Spr (Lenoir)
152. The Biology and Culture of Recreational
Drugs—The biopharmacology of alcohol, nico-
tine, and other drugs, along with the psychological,
social, cultural, economic and political factors that
have influenced substance use in the U.S. Historical
and cross-cultural comparisons provide perspec-
tives on current drug use issues. Prerequisites: basic
understanding of the nervous system; at least one
course such as 4A, Biology 32, Psychology 70; or
consent of instructor.
3-4 units, Win (O’Hara, Lenox) MWF 10
153. Constructing HIV/AIDS: The Epidemic’s
Second Decade—(Enroll in History and Philoso-
phy of Science 120.)
5 units, Win (Linden)
154. Biosocial Aspects of Cancer—Recent ad-
vances in the biology, diagnosis, and treatment of
cancer. The social and economic ramifications of
being diagnosed and treated for cancer. What are the
present options for cancer treatment and what new
technologies may change these options in the fu-
ture? New diagnostic techniques for early detection
of cancer. The use of predictive assays to determine
the most effective treatment modality—chemo-
therapy, radiotherapy, surgery, hyperthermia, im-
munotherapy, etc.
4 units, Spr (Giaccia)
155. Undergraduate Seminar: Selected Topics in
Sleep Research and Sleep Disorders Medicine—
Topics decided by the students and instructor, taken
from current research in the areas of basic sleep and
dream research and sleep disorders medicine. Guest
lectures by scientists in the field. Discussions on
current research. Students find and critique data
from predominantly scientific journals, culminat-
ing in a formal presentation. Enrollment limited to
12. Prerequisites: 11, consent of instructor.
5 units (Dement) not given 1995-96
156. Human Development: Biological, Medical,
and Social Aspects—(Same as Biology 154.)
Biological, medical, and social aspects of normal
and abnormal human development. Topics: in vitro
fertilization and embryo transfer; gene and cell
therapy; gametogenesis; pattern formation in ner-
vous system and limb development; gene activity in
early development; cell recognition at fertilization;
twinning and grand multiple pregnancies; prematu-
rity, in utero effects of teratogens; sex determina-
tion and differentiation; growth control; gigantism
and dwarfism; neural tube defects; cardiac morpho-
genesis; progress in the developmental biology of humans. Three hours of lectures plus one hour required discussion section per week. Limited enrollment. Prerequisites: Human Biology or Biology core, or consent of instructor.

3-4 units, Aut (Porzig) TTh 11-12:15

157. Biological Basis of Behavior — (Same as Psychology 148.) The neural and hormonal basis of animal behavior studied to understand the basis of behavioral patterns. Multidisciplinary analysis of the ecological and physiological constraints which have governed specific adaptations in animal systems.

3 units (R. Fernald) not given 1995-96

158. The Black Death and Medieval Responses to Plague: The AIDS of the 14th Century — (Enroll in History 111.)

5 units, Spr (Smoller)

159. Sports Medicine — (Same as Medicine 260.) Overview designed for medical students and upper-division Human Biology undergraduates. Integrated physiological responses to the elevated metabolic demands of exercise; acute responses and training adaptations. Topics: the neuromuscular system, energy metabolism, cardiopulmonary system, endocrine system, nutrition and biomechanics. The application of physiological principles to specific situations and populations. Topics: training principles, measurement of exercise capacity, nutrition and performance, environmental extremes of human performance, exercise and children, exercise and aging, women’s issues, fitness and health, prescribing exercise, overtraining and immunity, drugs in sport, and musculoskeletal injuries. Prerequisite: medical school enrollment or upper-division Human Biology standing or consent of instructor.

4 units, Aut (Matheson) MWF 1:15

160. Health Care in America — Overview of the health care system in the U.S., examining several key organizations and institutions that shape health policy and health care delivery. By understanding the forces that affect health and health care, students assess more critically options for health care reform.

3 units, Aut (Barr) TTh 11

161. Darwin, Evolution and Galapagos — (Same as Anthropology 193.) Advanced seminar on the flora and fauna of the Galapagos Islands and what they reveal about pattern and process in organic evolution. Darwin’s observations in the Galapagos, and their role on the formulation of his theory of evolution. Implications of recent research in the Galapagos for understanding evolutionary dynamics. Lectures, discussion, and optional field trip to the Galapagos Islands (at extra expense, limited capacity). Enrollment limited to 25. Prerequisites: Human Biology core or consent of instructor.

5 units (Durham) not given 1995-96

164. Topics in Socio-Cultural Studies of Biotechnology — (Enroll in Anthropology 162A.)

5 units (Fujimura)

165A. Disease, Health, and Culture Change — Outbreaks of disease and health as casual factors in the shaping of human cultures. Humans buffer themselves against the consequences of ill health through their capacities for storing and transmitting knowledge, and for dividing the labor of subsistence in flexible ways. The complexity of cultures renders them vulnerable under biologically stressful conditions as individuals or groups with special knowledge and skills die or become incapacitated. Cultural changes are examined to access the significance of disease and health as factors in cultural processes. Class, ethnic, and sex/gender differences as they affect disease-induced culture change.

4 units, Win (Gates)

166. Cardiovascular Disease Epidemiology and Prevention — Epidemiological, biological, and behavioral perspectives of cardiovascular disease and assessment and modification of risk factors relating to it. The potential for disease prevention in the context of major preventive trials. Public policy ramifications. Topics: diet, weight control, smoking, Type-A behavior, and exercise. Enrollment limited to 40. Prerequisites: Human Biology core or consent of instructor.

4 units, Aut (King) MW 11-12:30

167. International Health — (Enroll in Health Research 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

168. Medical Anthropology — (Enroll in Anthropology 168.) For students with interests in health care. Introduction to curing systems in our own and in non-Western cultures; problems of adapting modern medicine to diverse cultures; explication of the social and cultural correlates of physical and mental health and disease (social epidemiology).

5 units, Aut (Barnett)

169. Women, Sexuality, and Health — 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 from a social, psychological, and feminist perspective. DR:2(*) or DR:9(5*)

5 units, Aut (Barnett)

170. Gender and Science — (Enroll in Anthropology 160.)

5 units, Aut (Fujimura)
171. Adolescence — Adolescence from anthropological, sociological, psychological, and psychiatric perspectives. Topics: physical, physiological, and cognitive development; identity, peer group, parent/child relations; impact of school and college, vocational development, and problem outcomes. Prerequisites: Human Biology core or Psychology 111, and statistics course.
4-5 units (S. Feldman) not given 1995-96

172. Biology and Evolution of Language — (Enroll in Anthropology 5.) Language as an evolutionary adaptation of humans. Comparison of communicative behavior in humans and animals, and the inference of evolutionary stages. Structure, linguistic functions, and evolution of the vocal tract, ear, and brain, with associated disorders (stuttering, dyslexia, autism, schizophrenia) and therapies. Controversies over language “centers” in the brain and the innateness of language acquisition. Vision, color terminology, and biological explanation in linguistic theory.
4-5 units (Fox) not given 1995-96

173. Medical Ethics — (Enroll in Philosophy 78.)
4 units (Staff)

175. Virtual Vertebrates — Computer simulations of the biomechanics of aquatic locomotion in vertebrates such as fishes and cetaceans. Development and testing of educational software on the anatomy, physiology, and biomechanics of swimming vertebrates. Possible organisms: lungfish, eels, lamprey, tuna, sharks, rays, turtles, penguins, dolphins. Estimation and resolution of the biomechanical forces affecting lift, thrust, and drag. Computer-laboratory-based weekly meetings. Enrollment limited to 10. Prerequisites: Human Biology 110, consent of instructor.
3 units, Win (Porzig)

176. Incas and their Ancestors: Peruvian Archaeology — (Enroll in Anthropology 189.)
5 units, Win (Rick)

3 units, Aut (Hastorf, Scott) TTh 11-12:15

178. Aging: From Biology to Social Policy — (Enroll in Anthropology 140.)
5 units, Spr (Barnett)

180C. Advanced Human Osteology — (Enroll in Anthropology 180C.)
5 units, Win (Franciscus)

180B. Beginning Human Osteology — (Enroll in Anthropology 180B.)
5 units, Aut (Franciscus)

181. Evolutionary Anthropology — (Same as Anthropology 181.) Upper-division/graduate seminar focused on the concept of evolution as used in anthropology. Evolutionary theory in biological anthropology, as applied to hominin evolution and human population genetics. Evolutionary approaches to culture and social organization, including social evolution, sociobiology, and evolutionary culture theory. Enrollment limited to 20.
5 units, Aut (Durham) TTh 3:15-5:05

182. Peasant Society: Economy and Environment — (Same as Anthropology 149A.) Until WW II, peasants were a majority of the world’s population. Now they are a minority everywhere except in S. and E. Asia and sub-Saharan Africa, a dramatic transformation of agrarian society. Peasant and semiproletarian populations in rural Asia, Latin America, and Africa number some two billion. Core seminars are on peasant society and the aspects of agrarian economic and social change. Students complete a research project on a specific question, relating to a social and geographic context in: food, forests, technology, or water. Prerequisite: one previous course on developing world.
4 units (Crow) not given 1995-96

183. Hunter-Gatherers in Archaeological Perspective — (Enroll in Anthropology 187.)
5 units (Rick) not given 1995-96

184. The Darwinian Revolution — (Enroll in History and Philosophy of Science 152.)
4 units, Aut (Lenoir)

187. The Study of Mind: Its Origins in Philosophy, Physiology, and Psychology — Different approaches to our understanding of consciousness in historical perspective, beginning with the British associationist philosophers in the 18th century. The major biological and physiological contributions of the 19th and early 20th centuries. Contemporary psychological positions including psychoanalysis, information processing, Gestalt psychology and recent findings in psychoimmunology. Prerequisites: Human Biology core, at least two courses in psychology, junior or senior standing.
3 units, Win (Hastorf) TTh 11-12:15

188. The Origins of Modern Humans — (Enroll in Anthropology 194.)
5 units, Spr (Franciscus)

HONORS, INTERNSHIP, AND SPECIAL PROJECTS

191. Honors Seminar for Juniors — Open to juniors and sophomores considering honors work in Human Biology. Weekly seminar surveys faculty research areas and considers writing honors proposals, research grant applications, and Hu-
man Subjects Committee approval. Speakers include honors students, faculty, and statistical and writing consultants.

1 unit, Aut (Staff)

192. Honors Seminar for Seniors — Weekly seminar considers modifying honors proposals and honors theses. Speakers include honors students, faculty, and statistical and writing consultants. Prerequisites: admission to the honors program; may be taken by juniors or seniors advanced in their honors work.

1 unit, Aut (Porzig)

193. Research in Human Biology — Independent research conducted under faculty supervision, normally taken junior or senior year in pursuit of an honors project. May be taken more than one quarter for credit. Prerequisites: completed application to the honors program.

1-10 units (Staff) by arrangement

194. Honors — Completion of the honors project. First component: the honors thesis, a final paper providing evidence of rigorous research, fully referenced, and written in an accepted scientific style. Second component: participation in the honors symposium, including a 10-minute oral presentation followed by a brief question and answer session. Prerequisites: 193, a draft of the honors thesis, and acceptance into the honors program.

1-5 units (Porzig) by arrangement

197. Internship in Human Biology — Limited to and required of Human Biology majors. Combines coursework with a supervised field, community, or lab experience of student’s own choosing. Must be arranged in advance and initiated at least three quarters prior to graduation.

4 units (Staff) by arrangement

199. Directed Reading/Special Projects — Independent study. Students must complete application in student services office.

1-4 units (Staff) by arrangement

200. Teaching of Human Biology — For upper-division undergraduate and graduate students. Practical experience in teaching Human Biology or serving as an assistant in a lecture course.

1-5 units (Staff) by arrangement

OVERSEAS STUDIES

Descriptions of these courses are in the “Overseas Studies” section of this bulletin or at the Overseas Studies office, 126 Sweet Hall.

106H. Man Environment Interactions — Case Studies from Central Chile — Santiago. DR:6(8)
5 units, Aut (Hajek)

153X. Health Systems and Health Insurance: France and the U.S. — A Comparison — Paris
4 units, Win (Giraud)

HUMANITIES SPECIAL PROGRAMS

Emeriti: (Professors) Paul H. Kocher, Kurt Mueller-Vollmer, Lawrence V. Ryan
Chair: Paul Robinson
Teaching and Program Coordinator: Helen Brooks (English and Humanities)

Honors Program Committee in Charge: (Chair) Paul Robinson (History); Helen Brooks (English and Humanities), Gregory Freidin (Slavic Languages and Literatures), Robert Harrison (French and Italian), Karen Kenkel (German Studies), Andrea Nightingale (Classics), Alice Rayner (Drama)

Graduate Program Committee in Charge: (Chair) Paul Robinson (History); Karol Berge (Music), Helen Brooks (English and Humanities), Eckart Förster (Philosophy), Hester Gelber (Religious Studies), Suzanne Lewis (Art), Kurt Mueller-Vollmer (German Studies and Humanities), Andrea Nightingale (Classics), Rush Rehm (Drama)

Humanities Special Programs include:
1. Honors Program in Humanities
2. Graduate Programs in Humanities
   a) Master of Arts
   b) Joint Ph.D.
3. American Studies (see the “American Studies” section of this bulletin.)
4. Medieval Studies (see the “Medieval Studies” section of this bulletin.)

UNDERGRADUATE PROGRAMS

HONORS PROGRAM

The Honors Program in Humanities aims to heighten a sense of the relations among various humanistic disciplines, and to increase awareness of basic human values — intellectual, aesthetic, literary, historical, social, and ethical.

ADMISSION

As an extradepartmental honors program, the Humanities Honors Program is open to any qualified undergraduate at Stanford, regardless of major. Interested freshmen and sophomores may obtain information from the program office. Applications should be submitted at the earliest opportunity, preferably Spring Quarter of the freshman year, and in every case before the junior year. Students must meet the following entrance requirements before being admitted to the program:

1. Completion of all three quarters of the Cultures, Ideas, and Values (CIV) Area I 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 Writing and Critical Thinking sections; all courses in the Departments of Art, Drama, and Music (except studio or performance courses); all courses in the Departments of Asian Languages, Classics, English, French and Italian, German Studies, Slavic Languages and Literatures, and Spanish and Portuguese (except first-year language courses); all courses in the Departments of Comparative Literature, History, Philosophy, and Religious Studies; and all courses in the Programs in Feminist Studies and Modern Thought and Literature.

REQUIREMENTS

1. Humanities 160: 5 units, sophomore year. Prerequisite: completion of Area 1 requirement (CIV).

2. Unless students have strong intellectual reasons for doing otherwise, they must fulfill their “World Cultures” (Area 2) and “American Cultures” (Area 3) requirements from courses offered in humanities disciplines.

3. In order to develop the requisite knowledge and methodological background to write a Humanities honors essay, students must take, during their sophomore and junior years, the required Humanities honors courses and additional humanities courses in disciplines of their interest.

4. Two different Humanities honors seminars in the series 190-198: 10 units, usually junior year. Prerequisite: 160. Both seminars must be completed by the end of the tenth quarter of undergraduate study in order for students to remain members in good standing.

5. An honors essay proposal, submitted to the Committee-in-Charge at least one year prior to the intended date of graduation, and approved by the committee (2 units, usually Winter or Spring Quarter, junior year).

6. An honors essay on a topic approved by the Committee-in-Charge (usually 5 units Autumn Quarter and 5 units Winter Quarter, senior year).

7. An overall minimum average LGI of 3.0 (B) in all course work in order to remain in the program.

BACHELOR OF ARTS

Students in the Humanities Honors Program who have a high interest in making interdisciplinary work in the Humanities a focus of their undergraduate program may obtain an A.B. in Humanities through one of the following alternatives:

1. Choose a major in Humanities honors concentrating in Modern Thought and Literature and submit a study plan approved by one of the designated Modern Thought and Literature undergraduate advisers (see the “Modern Thought and Literature” section of this bulletin). The Modern Thought and Literature concentration is open to students whose interests are in cultural studies.

2. Propose and receive approval of a 40-unit concentration of interdepartmental course work constituting a unified program of study that is not encompassed by any other undergraduate major at Stanford (for example, Medieval studies, modern visual esthetics, baroque studies.)

Students who wish to major in Humanities honors should enter the program and receive approval of their concentrations before the end of the first quarter of the junior year. Competence in reading a foreign language is required of all Humanities honors majors and must be certified by appropriate course work or equivalent.

GRADUATE PROGRAMS

MASTER OF ARTS

Application is made through the Humanities Special Programs office. (Application forms are available from Graduate Admissions, Registrar’s Office, Old Union, Stanford University, Stanford CA 94305-3005.) The A.M. program in Humanities is ideally completed as a half-time, two-year program, but under some circumstances it may be completed in one year as a full-time program. The department does not offer financial aid for the master’s program. Qualified undergraduates at Stanford may petition to complete the A.M. program coterminally with their bachelor’s degrees. The deadline for applying to the A.M. program is March 1 for both outside and coterminus applications.

REQUIREMENTS

1. Reading knowledge of at least one foreign language, to be completed prior to admission to the A.M. program.

2. Complete the five Graduate Program in Humanities (GPH) seminars (Humanities 311-315).

3. Complete four graduate-level courses in an approved “established discipline,” to be determined in consultation with the chair. One of these must be a graduate-level research seminar for which a research paper is required (this paper must be filed in the department). Under “Statement of Purpose” on the application form, the candidate must indicate the established discipline (for example, art history, classics, philosophy, and so on.) from which the graduate-level courses are drawn. The candidate must also note his or her qualifications for under-
taking graduate study in that discipline. Once admitted, the student submits a proposed program of study to the chair, specifying the particular courses to be taken. The proposed program is approved on its own merits to ensure that the chosen graduate courses are suited to the A.M. in Humanities.

4. Satisfactory completion of 298, the Spring Quarter Graduate Program in Humanities Symposium.

The minimum number of units for the A.M. degree is 36. Additional elective units may be taken at the option of the student.

Undergraduates wishing to pursue the A.M. as part of a coterminous program should speak with the department administrator about the application procedures for coterminous students.

**JOINT Ph.D.**

The GPH provides graduate students in different disciplines an opportunity to broaden their knowledge of intellectual and cultural history by focusing on texts and ideas which have been central to all humanistic disciplines from classical Greece to the present. The program’s seminars usually focus on specific topics or issues in the context of historical, literary, philosophical, and other possible disciplinary and theoretical orientations. The program provides a unique opportunity to study highly influential texts with a view to their relevance to the student’s own disciplinary field.

Because the GPH supplements, and does not substitute for, department specialties, its members must be students earning the Ph.D. in an academic department at Stanford.

Application for entrance should be made to the chair. Members of the program are given first preference in registration for all of its offerings. Normally, the program involves taking Humanities 311-314, followed by 315, the core seminar on interdisciplinary study in the humanities. The course of study culminates in the GPH student symposium, which is developed and organized by the students in the program.

Although students in the GPH generally complete the program course work in their first two years of graduate study, requirements of some participating departments may necessitate completion of the GPH over three years. In some instances, one or more of the GPH seminars may fit within the requirements of the student’s home department.

The Departments of Art, Classics, Drama, English, French and Italian, German Studies, History, Modern Thought and Literature, Music, Philosophy, Religious Studies, Slavic Languages and Literatures, and Spanish and Portuguese all participate in the GPH. Doctoral students from other departments may participate with the permission of their home departments and approval of the chair of Humanities Special Programs.

**REQUIREMENTS**

1. Continue satisfactory work in the student’s major field, in accordance with department requirements.

2. Complete the four chronologically ordered seminars (Humanities 311-314) followed by the core seminar on interdisciplinary study in the humanities (Humanities 315). To qualify for candidacy, students should complete at least three seminars in the first two years of graduate residence. Exemption from, or permission to audit, a seminar may be secured by petition if the student can show coverage of the material at an advanced level.

3. Participate in the GPH student symposium at the end of the second year of GPH course work (Humanities 298; registration for units is optional).

4. At least one quarter of teaching for Humanities Special Programs, normally a teaching internship in the third or fourth year; other interdisciplinary teaching may be substituted for this requirement by petition to the Committee-in-Charge (Humanities 299; registration for units is optional).

5. Reading knowledge of at least one foreign language, ancient or modern, to be certified in the first two years of graduate work.

6. Passing the University oral examination according to the schedule prescribed by the major department, with one GPH representative, designated by the chair, as a member of the examining committee.

7. Submission of a Ph.D. dissertation acceptable to a committee which includes one representative of the GPH, designated by the chair.

**COURSES**

See quarterly *Time Schedule* for changes in listings.

61,62,63. Literature and the History of Ideas

- Introduction to fundamental ideas of the past. Emphasis is on the interconnection of literature, the arts, and philosophical and social thought in shaping the cultural traditions from the ancient to the contemporary world. The sequence also gives attention to non-European cultural traditions.

61. The Ancient Near East, Greece, and Rome — DR:1 (three-quarter sequence)

5 units, Aut (McCall, Staff)

62. The Middle Ages and the Renaissance — DR:1 (three-quarter sequence)

5 units, Win (Brooks, Staff)
63. The Enlightenment to the Present — DR: 1
   (three-quarter sequence)
   5 units, Spr (Eisen, Staff)

110A, B.C. Seminar: Topics in Cultures, Ideas, and Values —
   Advanced undergraduate seminar for students concurrently enrolled in 61, 62, 63.
   Opportunity to go beyond the requirements of the Humanities CIV sequence in a seminar of fewer students.
   Reading list from 61, 62 and 63 constitutes the primary textual material. Materials and guest speakers are arranged in consultation with the enrolled students. Completion of 110 does not substitute for work required in the CIV sequence. Prerequisite: consent of Teaching and Program Coordinator.
   2 units, Win, Spr (Brooks)

160. Introduction to the Humanities Honors Program —
   Themes and issues as treated in important works from various disciplines in the humanities. Topic: turn of the century Vienna. Prerequisites: completion of CIV requirement and enrollment in Humanities honors program.
   5 units, Win (Harvey)

160A. Introduction to the Humanities Honors Program —
   (Same as Religious Studies 174D.)
   Themes and issues as treated in important works from various disciplines in the humanities. Topic: Nietzsche. Prerequisites: completion of CIV requirement and enrollment in Humanities honors program.
   5 units, Spr (Harvey)

175. Individual Work — For students in the Humanities honors program who have objectives not met by current course offerings.
   2-5 units, any quarter (Staff)
   by arrangement

190-198. Interdisciplinary Honors Seminars on the Nature of the Humanities — Students in the Humanities Honors Program must complete two different seminars from different areas before the end of the tenth quarter of undergraduate study. Humanities majors in Modern Thought and Literature take one of those seminars from the 197 series. Other students may enroll if space allows and with the instructor's consent. Prerequisite: 160.

191R. History and The Humanities: Europe 1880-1918 —
   The Fin de Siècle and the Great War — (Same as History 239.)
   The period from 1880-1914 represents transition from an optimistic, naive age to one that knew moral relativism, total war, and material comfort and great genius. Through art, fiction, autobiography, psychology and cultural history, how the “age of innocence” ended and the 20th century began.
   5 units, Aut (Roberts) MW 11-12:50

192G. The Arts and the Humanities: Philosophical Art
   5 units, Win (Guttmann)

192H. Opera and the Humanities — For students who have had a prior interest in, but no exposure to opera. Introduction to opera through a study of its changing conventions and social and aesthetic functions at various times in its history. The role of performers, opera's shifting relationships to high and popular culture, representations of women. Several operas are studied in detail; students attend at least one performance.
   5 units, Aut (Lindenberger)

193R. Philosophy and the Humanities: What is it like to be Human? —
   What is distinctive about human beings, and what is it to lead a full (or good) human life? How important are cultural, ethnic, gender differences? These issues in the context of the encounter between Europe and the New World, and early modern revaluations of the status of women. Readings: classical philosophical works and other types of writings, primarily 16th-18th century.
   5 units, Spr (Rozemond)

197F. Modernism and the Humanities: Tolstoy's Anna Karenina and the Social Thought of Its Time —
   (Same as Slavic Languages and Literatures 190.)
   5 units, Spr (Freedin)

197P. Modernism and the Humanities: Symbolism —
   5 units, Spr (Freedin)

200A, B.C. Senior Research — Limited to Humanities honors students. A critical essay of about 15,000 words.

200A. Research 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. Senior Research — Regular meetings with tutor. Prerequisite: 200A.
   1-5 units (Staff) by arrangement

200C. Senior Research — Regular meetings with tutor; submission of complete first draft to tutor by end of quarter. Prerequisite: 200B.
   1-5 units (Staff) by arrangement
298. GPH Symposium — Required of doctoral and masters students in the GPH. Participation in the student-organized symposium; presentation of a paper informed by texts addressed in the GPH seminars.
   1-3 units, Spr (Robinson) by arrangement

299. Teaching Internship — Required of doctoral students in the GPH. Preparation for teaching in interdisciplinary programs. Closely supervised teaching responsibilities in the Humanities CIV sequence (61, 62, 63).
   1-3 units (Brooks) by arrangement

311,312,313,314,315. Graduate Program in Humanities Seminars — Required of students in GPH. Open to other graduate students only by consent of the instructor.
   311. Classical Seminar
      3-4 units, Aut (Stephens) MW 4:15-6:05
   312. Medieval Seminar
      3-4 units, Win (Andersson) TTh 4:15-6:05
   313. Renaissance/Early Modern Seminar
      3-4 units, Aut, Spr (Brooks) TTh 4:15-6:05
   314. Modern Seminar
      3-4 units, Win (Mueller-Vollmer)
      MW 4:15-6:05
   315. Graduate Core Colloquium: The Interdisciplinary Study of the Humanities
      3-4 units, Win (Robinson)
      TTh 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 a number of prescribed courses during his or her undergraduate career.

The program provides (1) an understanding of the historical development of the modern world; (2) training in economics and politics, with emphasis on the study of international relations; and (3) 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 coterminous degree program involving their undergraduate major department and this program. Application requires an up-to-date transcript, two letters of recommendation from university-level instructors, a course paper of at least ten pages, and a statement of relevant personal, academic, and career plans and goals. Application is made through the International Relations office, Bldg. 200, room 17. Before making formal application, students should review the brochure "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 Coterminous 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 submitted at the International Relations/International Policy Studies office, Bldg. 200, room 17. The closing date for filing applications and supporting credentials is November 10 of the senior year.

Admission at the Graduate Level — Applicants from schools other than Stanford or applicants from Stanford who did not apply in their senior year should submit the form entitled Graduate Admission Application and provide a statement setting forth relevant personal, academic, and career plans and goals, transcripts, three letters of recommendation, and Graduate Record Examination (GRE) scores. Applicants are expected to have an A.B. or B.S. degree from an accredited school. Applications for admission at the graduate level are accepted only for the Autumn Quarter and must be filed together with supporting credentials, including, among other materials, one paper of at least ten pages and three recommendations, by the preceding January 2.
DEGREE REQUIREMENTS

The A.M. degree in International Policy Studies is awarded to students who fulfill the following requirements:

1. Meet satisfactorily all department, University, and program requirements for the A.B. degree. It is expected that most participants in the program will be undergraduate majors in international relations, political science, or economics. While other backgrounds are possible and acceptable, it seems improbable that they would supply any very substantial amount of the prescribed undergraduate preparation. In such cases, it would be necessary for the student to make up the missing undergraduate work, and the time required to qualify for the A.M. degree would increase correspondingly.

2. Complete satisfactorily all requirements for the A.M. degree in International Policy Studies. These are described in detail in the International Policy Studies brochure. 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. Complete and file the IPS Program Proposal, available in the IPS office, before the last day of classes of the first quarter of enrollment as a graduate student. On this form, students should list the 45 units fulfilling the IPS field requirements. Coterminal students must be sure to list 45 unduplicated units, that is, units for courses not counted toward the undergraduate degree.

4. Use Axess to file an Application to Graduate by the appropriate deadline, and complete and file the IPS Program Requirement Completion Worksheet with the IPS office.

FINANCIAL AID

Undergraduate financial aid is not normally available for coterminal students completing the fifth year. University-based financial aid is not available for graduate students entering the IPS program.

GRADE REQUIREMENTS

During enrollment in the IPS program, students may take only one of the two required "skills" courses for Satisfactory/No Credit, and they may also take one other course in IPS for Satisfactory/No Credit. Not counting "skills" courses, IPS students must maintain at least an average LGI of 'B-', and grades under 'B-' except in "skills" courses cannot be used toward the 45 units normally required in IPS.

The records of IPS students are normally reviewed during the summer after the beginning of their course work, and students who are not making adequate progress will receive a warning. In cases where the record is poor, the student's participation in the program may be terminated.

INTERNATIONAL RELATIONS

Chair: Barton J. Bernstein
Committee in Charge: Barton J. Bernstein (History), Peter Duus (History), Judith L. Goldstein (Political Science), Terry Karl (Political Science), Stephen Krasner (Political Science, on leave 1995-96), Scott Pearson (Food Research Institute), Jeffrey Williams (Food Research Institute)

Affiliated Faculty: David Abernethy (Political Science), Masahiko Aoki (Economics), W. Brian Arthur (Food Research Institute), Paul Basch (Health Research Policy), Joel Beinin (History), Barton J. Bernstein (History), Byron Bland (Institute for International Studies), Frederick Bowser (History), Bruce Bueno de Mesquita (Hoover Institute), Albert Camarillo (History), Gordon Chang (History), George Collier (Anthropology), Paul David (History), Carol Delaney (Anthropology), Charles Drekr-meier (Political Science, emeritus), Marcel Farshchamps (Food Research), Walter Falcon (Institute for International Studies), George Fredrickson (History), Estelle Friedman (History), Geoffrey Garrett (Business), Kurt T. Gauvatz (Political Science), James Gibbs (Anthropology), Judith Goldstein (Political Science), Avner Greif (Economics), Akhil Gupta (Anthropology), Robert Hamerton-Kelly (International Strategic Institute), Donald Harris (Economics), Gabriel Hecht (History and Philosophy of Science), David Holloway (Political Science), Kennell Jackson, Jr. (History), Timothy Josling (Food Research), Harold Kahn (History), Terry Karl (Political Science), Anjini Kochar (Economics), Nancy Kollman (History), Stephen D. Krasner (Political Science, on leave 1995-96), Anne Krueger (Economics), Paul R. Krugman (Economics), Lawrence Lau (Economics), John Lewis (Political Sci-
The A.B. in International Relations (IR) requires completion of at least 50 units in the major clusters (A, B, and C) and a minimum of 10 units in related work. Work in the cluster includes both Political Science 35, International Politics, one designated course in American foreign policy, and at least one seminar or colloquium; related work refers to social science or history courses dealing with the student's geographical or topical area of concentration, or economic analysis (Economics 51, 52). Each IR major is required to demonstrate proficiency in a language other than English, equivalent to at least two years of university-level instruction, and is expected to study overseas as in the Stanford Overseas Studies Program, or its equivalent. IR majors must take at least two courses in the Department of Economics. To fulfill this requirement, two Economics courses may be selected in Cluster C, or one may be in Cluster C and either Economics 51 or 52 (or both) may be taken as related work. (Economics 51 and 52 may not be counted in Cluster C.) One course in the major may be taken for a Satisfactory/No Credit grade.

Other course requirements depend on the cluster which the student chooses as the focus for his or her program. Cluster A includes courses that emphasize the political and historical aspects of international relations. Cluster B focuses on humanistic aspects of relations among national cultures. Cluster C constitutes a set of policy-oriented courses, largely on political-economic issues. All students must take at least two courses in the humanities-cultural area (Cluster B), at least five courses in one of the two remaining areas, and three courses in the other.

The International Relations major must be declared before the senior year by submission of an acceptable proposal to the chair of the program. Students completing a double major or fulfilling International Relations as a secondary major also are required to file a proposal before the senior year.

Students who have already been accepted as majors in the program may petition for credit for courses not listed in this section of the bulletin or in the updated course lists in the International Relations office. Petitions should contain as much information as possible about the course in question (syllabi, reading lists, examinations, papers, etc.). No course should be proposed for inclusion in the major unless more than half the course work deals with international material. ("International" here means "transactional," that is, dealing with real-life relationships among national or cultural units as distinguished from relationships that exist only in the mind of the observer, such as comparisons.)

Students are encouraged to shape their programs so that coherent central themes emerge, around which they can organize their reading and thinking about international relations.

HONORS PROGRAM

The International Relations honors program offers qualified students the opportunity to conduct a major independent research project under faculty guidance. Such a project requires a high degree of initiative and dedication, significant
amounts of time and energy, and skills in research and writing. 

In their junior year, students should consult with prospective honors advisers, choose the courses that provide academic background in their areas of inquiry and demonstrate an ability to conduct independent research. Students should submit their honor thesis proposal during Spring Quarter of their junior year if they are applying for a summer grant, or by the end of the third week of Autumn Quarter of their senior year. Honors thesis students are required to discuss, in a series of informal sessions with other students in the program and faculty sponsors, their research methods, problems, and findings. 

Prerequisites for participation include a 3.5 letter grade indicator (LGI) in International Relations courses, a strong overall academic record, successful experience in writing a research paper, and submission of an acceptable thesis proposal. Normally, students receive 15 units of credit, spread over three quarters, for the honors project. Five of these units may count toward the required 50 units in the major; an additional 5 may be used toward the requirement of 10 units of related course work.

Further details of the International Relations honors program are available from the program office.

GRANTS

The International Relations Program offers funds to students writing senior honor theses in international relations to finance travel to places where field work or library research is to be conducted, or to support intensive work at Stanford. The grants are intended for use by IR majors during the summer between their junior and senior years. The creativity and intellectual promise of the project and the preparation of the student are major considerations in awarding these funds. Applications are made during the Spring Quarter through the Office of Undergraduate Research Opportunities at Stanford.

GRADUATE PROGRAM

MASTER OF ARTS

It is possible for students majoring in International Relations to work simultaneously for a coterminal master’s degree in a number of related fields. Coterminal students should consult advisers in both departments or programs to make sure they fulfill the degree requirements in both fields. For information on the A.M. program in International Policy Studies, see the “International Policy Studies” section in this bulletin.

COURSES

Course offerings often change after this bulletin is sent to the printer. For updated information, see the quarterly *Time Schedule* and course lists available in the International Relations office.

CLUSTER A: POLITICAL-HISTORICAL EMPHASIS

ECONOMICS

115. European Economic History — (Cluster A or C.)
   5 units, Win (Greif)

130. The Rise of Industrial Asia — (Cluster A or C.)
   5 units, Aut (Lau, Okimoto, Raphael, Rohlen)

227. European Economic History — (Cluster A or C.)
   5 units, not given 1995-96

ENGINEERING-ECONOMIC SYSTEMS

170. The Role of Technology in National Security — (Cluster A or C.)
   3 units, Aut (May)

HEALTH RESEARCH AND POLICY

270. International Health
   2-4 units, Spr (Basch) Th 1:15-3:05

HISTORY

24B. Russian Civilization II: 18th to 20th Centuries
   5 units (Emmons) not given 1995-96

85S. Introductory Seminar: Jews and Moslems
   5 units (Rodrigue) not given 1995-96

119. Aristocracies and Absolutism: Early Modern Eastern Europe, 1400-1800 — (Cluster A or B.)
   DR:9(5)
   5 units, Spr (Kollmann) MTWTh 10

125. 20th-Century Eastern Europe
   5 units, Aut (Naimark) MTWTh 11

127D. 20th-Century Germany — DR:9(5)
   5 units, Spr (Feinstein)

134A. The Industrial Revolution: Historical and Cultural Perspectives — DR:9(5)
   5 units (Hecht) not given 1995-96

135A. The Nuclear Age
   5 units (Hecht) not given 1995-96

136A. European Thought and Culture in the 19th Century: From Romanticism to Modernism — DR:8(3)
   5 units, Win (Robinson) MTWTh 10

137. The Holocaust — DR:9(5)
   5 units, Aut (Rodrigue) MW 1:15

145. 20th-Century Britain — DR:9(5)
   5 units, Spr (Tyack) MTWTh 11

148. Introduction to African History — DR:2(4)
   5 units, Aut (Jackson) MTWTh 9
148C. Africa in the 20th Century — DR:2(*)
5 units, Spr (R. Roberts) MTWTh 10

149. Africa since 1935
5 units (Jackson) not given 1995-96

149A. East Africa in History
5 units (Jackson) not given 1995-96

165C. The United States in the 20th Century: Great Issues and Problems — (Does not fulfill the American Foreign Policy Requirement.) DR:3 or 9(5)
5 units, Spr (Camarillo) MTWTh 11

172A. America since 1945 — (Fulfills the American Foreign Policy Requirement.) Analyzes foreign policy and politics, and deals with social themes and intellectual history. DR:9(5)
4-5 units (Bernstein) not given 1995-96

176. Spain in America, 1492-1825 — DR:9(5)
5 units, Aut (Stahl) MTWTh 10

179. History of Mexico — DR:9(5)
5 units (Bowser) not given 1995-96

180. 20th-Century Brazil
5 units, Spr (Wirth) MTW 9

186A. Modern India: History, Society, Cultures — Clusters A and B.
3 units, Win (Gupta, Mancall) MTWTh 9

187B. Middle East in the 20th Century
5 units, Win (Pollard)

189A. Israel: 1880 to the Present
5 units, Aut (Mancall) MTWTh 9

192C. Modern China, 19th and 20th Century — DR:2(*)
5 units, Spr (Hayford)

194D. The Rise of Modern Japan — DR:2(*)
5 units, Spr (Duus) MTWThF 1:15

207. Undergraduate Colloquium: Topics in Comparative Women's History — DR:9†(5)
5 units (Freedman) not given 1995-96

221S. Undergraduate Research Seminar: Wartime and Postwar Poland
5 units (Naimark) not given 1995-96

224. Undergraduate Colloquium: Stalinism in Eastern Europe
5 units (Naimark) not given 1995-96

228S. Undergraduate Research Seminar: War and Society in the 20th Century
5 units (Sheehan) not given 1995-96

232A. Undergraduate Colloquium: France during WW II
5 units (Rodrique) not given 1995-96

239A. Undergraduate Colloquium: Culture and Politics of Europe, 1945-1989
5 units, Win (Feinstein)

246A. Undergraduate Colloquium: African History and African Novel
5 units (Jackson) not given 1995-96

246S. Undergraduate Research Seminar: East Africa in Transition, 1880s-1920s
5 units (Jackson) not given 1995-96

247A. Undergraduate Colloquium: African Identity in a Changing World
3-5 units (R. Roberts) not given 1995-96

248A. End of Slavery and the Americas
5 units, Aut (Roberts)

259. Undergraduate Colloquium: Black and White in the United States and South Africa
5 units, Spr (Fredrickson)

259S. Undergraduate Research Seminar: The United States and the Vietnam War
5 units, Aut (Chang) Th 1:15-3:05

261. Undergraduate Colloquium: Nuclear Weapons — Theories and History — Case studies involving nuclear weapons and related international relations theory.
5 units (Bernstein, Holloway) not given 1995-96

276. Undergraduate Colloquium: The Creation of North America
5 units, Spr (Wirth) T 3:15-5:05

278. Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America —
(Cluster A or C.)
5 units, Aut (Stahl)

280. Undergraduate Colloquium: Modern Mexico
5 units (Haber) not given 1995-96

286. Undergraduate Colloquium: Economic and Social History of the Modern Middle East
5 units (Beinin) not given 1995-96

287S. Undergraduate Research Seminar: Topics in the Modern History of Egypt, Palestine, and Israel
5 units, Aut (Beinin) Th 1:15-3:05

288. Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict
5 units, Spr (Blecher)

289B. Undergraduate Colloquium: Zionism and its Critics
5 units (Zipperstein) not given 1995-96

290. Undergraduate Colloquium: United States and Japan
5 units (Duus) not given 1995-96

291A. Undergraduate Colloquium: Industrialization of Japan
5 units (Duus) not given 1995-96
292. Undergraduate Colloquium: Postwar Japan
5 units (Duus) not given 1995-96

303C. Graduate Colloquium: The Process of Industrialization — Europe, the United States, and Latin America
4-5 units (Haber) not given 1995-96

352. Graduate Colloquium: Decision-Making in International Crisis — IPS students only.
4-5 units, Aut (Bernstein) T 2:30-5

LATIN AMERICAN STUDIES
191. Undergraduate Seminar: Problems in United States-Mexico Relations — DR:9(5)
5 units, Aut (Smith) W 7-9 p.m.

POLITICAL SCIENCE
25. Colonialism and Nationalism in the Third World — DR:2(*) or 9(5*)
5 units (Abernethy) given 1996-97

35. International Politics — Approaches to the study of world politics including realism, liberalism, and decision-making theories. WW I, the nuclear weapons debate, contemporary international security and economic problems. The normative and policy implications of different theories. DR:9(5)
5 units, Aut (Risse-Kappen)

5 units, Win (Holloway)

113A. Politics and Development in Latin America — (Cluster A or C.) DR:9(5)
5 units, Spr (Packenham)

114K. The Political Economy of Development — (Cluster A or C.) DR:2(*) or 9(5*)
5 units, Aut (Karl)

116. Politics and Society in Europe
5 units, Win (Schmitter)

116L. Social Foundations of Democracy
5 units (Diamond) given 1996-97

118A. Political Change in Tropical Africa — DR:2(*)
5 units, Spr (Abernethy)

118B. The Politics of Race and Class in Southern Africa — DR:2(*) or 9(5*)
5 units (Abernethy) given 1996-97

120. The European System Under New Circumstances
5 units, Win (Hafner)

121M. Russian Politics
5 units, Win (McFaul)

122G. The Political Economy of Contemporary Europe — (Cluster A or C.) DR:9(5)
5 units (Garrett) given 1996-97

123M. Seminar: Postcommunist Politics — Pre-requisite: Political Science 121M.
5 units, Spr (McFaul)

124. Seminar: Political Economy of Latin American Development — (Cluster A or C.)
5 units, Win (Packenham)

126K. Seminar: The United States and Central America
5 units (Karl) not given 1995-96

130. How Nations Trade — (Cluster A or C.)
5 units (Garrett) given 1996-97

132D. Seminar: Controversies over Foreign Aid
5 units, Aut (Abernethy)

133. Peace Studies
5 units, Spr (Bland, Dreikmeier, Holloway, Moses, Noddings, Ross)
MTW 1:15 and by arrangement

134A. Strategy, War, and Politics — (Fulfills American Foreign Policy requirement.) DR:9(5)
5 units, Spr (Sagan)

134B. Seminar: America and the World Economy — (Fulfills American Foreign Policy requirement.) Developmental approach analyzes American foreign economic policy, centering on a historical analysis of the basic issues involved in the formation of American foreign policy. Issues: evolution of American tariff and trade policy, development of mechanisms for international monetary management, and American foreign investment policy reflected in changing political goals pursued by American central decision-makers. Prerequisite: 35 or equivalent. (Cluster A or C.)
5 units, Win (Goldstein)

134C. Seminar: America and the World Economy — (Cluster A or C.)
5 units, Spr (Goldstein)

138A. Seminar: Advanced Study in International Security
5 units, Spr (Sagan)

138B. Seminar: Security and Diplomacy
5 units, Spr (Lewis)

139A. Japanese Foreign Policy
5 units, Win (Okimoto)

142K. International Law
5 units, Win (Gaubatz)

142S. Seminar: Managing Hazardous Technologies
5 units (Sagan) not given 1995-96

143G. Seminar: Public Opinion in International Relations
5 units (Gaubatz) given 1996-97

143H. Seminar: Security Studies
5 units (Sagan) given 1996-97

143K. Seminar: Democratic States and International Relations
5 units, Aut (Gaubatz)
143L. Seminar: War, Peace, and Organization Theory
   5 units (Eden) not given 1995-96

212P. The Politics of International Cooperation and Regional Integration
   5 units (Schmitter) not given 1995-96

223. Seminar: Japanese Politics
   5 units (Okimoto) given 1996-97

224K. Contemporary Issues in Latin America —
   Restricted to A.M. and Ph.D. students. Oriented toward defining individual research on contemporary Latin America.
   5 units, Win (Karl, Morrison)

227. Seminar: Democratization — East, West, and South — For graduate students; advanced undergraduates by consent of instructor. Comparison of political changes possibly leading to more democratic institutions in Latin America, with reference to Southern and Eastern Europe and perhaps Asia: differences in previous regimes and economic systems; in levels of development and international context; in modes of demise and efforts at reform; in eventual institutions and practices.
   5 units, Win (Schmitter)

234B. International Institutions — (Cluster A or C.)
   5 units, Win (Goldstein)

243A. Graduate Seminar: International Relations Theory — Introduction to contemporary theories of international politics. Micro and macro approaches to the study of conflict and cooperation in world politics, including the work of Carr, Waltz, Gilpin, Keohane, and Bueno de Mesquita. Format emphasizes student oral and written presentation of assigned readings.
   5 units, Aut (Gaubatz)

243B. Seminar: Theoretical Issues in International Security — Critical examination of the major theories concerned with international security. Theories at a variety of levels of analysis (systemic, domestic politics, organizational, and psychological). Short research design papers.
   5 units, Win (Sagan)

243G. Seminar on Political Theory and International Relations
   5 units (Gaubatz) given 1996-97

244D. Theories of European Imperialism
   5 units, Win (Abernethy)

247. Seminar: The Causes of War
   5 units, Win (Gaubatz)

247G. Research Seminar: Democratic Politics and Foreign Policy
   5 units (Gaubatz) not given 1995-96

PUBLIC POLICY

201. Theories of International Cooperation and Conflict
   4 units, Aut (Bueno de Mesquita)

202. Political Foundations of Transitional Economies — (Cluster A or C.)
   5 units, Aut (Root)

SCIENCE, TECHNOLOGY, AND SOCIETY

116. War and Technology
   4 units (Adams) given 1996-97

CLUSTER B: HUMANITIES EMPHASIS

195. Ethics, International Security, and Arms Control — Ethics and the use of military force in the international system; the morality of military intervention. Collective and cooperative security and the role of international security organizations, especially the UNO. Ethical issues of weapons of mass destruction, nuclear proliferation, and the international arms trade. Recent and current case studies: the Gulf war, Bosnia, Somalia.
   5 units, Spr (Hamerton-Kelly)

ANTHROPOLOGY

103/203. Mesoamerican Communities, Ethnicities, and Nations — DR:2(*)
   3-5 units, Aut (G. Collier)

108. African Societies in a Changing World — DR:2(*) or 9(5*)
   5 units, Aut (Gibbs)

159A. The Multicultural City in Europe
   5 units (Delaney) not given 1995-96

HISTORY

115. Introductory Seminar: The Medieval City, Conflict and Community in Premodern Europe
   5 units, Aut (Ott) W 1:15-3:05

49S. Introductory Seminar: Slavery in Africa
   5 units, Win (Hawthorne)

80. Culture, Society, and Politics of Latin America — DR:9(5*)
   5 units, Spr (Klein) MW 1:15-3:05

93S. Introductory Seminar: Piracy, Trade, and Diplomacy: Japan and East Asia, 1500-1900
   5 units, Aut (Hellyer) Th 1:15-3:05

121. Russian Jewish History, 1772-1917
   5 units (Zipperstein) not given 1995-96

131. European Culture and the Two World Wars
   5 units, Aut (Thompson) MWF 11

134A. The Industrial Revolution: Historical and Cultural Perspectives — (Clusters A and B.)
   5 units (Hecht) not given 1995-96
135A. The Nuclear Age
5 units (Hecht) not given 1995-96

136A. European Thought and Culture in the 19th Century: From Romanticism to Modernism
5 units, Win (Robinson) MTWTh 10

136B. European Thought and Culture in the 20th Century: From Freud to Foucault —The important European thinkers and intellectual movements of the 20th century, from Freud to Foucault. 5 units (Robinson) not given 1995-96

185. Introduction to Islamic Civilization — DR:2(*)
5 units (Beinin) not given 1995-96

186A. Modern India: History, Society, Cultures — DR:2(*) or 9(5*)
5 units, Win (Gupta, Mancall) MTWTh 9

187B. Middle East in the 20th Century
5 units, Win (Pollard) MTWTh 11

187C. Women in the Modern Middle East — DR:2(5*) or 9(5*)
5 units, Spr (Beinin) MW 1:15-3:05
Th 7-10 p.m.

188B. Jews in the Medieval World — DR:9(5)
5 units (Rodrigue) not given 1995-96

188C. Jews in the Modern World — DR:9(5)
5 units, Win (Zipperstein) TWTh 9

189A. Israel: 1880 to the Present
5 units, Aut (Mancall) MTWTh 9

204C. Sophomore Seminar: Jews and Muslims
5 units, Win (Rodrigue) T 2:15-4:05

204D. Sophomore Seminar: Approaching Islam — History and Western Representations
5 units (Beinin) not given 1995-96

207. Undergraduate Colloquium: Topics in Comparative Women’s History — DR:9(5)
5 units (Freedman) not given 1995-96

222A. Undergraduate Colloquium: National Identities in 20th-Century Ukraine
5 units, Win (Weiner)

235A. Undergraduate Colloquium: Art and Society in 19th-Century Europe
5 units (Sheehan) not given 1995-96

246A. Undergraduate Colloquium: African History and African Novel
5 units (Jackson) not given 1995-96

248. Undergraduate Colloquium: Popular Culture in Africa
5 units (Jackson) not given 1995-96

248A. End of Slavery: Africa and the Americas
5 units, Aut (Roberts) Th 3:15-5:30

248D. Law and Colonialism in Africa
5 units, Spr (Roberts) Th 2:15-5:05

277A. Undergraduate Colloquium: Ethnicity, Class, and Identity in Latin America
5 units (Bowser) not given 1995-96

285A. Undergraduate Colloquium: National Identity in Israel
5 units (Mancall) not given 1995-96

288. Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict — (Cluster A or B.)
5 units, Spr (Blecher) Th 1:15-3:05

293A. Undergraduate Colloquium: The American Cultural Empire in China
5 units, Win (Hayford)

LATIN AMERICAN STUDIES
91/171. Women in the Transition to Democracy in Latin America
5 units, Spr (Friedman)

POLITICAL SCIENCE
141K. Ethics and International Relations
5 units (Gaubatz) not given 1995-96

SCIENCE, TECHNOLOGY, AND SOCIETY
110. Ethics in Public Policy — Ethical issues in science- and technology-related public policy conflicts. Develops the capacity for rigorous critical analysis of complex, value-laden policy disputes. Topics: the natures of ethics and morality; the natures of and rationales for liberty, justice, and human rights; and the use and abuse of these concepts in recent and current policy disputes. Cases from: biomedicine, environmental affairs, the technical professions, communications, and international relations. A Writing Across the Curriculum course. (Cluster B or C.) DR:8(3)
5 units, Win (McGinn) MW 2:15-3:30
plus two hour section by arrangement

SPANISH AND PORTUGUESE
180. Introduction to Chicano Life and Culture — DR:3
5 units, Aut (Yarbo-Bejerano)

CLUSTER C: POLITICAL-ECONOMIC ISSUES AND POLICY ANALYSIS
196. Environmental Issues in International Relations
4 units (Naylor) not given 1995-96

ANTHROPOLOGY
60. Environmental Problems and Development
3-5 units, Spr (Gupta)

ECONOMICS
99. State, Market, and Development
5 units, Win (Meier)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Term</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>106</td>
<td>The World Food Economy</td>
<td>4</td>
<td>Spr</td>
<td>Falcon, Naylor</td>
</tr>
<tr>
<td>113</td>
<td>Technology and Economic Change — DR:9(5)</td>
<td>5</td>
<td>Spr</td>
<td>Rosenberg</td>
</tr>
<tr>
<td>115</td>
<td>European Economic History — (Cluster A or C.)</td>
<td>5</td>
<td>Win</td>
<td>Greif</td>
</tr>
<tr>
<td>118</td>
<td>The Economics of Development</td>
<td>5</td>
<td>Aut</td>
<td>Kochar</td>
</tr>
<tr>
<td>119</td>
<td>Development and Population Interactions in the Third World</td>
<td>5</td>
<td>Win</td>
<td>Yotopolous</td>
</tr>
<tr>
<td>120</td>
<td>Socialist Economies in Transition</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>122</td>
<td>The Theory of Capitalist Development — DR:9(5)</td>
<td>5</td>
<td>Spr</td>
<td>Harris</td>
</tr>
<tr>
<td>123</td>
<td>Economic Development in Latin America</td>
<td>5</td>
<td>Win</td>
<td>Reynolds</td>
</tr>
<tr>
<td>124</td>
<td>The Japanese Economy</td>
<td>5</td>
<td>Win</td>
<td>Aoki</td>
</tr>
<tr>
<td>126</td>
<td>Comparative Economic Institutions: The Economics of Transition</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>The Rise of Industrial Asia — (Cluster A or C.)</td>
<td>5</td>
<td>Aut</td>
<td>Lau, Okimoto, Raphael, Rohlen</td>
</tr>
<tr>
<td>134</td>
<td>Development of the Newly Industrialized Economies</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>165</td>
<td>International Economics</td>
<td>5</td>
<td>Win, Spr</td>
<td>Krueger</td>
</tr>
<tr>
<td>215</td>
<td>Industrialization, Growth, and Economic Development</td>
<td>5</td>
<td>Aut</td>
<td>Schaffer</td>
</tr>
<tr>
<td>217</td>
<td>Money and Finance in Economic Development</td>
<td>5</td>
<td>Spr</td>
<td>McKinnon</td>
</tr>
<tr>
<td>227</td>
<td>European Economic History — (Cluster A or C.)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>266</td>
<td>International Trade Theory</td>
<td>5</td>
<td>Win</td>
<td>Krugman</td>
</tr>
<tr>
<td>267</td>
<td>Special Topics in International Economics</td>
<td>5</td>
<td>Spr</td>
<td>Krueger</td>
</tr>
<tr>
<td>106.</td>
<td>The World Food Economy</td>
<td>4</td>
<td>Spr</td>
<td>Falcon, Naylor</td>
</tr>
<tr>
<td>113.</td>
<td>Technology and Economic Change — DR:9(5)</td>
<td>5</td>
<td>Spr</td>
<td>Rosenberg</td>
</tr>
<tr>
<td>115.</td>
<td>European Economic History — (Cluster A or C.)</td>
<td>5</td>
<td>Win</td>
<td>Greif</td>
</tr>
<tr>
<td>118.</td>
<td>The Economics of Development</td>
<td>5</td>
<td>Aut</td>
<td>Kochar</td>
</tr>
<tr>
<td>119.</td>
<td>Development and Population Interactions in the Third World</td>
<td>5</td>
<td>Win</td>
<td>Yotopolous</td>
</tr>
<tr>
<td>120.</td>
<td>Socialist Economies in Transition</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>122.</td>
<td>The Theory of Capitalist Development — DR:9(5)</td>
<td>5</td>
<td>Spr</td>
<td>Harris</td>
</tr>
<tr>
<td>123.</td>
<td>Economic Development in Latin America</td>
<td>5</td>
<td>Win</td>
<td>Reynolds</td>
</tr>
<tr>
<td>124.</td>
<td>The Japanese Economy</td>
<td>5</td>
<td>Win</td>
<td>Aoki</td>
</tr>
<tr>
<td>126.</td>
<td>Comparative Economic Institutions: The Economics of Transition</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>130.</td>
<td>The Rise of Industrial Asia — (Cluster A or C.)</td>
<td>5</td>
<td>Aut</td>
<td>Lau, Okimoto, Raphael, Rohlen</td>
</tr>
<tr>
<td>134.</td>
<td>Development of the Newly Industrialized Economies</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>165.</td>
<td>International Economics</td>
<td>5</td>
<td>Win, Spr</td>
<td>Krueger</td>
</tr>
<tr>
<td>215.</td>
<td>Industrialization, Growth, and Economic Development</td>
<td>5</td>
<td>Aut</td>
<td>Schaffer</td>
</tr>
<tr>
<td>217.</td>
<td>Money and Finance in Economic Development</td>
<td>5</td>
<td>Spr</td>
<td>McKinnon</td>
</tr>
<tr>
<td>227.</td>
<td>European Economic History — (Cluster A or C.)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>266.</td>
<td>International Trade Theory</td>
<td>5</td>
<td>Win</td>
<td>Krugman</td>
</tr>
<tr>
<td>267.</td>
<td>Special Topics in International Economics</td>
<td>5</td>
<td>Spr</td>
<td>Krueger</td>
</tr>
</tbody>
</table>

FOOD RESEARCH

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Term</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>136.</td>
<td>Population Perspectives in the Third World</td>
<td>5</td>
<td></td>
<td>Arthur</td>
</tr>
<tr>
<td>146.</td>
<td>Economic Policies of the European Community</td>
<td>5</td>
<td></td>
<td>Josling given</td>
</tr>
<tr>
<td>148.</td>
<td>The Economics of Greater China and the World — (Cluster A or C.)</td>
<td>5</td>
<td>Spr</td>
<td>Rozelle</td>
</tr>
<tr>
<td>169.</td>
<td>International Agricultural Trade and Policy</td>
<td>5</td>
<td>Win</td>
<td>Josling</td>
</tr>
</tbody>
</table>

HISTORY

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Term</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>278.</td>
<td>Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America — (Cluster A or C.)</td>
<td>5</td>
<td></td>
<td>Stahl</td>
</tr>
</tbody>
</table>

HUMAN BIOLOGY

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Term</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>278.</td>
<td>Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America — (Cluster A or C.)</td>
<td>5</td>
<td></td>
<td>Stahl</td>
</tr>
</tbody>
</table>

POLITICAL SCIENCE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Term</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>113A.</td>
<td>Politics and Development in Latin America — (Cluster A or C.) DR:9(5)</td>
<td>5</td>
<td>Spr</td>
<td>Packenham</td>
</tr>
<tr>
<td>114K.</td>
<td>The Political Economy of Development — (Cluster A or C.) DR:2(<em>) or 9(5</em>)</td>
<td>5</td>
<td>Aut</td>
<td>Karl</td>
</tr>
<tr>
<td>122G.</td>
<td>The Political Economy of Contemporary Europe — (Cluster A or C.) DR:9(5)</td>
<td>5</td>
<td></td>
<td>Garrett</td>
</tr>
<tr>
<td>124.</td>
<td>Seminar: Political Economy of Latin American Development — (Cluster A or C.)</td>
<td>5</td>
<td>Win</td>
<td>Packenham</td>
</tr>
<tr>
<td>134B.</td>
<td>Seminar: America and the World Economy — (Fulfills American Foreign Policy requirement.) (Cluster A or C.)</td>
<td>5</td>
<td>Win</td>
<td>Goldstein</td>
</tr>
<tr>
<td>134C.</td>
<td>America and the World Economy — (Cluster A or C.)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ENGINEERING-ECONOMIC SYSTEMS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Term</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>170.</td>
<td>The Role of Technology in National Security — (Cluster A or C.)</td>
<td>3</td>
<td>Aut</td>
<td>May</td>
</tr>
</tbody>
</table>
INTERNATIONAL RELATIONS

202. Political Foundations of Transitional Economies — (Cluster A or C.)
5 units, Aut (Root)

PUBLIC POLICY

SCIENCE, TECHNOLOGY, AND SOCIETY

110. Ethics in Public Policy — (Cluster B or C.)
DR:8(3)
5 units, Win (McGinn) MW 2:15-3:30
plus two hour section by arrangement

279A. Technology Policy in Newly Industrializing Countries — (International Relations majors must take for 4 units.)
2-4 units, Aut (Forbes)

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. Senior Thesis — Open only to declared International Relations majors with approved senior thesis proposals.
5 units, any quarter (Staff)

OVERSEAS STUDIES

These courses are approved for the International Relations major and taught at the campus indicated. Students should discuss with their major advisers which courses would best meet educational needs. Course descriptions can be found in the “Overseas Studies” section of this bulletin or in the Overseas Studies Program Office, 126 Sweet Hall.

BERLIN

The History of German and European Economic Philosophy — (Enroll in Economics 100X.) (Cluster A or C.) DR:8(3)
4-5 units, Aut (Krüger)

The Political Economy of Contemporary Germany — (Enroll in Economics 127X.) (Cluster C.) DR:9(5)
5 units, Spr (Krüger)

Transition in Germany and Eastern Europe — (Enroll in Economics 128X.) (Cluster C.) DR:9(5)
4-5 units, Win (Krüger)

The Economics of Europe — (Enroll in Economics 166X.) (Cluster C.) DR:9(5)
5 units, Aut (Howell)

Culture and Politics in Modern Germany — (Enroll in German Studies 177A.) (Cluster B.) DR:9(5)
4-5 units, Win (Kramer)

Split Images: Postwar German Cinema — (Enroll in German Studies 179B.) (Cluster B.) DR:7(2)
4 units, Aut (Kramer)

Nationalism and Political Culture in Germany — (Enroll in History 288V.) (Cluster A.) DR:9(5)
4 units, Spr (Tempel)

International Political Economy — (Enroll in Political Science 132X.) (Cluster A.) DR:9(5)
5 units, Win (Krasner)

FLORENCE

The Political Economy of Industrial Change: Italy and Europe in a Global System — (Enroll in Economics 159X.) (Cluster C.) DR:9(5)
5 units, Win (Bianchi, Bellini)

The Integration of Europe — (Enroll in Political Science 145X.) (Clusters A and C.) DR:9(5)
4-5 units, Aut (D’Alimonte)

KYOTO

4-5 units, Spr (MacDougall)

MOSCOW

Russian Economy: Past Experience, Current Reforms, and Prospects — (Enroll in Economics 125X.) (Cluster C.)
4-5 units, Aut (Panova)

Russia in the Age of Nobility 1700-1840: State Society, and Culture — (Enroll in History 212V.) (Cluster C.) DR:9(5)
5 units, Aut (Zorin)

Contemporary Issues in Russian Society — (Overseas Studies 17.) (Cluster A.)
4 units, Win (Bratersky)

Russian Politics — (Enroll in Political Science 119X.) (Cluster A.) DR:9(5)
5 units, Aut (Bratersky)

OXFORD

Oxford Economists and Development Economics — (Enroll in Economics 132X.) (Cluster C.)
5 units, Aut (Meier)

Europe in the World Economy — (Enroll in Economics 164X.) (Cluster C.)
5 units, Aut (Meier)

Economic Organization of Science and Technology in the West Since 1600 — (Enroll in Economics 168X.)
5 units, Spr (David)

Modern African History Through the African Novel, 1914-1994 — (Enroll in English 146V.) (Cluster A.) DR:2(*) or 9(5*)
5 units, Aut (Kirk-Greene)
European Integration — (Enroll in History 147X.) (Clusters A and C.) DR:9(5) 4—5 units, Win (Thomas)

European Imperialism and the Third World, 1870-1970 — (Enroll in Political Science 148X.) (Cluster A.) DR:9(5) 5 units, Spr (Darwin)

Race and Ethnicity in Modern Britain — (Enroll in Political Science 111X.) (Cluster B.) DR:9(5) 3 units, Spr (Lustgarten)

PARIS 121X. The Left in Europe — (Cluster A.) DR:9(5) 4 units, Win (Lazar)

SANTIAGO Latin America in the International Economy — (Enroll in Economics 163X.) (Cluster C.) 5 units, Win (Ffrench-Davis)

Modernization and Culture in Latin America — (Enroll in Latin American Studies 120X.) Cluster B. DR:9(5) 5 units, Aut (Subercaseaux)

PROGRAM IN JEWISH STUDIES

Director: Steven Zipperstein
Faculty Advisory Committee: Joel Beinin, Arnold Eisen, John Felstiner, Estelle Freedman, Van Harvey, Roger Kohn, Seymour Martin Lipset, Mark Mancall, Norman Naimark, Jack Rakove, Aron Rodrigue, David Rosenhan, Peter Stansky

The interdisciplinary Program in Jewish Studies investigates all aspects of Jewish life in history, literature, language, and culture from biblical times to the present. Courses are offered on the undergraduate and graduate levels in a program complemented by a full range of guest lectures, conferences, and symposia. The program annually sponsors the Donald and Robin Kennedy Undergraduate Award for the best undergraduate essay on any theme in Jewish studies, and it coordinates the annual Dorot Fellowships for summer study in Israel.

Graduate students enroll in the program through either the Department of History or Religious Studies and must meet the requirements of that department.

UNDERGRADUATE PROGRAMS

INDIVIDUALLY DESIGNED MAJOR

The Individually Designed Major in Jewish Studies permits interested students to focus their attention on the broad field of Jewish Studies and, at the same time, to expand their knowledge of one or another related field.

Each major should complete at least 60 units, all in courses at or above the 100 level (or their equivalent). A maximum of 15 of these 60 units may be taken on a Credit/No credit basis. A maximum of 5 of these 60 units may be taken in individual study or directed reading. Students must present evidence that demonstrates their ability to do independent work and have at least three full quarters of undergraduate work remaining at Stanford after the date on which the proposal is approved by the committee. Each major must obtain sponsorship from three faculty members, one of whom is the student’s primary adviser.

Details about the written procedures and documents necessary for application for an Individually Designed Major can be obtained at the Undergraduate Advising Center, Sweet Hall, first floor (415-723-2426).

REQUIREMENTS

The faculty members in Jewish Studies have designed the following structure for the major.

<table>
<thead>
<tr>
<th>Category</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>History and Society: students must take one course in each of the three periods — biblical and ancient, medieval, and modern, and contemporary</td>
<td>15</td>
</tr>
<tr>
<td>Religion: biblical, rabbinic, medieval, modern</td>
<td>15</td>
</tr>
<tr>
<td>Literature: Hebrew, Yiddish, Holocaust, American Jewish</td>
<td>10</td>
</tr>
<tr>
<td>Hebrew Language (second year or beyond): Students who demonstrate by examination that they have completed the equivalent of at least two years of university-level Modern Hebrew may apply the 12 units required in this category to more work in one or the other categories required by the major, with the approval of their primary adviser.</td>
<td>12</td>
</tr>
<tr>
<td>Ancilliary Courses: ancient history, Medieval history, modern European history, history of philosophy, Islam, Christianity</td>
<td>8-10</td>
</tr>
<tr>
<td>Total number of units required</td>
<td>60-62</td>
</tr>
</tbody>
</table>

Students planning an Individually Designed Major in Jewish Studies are also strongly urged to write an honors thesis. Students interested in majoring in Jewish Studies should discuss this with their adviser(s) when discussing the major itself. Up to 10 honors thesis units may be included in the major.

No course proposed for the major may be counted as fulfilling more than one required category in the proposed major. Transfer credits from other universities must be approved by the appropriate Stanford authorities. For additional information about the Jewish Studies major, call 415-723-7589.
HONORS PROGRAM

The honors program is open to students in any discipline who wish to enrich their studies through the acquisition of knowledge of Jewish history, thought, literature, religion, and society. It may also interest students who wish to consider including some aspects of Jewish Studies in graduate work or in career planning. Students in the Social Sciences and Humanities are encouraged, by combining the program with their major, to explore the field of Jewish Studies from the perspective of their particular disciplines. Each student must take one 5-unit course in each of the three major areas of Jewish Studies (history, religious studies, and literature), complete 1 unit of Hebrew language study, and write an honors thesis under the supervision of a Jewish Studies faculty member. Contact the Jewish Studies Program for information.

COURSES

CLASSICS

335. Jews, Pagans, and Christians in Late Antiquity
4-5 units, Win (Gregg)

ENGLISH

164B. Imagining the Holocaust
5 units, Win (Felstiner) MW 1:15-3:05
181B. Seminar: The Other Middle Ages
5 units, Aut (Narin van Court) TTh 11-12:30

HISTORY

137. The Holocaust
5 units, Aut (Rodrigue) MW 1:15
184. Jews in 20th-Century United States
5 units, Spr (Zipperstein) TWTh 10
188C. Jews in the Modern World
5 units, Win (Zipperstein) TWTh 10
189A. Israel: 1880 to the Present
5 units, Aut (Mancall) MTWTh 9
204C. Sophomore Seminar: Jews and Muslims
5 units, Win (Rodrigue) T 2:15-4:05
204G. Sophomore Seminar: Who are Jews?
5 units, Aut (Zipperstein) T 3:15-5:05
287S/487. Undergraduate/Graduate Research Seminar: Topics in the Modern History of Egypt, Palestine, and Israel
5 units, Aut (Beinin) Th 1:15-3:05
288. Undergraduate Colloquium: Palestine and the Arab-Israeli Conflict
5 units, Spr (Blecher)
384. Graduate Core Colloquium in Jewish History
4-5 units, Aut (Rodrigue, Zipperstein) W 2:15-4:05

LINGUISTICS, FOREIGN LANGUAGES

628A, B, C. Beginning Hebrew
4 units, Aut, Win, Spr (Berman) MTWTh 10
629A, B, C. Intermediate Hebrew
4 units, Aut, Win, Spr (Berman) MTWTh 2:15
630A, B, C. Advanced Hebrew
4 units, Aut, Win, Spr (Berman) MTWTh 3:15

RELIGIOUS STUDIES

23. Introduction to Judaism
4 units, Win (Eisen)
26. Dead Sea Scrolls, Christianity, and other Ancient Judaisms
4 units, Win (Eisen)
161. Modern Jewish Thought: The Meaning of Life
5 units, Win (Eisen)
162. Conception of the Self and Jewish Identity in Modern Jewish Thought
5 units, Win (Fromm)
166. Myth and Ritual in Judaism
5 units, Spr (Kohl)
231. The Bible in Fiction, Fiction in the Bible
5 units, Aut (Bach)
260. Contemporary Jewish Thought: Jewish Feminism and Jewish Tradition
5 units, Spr (Magnus)

CENTER FOR LATIN AMERICAN STUDIES

Chair of the Committee and Director of the Center: Terry Karl
Associate Director: Kathleen B. Morrison
Affiliated Faculty:
Anthropology: Clifford Barnett, George Collier, Jane Collier, William Durham, James Fox, John W. Rick, Renato Rosaldo
Biology: Paul Ehrlich, Harold Mooney, Peter Vitousek
Dance: Susan Cashion
Economics: Donald Harris, Ronald McKinnon, Julie Schaffner
Education: Martin Carnoy, Henry Levin, Amado Padilla
Food Research Institute: Tim Josling, Clark Reynolds, Pan Yotopoulos
History: Frederick Bowser, Albert Camarillo, Stephen Haber, John D. Wirth
Latin American Studies: Kathleen Morrison, Clint Smith, Roberto Trujillo
Law, School of: John Barton, Thomas Heller, Bill Hing
Linguistics: Shirley B. Heath, John Rickford
Medicine, School of: Paul Basch, Yvonne MalDONado, Julie Parsonnet, Gary Schoolnik
Political Science: Terry Karl, Stephen Krasner, Robert Packenham, Philippe Schmitter
Spanish and Portuguese: Claire Fox, Maria-Paz Haro, Mary Pratt, Michael Predmore, Ricardo Rosa, Jorge Ruffinelli, Guadalupe Valdés
Tinker Visiting Professors: Maria Herminia Tavares de Almeida, Rubén Zamora

The Center for Latin American Studies coordinates the University's teaching, research, and extracurricular activities related to Latin America. Field research, language training, and interdisciplinary approaches are stressed in the Latin American Studies Program, which draws on the strength and diversity of its nationally recognized faculty affiliates and substantial library holdings on Latin America. These resources are enhanced by the Tinker Visiting Professorship in Latin American Studies which brings one or more distinguished Latin American academics to teach at Stanford each year. The Stanford-Berkeley Title VI National Resource Center for Latin American Studies provides opportunities for faculty and students on the two campuses to meet and work together.

The principal programs administered by the center (the bachelor's degree, the honors certificate program, summer field research grants, the master's degree, and concurrent degrees with Business, Education, Law, and Medicine) are described below. For further information, contact the Center for Latin American Studies, Bolivar House, 582 Alvarado Row, Stanford University, Stanford, California 94305-8545, or phone 415-723-4444.

UNDERGRADUATE PROGRAMS
BACHELOR OF ARTS

The A.B. in Latin American Studies (LAS) offers qualified undergraduates the opportunity to pursue an individualized, interdisciplinary study of Latin America, culminating in the preparation of a senior honors thesis written under the guidance of a faculty sponsor.

To declare a major in Latin American Studies, a student must apply to the center's Subcommittee on Undergraduate Programs no later than the beginning of the second quarter of the junior year; exceptions are made only in unusual circumstances.

Requirements for the major include the following:

1. Completion of a coherent interdisciplinary program of at least 55 units, based on an individualized plan of study achieved in consultation with the student's adviser and approved by the center's Subcommittee on Undergraduate Programs. The curriculum ordinarily includes:

   a) At least two courses (10 units) surveying Latin America comprehensively, whether historically, from the perspective of a discipline, or in an explicitly interdisciplinary framework. Appropriate courses are Anthropology 103, Economics 123, History 177, Latin American Studies 80, Political Science 113A.

   b) At least five courses (25 units) focused on a theoretical problem or disciplinary approach.

   c) Up to 15 units (LAS 169 or 198) devoted to work on the senior research paper (see item 3 below).

   d) Remaining courses must be at the 100-level or higher and focus directly on Latin America.

First- or second-year language courses may not be counted toward the 55 units. Only 10 units of Satisfactory/No Credit work may be counted towards the major.

2. Demonstration of language competency in either Spanish or Portuguese at least equivalent to satisfactory completion of courses in grammar and composition at the third-year level of university training (for example, Spanish 201 and 202), or any course taught in Spanish at the third-year level of university training (for example, Spanish 131B, 160, or 161). Alternatively, certification from the Department of Spanish and Portuguese of oral language proficiency at the advanced level on the scale of the American Council for the Teaching of Foreign Languages. Portuguese 109, Portuguese for Students of Spanish, is strongly recommended for those students demonstrating competency in Spanish.

3. Field experience in Latin America (study abroad, summer research, internship, and so on).

4. Submission in the senior year of a research paper of acceptable quality on a topic approved by the Subcommittee on Undergraduate Programs and written under the guidance of a faculty sponsor.

The A.B. in Latin American Studies is an honors program by design. Satisfactory completion of the program, including an LGI of 'B+' or better in course work for the major and submission of a senior research paper of honors quality, earns the designation of Honors in Latin American Studies. If these criteria are not met, the degree is awarded without the honors designation.
HONORS CERTIFICATION FOR MAJORS IN OTHER DEPARTMENTS OR PROGRAMS

As distinguished from honors for majors in Latin American Studies, Honors Certification in Latin American Studies is intended to complement study in any conventional major. The aim of certification is to enable the student to pursue a foreign area focus through interdisciplinary course work and individualized research on Latin America, culminating in the preparation of a senior honors thesis written under the guidance of a faculty sponsor.

The Honors Certification program is of particular interest to students in any discipline who plan further study or a career with an international or foreign-area focus. Students in the humanities, social sciences, or natural sciences may wish to enrich their studies by acquiring a first-hand understanding of a related aspect of Latin American life.

ADMISSION

To pursue the Honors Certification program, students must apply to the Subcommittee on Undergraduate Programs no later than Autumn Quarter of the junior year. The application includes a proposed plan of course work and tentative thesis topic.

REQUIREMENTS

1. Completion of a coherent interdisciplinary program of at least 25 units, based on an individualized plan of study achieved in consultation with the student's adviser and approved by the center's Subcommittee on Undergraduate Programs. The curriculum ordinarily includes:

   a) At least one course (5 units) surveying Latin America comprehensively, whether historically from the perspective of a discipline, or in an explicitly interdisciplinary framework. Appropriate courses are Anthropology 103, Economics 123, History 177, Latin American Studies 80, and Political Science 113A.

   b) At least four additional courses (20 units) in 100-level courses or higher, focusing directly on Latin America. First- or second-year language courses may not be counted toward the 25 units. Only 5 units of Satisfactory/No-Credit work may be counted toward the program.

   2. Demonstration of language proficiency in either Spanish or Portuguese at least equivalent to satisfactory completion of courses in grammar and composition at the third-year level of university training (for example, Spanish 131B, 160, or 161). Alternatively, certification from the Department of Spanish and Portuguese of oral language proficiency at the advanced level on the scale of the American Council for the Teaching of Foreign Languages.

   3. Field experience in Latin America (study abroad, summer research, internship, and so on).

   4. Submission in the senior year of a research paper of acceptable quality on a topic approved by the Subcommittee on Undergraduate Programs and written under the guidance of a faculty adviser. Up to 15 units may be given for preparation of the senior paper, but these units do not count toward item 1.

Honors Certification in Latin American Studies is recommended for students who have achieved an LGI of 'B+' or better in their course work for Latin American Studies and have submitted a senior research paper judged to be of honors quality by the student's faculty sponsor and the Subcommittee on Undergraduate Programs.

SUMMER FIELD RESEARCH

Each summer the center awards research grants to a small number of undergraduates to conduct individual research projects in Latin America. Students must have demonstrated the ability to work independently and must possess the necessary language competence. Applications must include a research proposal that has been reviewed and endorsed by a faculty member who agrees to serve as sponsor. A course in research design, Latin American Studies (LAS) 165, is required the Spring Quarter before departure. Students from all departments are eligible to apply.

GRADUATE PROGRAMS

MASTER OF ARTS

The Latin American A.M. program is designed for (1) students who wish to pursue an interdisciplinary approach to the study of Latin America before continuing on to a relevant doctoral program in one of the social sciences or humanities, and (2) individuals who wish to add graduate-level expertise in Latin American Studies to other training necessary for careers in business, journalism, government, or one of the professions.

Minimum qualifications for admission include the equivalent of an A.B. or a B.S. degree, training in at least one of the social sciences, and a working knowledge of Spanish or Portuguese. Successful applicants are also expected to have completed previous course work on Latin America and to have field experience in the region. Applicants must also take the General Test of the Graduate Record Examination (GRE) and have the results sent to Graduate Admissions, Office.
of the Registrar. Candidates whose native language is not English and who have not studied in an English-speaking institution for at least one and one-half years must take the Test of English as a Foreign Language (TOEFL). Deadline for submission of applications for admission and financial aid is January 1. Admission is normally granted only beginning in Autumn Quarter.

The student's program is worked out in consultation with the Associate Director of the center who serves as the primary academic adviser on matters related to course work and degree requirements. In addition, the student prepares an interdisciplinary research paper under the guidance of a faculty sponsor.

1. Nine courses with a minimum of 40 units. Only courses at the 100 level or above count for the 40 units. At least eight of the nine courses must be basically Latin American in content. Normally, all courses are taken for a letter grade and distributed as follows:
   a) Core Seminar (LAS 250, 251, 252)—an interdisciplinary course required of all A.M. candidates in Latin American Studies. Fifteen units; 5 per quarter.
   b) Latin American Bibliography (LAS 260) required of all A.M. candidates in Latin American Studies, 3 units.
   c) Three or four courses that qualify as graduate level and focus on a theoretical problem or disciplinary approach.
   d) Two or three courses distributed among other disciplines.

2. Demonstration of language competency in either Spanish or Portuguese at least equivalent to satisfactory completion of courses in grammar and composition at the third-year level of university training (for example, Spanish 201 and 202), or any course taught in Spanish at the third-year level of university training (for example, Spanish 131B, 160, or 161). Alternatively, certification from the Department of Spanish and Portuguese of oral language proficiency at the advanced level on the scale of the American Council for the Teaching of Foreign Languages. Portuguese 109, Portuguese for Students of Spanish, is strongly recommended for students who demonstrate competency in Spanish.

3. An interdisciplinary research paper or project that provides satisfactory evidence of methodological, analytical, research, and writing skills. Students are expected to identify the topic for their paper or project by the onset of Winter Quarter and, under the guidance of a faculty sponsor, develop a bibliography and tentative outline by the end of that quarter. During Spring Quarter, students meet regularly with their faculty sponsors to develop and revise the paper or project which is formally presented to the members of the Core Seminar (LAS 252) at the close of the academic year. The grades assigned for the master's paper or project count for 10 of the 15 units of the Core Seminar (LAS 251 and 252).

All requirements for the A.M. degree are normally completed in three academic quarters as a full-time student.

CONCURRENT DEGREE PROGRAMS

The Center for Latin American Studies collaborates with the Schools of Business (M.B.A.), Education (M.A.T.), Law (J.D.), and Medicine (M.D.) to allow students to simultaneously pursue concurrent degrees in LAS (A.M.) and the respective professional field. Students must apply to and be independently admitted to both degree programs. For additional information about specific plans of study and degree requirements, please contact the Center for Latin American Studies.

DOCTOR OF PHILOSOPHY

Since the University does not offer a Ph.D. in Latin American Studies, students who wish to remain in an academic program at Stanford after completing their A.M. must be accepted by one of the departments offering a Ph.D., with an emphasis on Latin America.

SUMMER FIELD RESEARCH

The center awards summer research grants for continuing graduate students to conduct individual research projects in Latin America. Separate competitions are held each Spring Quarter in the following categories: predissertation grants for Ph.D. candidates, usually after their second year of study; short-term travel grants for students in any field and at any level of study; professional school research grants for students in the Schools of Business, Engineering, Law, and Medicine; Ayacucho Grants for research in Venezuela; and the H. J. K. Knowles research grants for research on women in Latin America. For additional information, contact the Center for Latin American Studies.

COURSES

Latin American Studies courses are also listed under Santiago in the "Overseas Studies" section of this bulletin.

In addition to the courses listed here, the faculty affiliated with the center regularly offer over 100 courses related to Latin America in their respective departments and schools. Consult the quarterly Time Schedule for current course offerings or contact the Center for Latin American Studies.

See the respective department section of this bulletin for cross-listed course descriptions.
80/170. Culture, Society, and Politics in Latin America—(Same as History 80.) Introduction to the economic, political, and social history of Latin America since the 15th century. Emphasis is on the interaction between economic change, social structure, and political movements. DR:9(5*)
5 units, Spr (Klein) MW 1:15-3:05

87. Urbanization, Poverty, and Children in Latin America—Sophomores only. Regional issues through the study of street children in Latin America: rural-urban migration patterns, the informal economy and labor sector, human rights, ethnicity and identity, the costs of structural adjustment policies, environmental and other health hazards, the role of public and private institutions, and grassroots mobilization. Disciplinary perspectives on the plight of street children include sociological and demographic profiles; psychological studies; depictions in literature, film, and popular culture; ethnographies; and economic analyses. Case studies of institutional responses. Enrollment limited to 10.
5 units, Spr (Morrison)

88. The Zapatista Rebellion in Chiapas, Mexico—(Enroll in Anthropology 98B.) Sophomores only. 3-5 units, Aut (G. Collier)

91/171. Women in the Transition to Democracy in Latin America—Comparison of how women have participated in, and been affected by, transitions to democratic politics in Brazil, Argentina, Venezuela, and El Salvador. Current political and feminist theory is used to address: the impact on women of changing political and economic models, family structures, religious and ethnic influences, and feminist movements. Emphasis is on the problems and possibilities of comparison. Limited enrollment.
5 units, Spr (Friedman)

121. 20th-Century Brazil—(Same as History 180.)
5 units, Spr (Wirth) MTW 9

125. Incas and their Ancestors: Peruvian Archaeology—(Same as Anthropology 189.)
5 units, Win (Rick)

127. Mesoamerican Communities, Ethnicities and Nations—(Same as Anthropology 103.) DR:2(*)
3-5 units, Aut (G. Collier)

129. Indigenous Peoples and Environmental Problems—(Same as Human Biology 149, Anthropology 169.)
3-5 units (Durham, Staff) not given 1995-96

138. Politics of Labor in Latin America—Introduction to the relationship between workers and the state in contemporary Latin America in light of institutional transitions, democratization processes, and economic reforms such as privatization.
5 units, Win (Tavares de Almeida)

165. Introduction to the Design and Methodology of Interdisciplinary Field Research—Preparation for summer fieldwork in Latin America or other regions. Issues of interdisciplinary research design and methodology; relationship between evidence and argument; practicalities of field research in developing countries; ethical and political considerations.
5 units, Spr (Staff)

169. Directed Individual Study—(Graduate students register for 269.) For students engaged in special interdisciplinary work that cannot be arranged by department.
1-5 units, Aut, Win, Spr (Staff)
by arrangement

180. Undergraduate Colloquium: Ethnicity, Class, and Identity in Latin America—(Same as History 277S.)
5 units (Bowser) not given 1995-96

181. Undergraduate Colloquium: Slavery and Race Relations in the Americas—(Same as History 283A.)
5 units, Win (Klein) W 3:15-5:05

182. Seminar: The United States and Central America—(Same as Political Science 126K.) The crisis of development in Central America and the challenge it poses for U.S. policy towards Latin America. Emphasis on the historic roots of the crisis and the emergence of specific policy dilemmas in the issue areas of democratization, national security, and human rights.
5 units (Karl) not given 1995-96

183. Undergraduate Colloquium: Historical Aspects of Underdevelopment in Latin America—(Same as History 278.)
5 units, Aut (Stahl) Th 1:15-3:05

184. Tendencies in Contemporary Brazilian Literature—(Same as Portuguese 265.)
3-5 units, Win (Almino)

187. Undergraduate Colloquium: The Agrarian Origins of Underdevelopment in Latin America—(Same as History 282.)
5 units (Haber) not given 1995-96

188. Undergraduate Colloquium: Interest Groups and Social Policy in Latin America—Research seminar focusing on the role of interest organizations (e.g., labor, industry, political parties) in formation of social policies in Latin America.
5 units, Spr (Tavares de Almeida)

191. Undergraduate Seminar: Problems in United States-Mexico Relations—Overview of problem areas in the relationship between the U.S. and Mexico. Historical survey of U.S.-Mexico economic and social relations, trade problems, foreign debt crisis, foreign investment, agriculture, energy policy, immigration policies, and labor markets. Enrollment limited to 15. Prerequisite: consent of instructor by application at Bolivar House. DR:9(5)
5 units, Aut (Smith) W 7-9 p.m.
195. Perspectives on Sustainable Development in Latin America — Cross-disciplinary examination of perspectives for "sustainable development" in rural areas of Latin America. Interactions between poverty, development, environmental degradation, and approaches to growth and sustainability as agroecology, agroforestry, small farm development, and conservation biology. Limited enrollment.
5 units, Win (Rosset)

196. Conservation and Community Development in Latin America — (Same as Human Biology 139, Anthropology 161A.)
3-5 units (Durham, Irvine)
not given 1995-96

197A,B. Workshop on Brazil — (Same as Political Science 226A,B.)
5 units, Aut, Win (Schmitter) T 3:15-5:05
Th 4:15-6:05

198. Senior Thesis — Restricted to undergraduate majors and those writing the honors thesis in Latin American Studies.
1-10 units, Aut, Win, Spr (Staff) by arrangement

200. Seminar: Research on Latin America — (Same as Political Science 222K.) Restricted to graduate students and undergraduates preparing senior honors theses after research in Latin America. Develop and present research and prepare a field paper. Prerequisite: consent of instructor.
5 units (Karl) not given 1995-96

202. Latin American Cinema: The Short Story in Film — (Same as Spanish 294.)
3-5 units, Aut (Ruffinelli)

240. Government and Politics in Central America — Introduction to 20th-Century government and politics in the Central American region: the political economy of Central America, origins of civil unrest, the role of the U.S. and other foreign actors, the process of peace negotiations, analysis of current democratization efforts.
5 units, Win (Zamora)

250,251,252. Core Seminar in Latin American Studies — Restricted to A.M. degree students, or consent of instructor. Interdisciplinary analysis of topics and issues related to the Latin American region.
250. — (Same as Political Science 114K.)
5 units, Aut (Karl) TTh 1:15-3:05
W 3:15-5:05

251. — (Same as Political Science 224K.)
5 units, Win (Morrison, Karl) Th 1:15-4:05
252. 5 units, Spr (Staff) Th 3:15-5:05

260. Latin American Bibliography — Introduction to research use of Stanford library collections on Latin American topics.
3 units, Aut (Trujillo) T 10:15-11:45

280. Senior Research Seminar: Ethnicity, Class, and Identity in Latin America — (Same as History 277S.)
5 units (Bowser) not given 1995-96

318. Graduate Seminar: Interest Groups in Latin America
5 units, Spr (Tavares)

378. Graduate Seminar: Economic and Social History of Colonial Latin America — (Same as History 477.)
4-5 units, Win (Klein) T 1:15-3:05

379. Graduate Seminar: Economic and Social History of Latin America — (Same as History 478.)
5 units (Haber) not given 1995-96

380. Graduate Seminar on Brazil — (Same as History 476.)
4-5 units (Wirth) not given 1995-96

AFFILIATED DEPARTMENT OFFERINGS
See respective department listings for course descriptions, days, times, and Distribution Requirement (DR) information.

ANTHROPOLOGY

3. Human Prehistory
3-5 units (Rick)

60. Environmental Problems and Development
3-5 units (Gupta)

73A,B,C. First-Year Quiche Maya
3 units (Fox) by arrangement

74A,B,C. Intermediate Yucatec Maya
3 units (Fox) by arrangement

75A,B,C. First-Year Classical Nahuatl
3 units (Fox) by arrangement

76. Intermediate Classical Nahuatl
3 units (Fox) by arrangement

77A,B,C. First-Year Quechua
3 units (Fox) by arrangement

78. Intermediate Quechua
3 units (Fox) by arrangement

93. Prefield Research Seminar
5 units (Staff)

94. Postfield Research Seminar
5 units (Gibbs)

164. Ecological Anthropology — (Same as Human Biology 134.)
3-5 units (Durham, Staff)

168. Medical Anthropology
5 units (Barnett)

173. Maya Hieroglyphic Writing
5 units (Fox)
181. Evolutionary Anthropology
5 units (Durham)

251. Issues in Cultural Studies
5 units (Rosaldo)

262. Topics in Political Economy
5 units (Gupta) not given 1995-96

266. Cultural Transmission: Education in Cross-Cultural Perspective—(Same as Education 315.)
3-5 units (G. and L. Spindler)

273. Seminar in Advanced Medical Anthropology
5 units (Barnett)

BUSINESS

301. International Economics and Policy Analysis
5 units (Wells)

DANCE

75. Mexican Dance and Folklore
2 units (Cashion)

77. Dances of Latin America
1 unit (Cashion)

78. Afro-Brazilian and Afro-Peruvian Dance
1 unit (Cashion)

177. Dance and Culture in Latin America
3-4 units (Cashion)

197. Argentine Tango and Swing
1 unit (Powers)

268. Society, Education, and Dance
4-5 units (Cashion, Ross)

ECONOMICS

99. State, Market, and Development—For sophomores only.
5 units (Meier)

106. The World Food Economy—(Same as Food Research 103.)
4 units (Falcon, Naylor)

118. The Economics of Development
5 units (Kochar)

119. Development and Population Interactions in the Third World—(Same as Food Research 121/219.)
5 units (Yotopoulos)

122. The Theory of Capitalist Development
5 units (Harris)

165. International Economics
5 units (Krueger)

215. Industrialization, Growth, and Economic Development
5 units (Schaffner)

217. Money and Finance in Economic Development
5 units (McKinnon)

219. Value, Distribution, and Accumulation
5 units (Harris)

265. International Finance
5 units (McKinnon)

266. International Trade Theory
5 units (Krugman)

267. Special Topics in International Economics
5 units (Krueger)

EDUCATION

163X. Technology Policy, Knowledge Formation, and Economic Development
2-5 units (Carnoy)

197. Education and the Status of Women: Comparative Perspective—(Same as Sociology 134.)
4-5 units (Ramirez) given 1996-97

202X. Introduction to the Study of International Comparative Education
1-3 units (Honig)

206B. Project Workshop in International and Comparative Education
2-5 units (Honig)

206X. Applied Research Methods in International and Comparative Education
3-5 units (Honig)

207. Seminar: The Politics of International Cooperation in Education
3-5 units (Honig)

283. Attitudes Towards Language and Language Study
4 units (Padilla)

287X. Culture and Learning—(Same as Anthropology 136.)
3 units (Baugh, McDermott)

306A. Education in Economic Development
5 units (Carnoy)

306B. Education and Political Development
5 units (Mintrop)

306C. Cultural Approaches to Education and Development
3-5 units (McDermott)

306D. World, Societal, and Educational Change: Comparative Perspectives—(Same as Sociology 332.)
5 units (Chabot)

335X. Language Policy and Planning: National and International Perspectives
3 units (Valdes)

376. Education and Theories of the State
5 units (Carnoy)

387A,B,C. Workshop: Comparative Systems—(Same as Sociology 311A,B,C.)
2-5 units (Meyer)
406X. Topics in Comparative Educational Research
   2-3 units (Ramirez)

408. Research Workshop in International and Comparative Education
   2-5 units (Carnoy)

ENGLISH

163K. Contemporary Latina Culture
   3-5 units (Rosa)

FOOD RESEARCH INSTITUTE

113/213. Planning and Analysis of Development Projects
   5 units (Gotsch)

118/218. Economic Development in Latin America
   5 units (Reynolds)

   5 units (Josling) given 1996-97

136/236. Population Perspectives in the Third World
   5 units (Arthur)

211. International Development Policy Analysis I
   5 units (Pearson, Gotsch)

212. International Development Policy Analysis II
   5 units (Pearson, Gotsch, Yotopoulos)

323. Economic Development Theory
   5 units (Fafchamps, Rozelle)

324. Explorations in the New Development Economics
   5 units (Yotopoulos)

HISTORY

176. Spain in America, 1492-1825
   4-5 units, Aut (Stahl) MTWTh 10-10:50

224. Seminar: States and Markets in National Development
   5 units (Packenham)

227. Seminar: Democratization — East, West, and South
   5 units, Win (Schmitter)

227D. Seminar: Consolidating Democracy
   5 units (Diamond)

234B. International Institutions
   5 units (Goldstein)

5B. Contemporary Latin American Music—
   Graduate students must seek Music Department approval.
   3 units, Aut (Montalvo) MWF10 TTh 10

MUSIC

25. Colonialism and Nationalism in the Third World
   5 units (Abernethy) given 1996-97

35. International Politics
   5 units (Risse-Kappen)

113A. Politics and Development in Latin America
   5 units (Packenham)

124. Seminar: Political Economy of Latin American Development
   5 units (Packenham)

140A,B,C. Ethics of Development in a Global Environment (EDGE)—(Same as Engineering
   297A,B,C; Anthropology 133A,B,C.)
   1-4 units (Gupta, Lusignan, Packenham)

176. Spain in America, 1492-1825
   4-5 units, Aut (Stahl) MTWTh 10-10:50

224. Seminar: States and Markets in National Development
   5 units (Packenham)

227. Seminar: Democratization — East, West, and South
   5 units, Win (Schmitter)

227D. Seminar: Consolidating Democracy
   5 units (Diamond)

234B. International Institutions
   5 units (Goldstein)

243A. International Relations Theory
   5 units (Gaubatz)

243C. Seminar: Theoretical Issues in International Political Economy
   5 units (Goldstein)

314K. Political Economy of Development
   5 units (Karl)

323. Seminar: Theories of National and International Development
   5 units (Packenham) given 1995-96

SPANISH AND PORTUGUESE

PORTUGUESE

130. Brazilian Cultural Perspectives
   4 units (Staff)

188. Struggle Literature as Discourse for Freedom in African Lusophone
   3-5 units (de Carvalho)

190. Brazilian Cinema
   3-5 units
SPANISH

109P. Practicum for Speakers of Spanish
4 units (Staff)

121M. Spanish for Medical Students
3 units (Corso)

125. Spanish for Professions
4-5 units (Staff)

131B. Hispanic American Cultural Perspectives
4 units (Sandoval)

132B. Mexican and Chicano Cultural Perspectives
4 units (Sandoval)

140. Introduction to Methods of Literary Analysis
3-5 units (Rosa)

160. Spanish American Literature I — DR:7(2)
3-5 units, Win (Rosa)

161. Spanish American Literature II — DR:7(2)
3-5 units, Spr (C. Fox)

180. Introduction to Chicano Life and Literature — (Same as Chicano Studies 180.)
5 units (Yarbro-Bejarano)

190D. Sophomore Seminar: Latin American Heroes in Postmodern Culture
3-5 units (Ruffinelli)

192. Film and Literature: U.S.-Mexico Border Representations
3-5 units (Fox)

201. Advanced Grammar
3 units (Sandoval)

202. Advanced Composition
3 units (Haro)

249. Puerto Rico: The Elusive Nation
3-5 units (Rosa)

250. Contemporary Mexican Thought
3-5 units (Fox)

268. A New Literary Genre: Testimony
3-5 units (Ruffinelli)

285. Chicana Expressive Culture
3-5 units (Yarbro-Bejarano)

289. Latina Gay/Lesbian Culture
3-5 units (Yarbro-Bejarano)

291. Race, Discourse, and the Origins of the Americas: The History that Literature Makes
3-5 units (Wynter)

306. Introduction to Literary Theory and Criticism
4-5 units (Pratt)

307. Latin American Cultural Theory
3-5 units (Pratt)

345. Gauchesca Poetry
3-5 units (Ruffinelli)

342. The Short Novels of the '60s and '70s in Latin America
3-5 units, Win (Rosa)

358. 19th-Century Constructors
3-5 units, Aut (Ruffinelli)

361. Latin American Writing, 1900-45: Dialects of Cosmopolitan/Localism
5 units (Pratt)

395. Transnational Film Production
3-5 units (Fox)

SCIENCE, TECHNOLOGY, AND SOCIETY

279. Technology and Policy in Newly-Industrializing Countries — (Same as Industrial Engineering 279.)
2-4 units (Forbes)

OVERSEAS STUDIES

These courses are approved for the Latin American Studies major and taught at the campus indicated. Students should discuss with their major advisers which courses would best meet educational needs. Course descriptions can be found in the “Overseas Studies” section of this bulletin or in the Overseas Studies Program office, 126 Sweet Hall.

SANTIAGO

116X. Contemporary Representations of Latin American Society
5 units, Win (Hurtado)

118X. Cultural Modernization: The Case of Chile
5 units, Win (Fuenzalida)

119X. Latin America in the International Economy
5 units, Win (Ffrench-Davis)

120X. Modernization and Culture in Latin America — (Same as Anthropology 104X.)
5 units, Aut (Subercaseaux)

121X. Latin American Democracy in the Southern Cone
5 units, Aut (Rehren)

122X. Man-Environment Interactions: Case Studies from Central Chile — (Same as Human Biology 106H, Overseas Studies 106H.)
5 units, Aut (Hajek)

127X. Theater and Society — (Same as Drama 158S, Overseas Studies 158S.)
5 units, Aut (Hurtado)

130X. Latin American Economies in Transition
5 units, Aut (Muñoz)

162X. Core Seminar: Ecology-Policy Studies
5 units, Win (Hajek)
LINGUISTICS

Emeriti: (Professors) Clara N. Bush, Charles A. Ferguson, Joseph H. Greenberg
Chair: Eve V. Clark
Professors: Joan Bresnan, Eve V. Clark, Penelope Eckert, Shirley Brice Heath (on leave Spring), Martin Kay, Paul Kiparsky, William R. Leben (on leave Winter, Spring), Stanley Peters, John R. Rickford, Ivan A. Sag, Elizabeth C. Traugott, Thomas A. Wasow
Associate Professor: Peter Sells (on leave)
Assistant Professor: Henriette de Swart
Courtesy Professor: John Baugh
Affiliated Faculty: Herbert H. Clark, Kenji Hakuta, James A. Fox, Mary L. Pratt, Orrin W. Robinson III (on leave Winter, Spring), Richard D. Schupbach
Senior Lecturers: Khalil Barhoum, Philip L. Hubbard, Beverley J. McChesney
Acting Assistant Professor: Edward Fleming
Consulting Professors: Jerry R. Hobbs, Ronald M. Kaplan, Charlotte Linde, Geoffrey Nunberg
Consulting Associate Professor: Jared Bernstein
Consulting Assistant Professor: Mary Dalrymple
Visiting Professor: Arnold Zwicky (Winter)
Visiting Associate Professor: Juliette Blevins (Winter)
Visiting Assistant Professor: Gert Webelhuth (Winter, Spring)

English for Foreign Students
Director: Beverley J. McChesney
Associate Director: Philip L. Hubbard

Special Language Program
Coordinator: Eva Prionas
Senior Lecturer in Arabic: Khalil Barhoum
Lecturer in Hebrew: Hanna Berman
Lecturer in Swahili: John Mugane

Linguistics concerns itself with the fundamental questions of what language is and how it is related to the other human faculties. In answering these questions, linguists consider language as a cultural, social, and psychological phenomenon and seek to determine what is unique in languages, what is universal, how language is acquired, and how it changes. Linguistics is, therefore, one of the cognitive sciences; it provides a link between the humanities and the social sciences, as well as education and hearing and speech sciences.

The department offers courses at undergraduate and graduate levels in the areas central to linguistic theory and analysis. Many of them deal with the analysis of structural patterns in the different components that make up language, including sounds (phonetics and phonology), meanings (semantics), words (morphology), sentences (syntax), and the way they change. Other courses integrate the analysis of linguistic structure with phenomena that directly concern other disciplines. These include courses in language acquisition, sociolinguistics, computational linguistics, and the philosophy of language.

A variety of open forums provide for the discussion of linguistic issues, including colloquia and regularly scheduled workshops in phonology, syntax, sociolinguistics, child language, and historical linguistics. Faculty and visiting scholars in the Cognitive Science Group and the Center for the Study of Language and Information, whose members are linguists, philosophers, psychologists, and computer scientists, participate extensively in the activities of the department.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The undergraduate major stresses the study of language both as a fundamental human faculty and as a changing social institution. At the core of the program is a set of departmental courses on the nature of human language; in addition, the major draws on courses offered by other departments and programs.

The Linguistics major cuts across the humanities, social, and physical sciences, and provides a solid general education as a background for advanced studies in such disciplines as anthropology, communication, computer science, education (language, literacy, and culture), hearing and speech sciences, languages, law, philosophy, and psychology.

REQUIREMENTS

Requirements for the A.B. include at least 50 units of course work in linguistics (typically 12 courses plus a seminar) and related fields, including the study of a foreign language. No more than two courses, neither of which can be a core course, may be taken on a Credit/No Credit basis.

Core Courses — The five core courses are:
110. Introduction to Phonetics and Phonology
120. Introduction to Syntax
130. Introduction to Semantics and Pragmatics
150. Introduction to Sociolinguistics
A course in Historical Linguistics or the History of a Language
The historical course must be crosslisted as a Linguistics class.

Other Courses — Other courses counting toward the unit requirement should form a coherent program and be approved by an adviser. Students should consult with an adviser when declaring the major, and maintain regular contact during the remainder of their Stanford career.

Of the 50 units for the major, 20 come from the five core courses. Students must also take:
1. At least five other courses (minimum 3 units each) taught through Linguistics, including at least two 200-level Linguistics courses.

2. The spring seminar (Ling. 97).

Language Requirement — Majors must have competence in at least one language other than English, as part of their understanding of the field of linguistics and its study. This is usually demonstrated by the completion of six quarters of language study or equivalent, or by a special examination or other evidence that the student has the required competence. Conversation classes can only be counted towards this requirement with the prior written approval of the student’s adviser. Up to 10 units of credit in language classes may be applied to the credit requirement (50 units) for the Linguistics major. This requirement may be modified for certain areas of specialization, in consultation with the student’s adviser and the chair of the Undergraduate Studies Committee.

Spring Seminar — The Spring Seminar (Linguistics 97) is offered each year as a 2-unit once-weekly course and is a required part of the Linguistics major. The goal of the seminar is to provide a forum for students to work on a small project that helps define a focus for their Linguistic studies at Stanford. Students normally take the seminar in the junior or senior year, and may take it more than once if they wish.

Language Specialization — Students may major in Linguistics while declaring a specialization in a foreign language. Below is a program that has been worked out for Linguistics majors who declare a specialization in French.

Students are subject to the normal requirements for the A.B. in Linguistics, with the following modifications:

1. Three additional courses are required: the introductory series on French literature and culture (French 130, 131, 132).
2. French 272, Pronunciation and Phonetics, may be substituted for Linguistics 110, Introduction to Phonetics and Phonology; French 275, History of the French Language, may be used as the required course in the history of a language.
3. The French section of Linguistics 1, Introduction to Linguistics, is recommended for students specializing in French.

Similar programs involving other languages may be worked out with a Linguistics adviser in consultation with the relevant language department.

HONORS PROGRAM

Students majoring in linguistics who plan to apply for graduate studies in linguistics or related fields should seek departmental honors. An application to pursue honors work should be presented well before the end of the junior year; approval is given only to students who have maintained a letter grade indicator (LGI) of ‘B+’ or better in the courses required for the major.

Honors students take a total of 60 units. These must include the core courses and an honors essay based on research conducted with a member of the Linguistics faculty. In the senior year, the student enrolls in Linguistics 99A and B (Independent Study) in the Autumn and Winter Quarters, respectively, to work closely with the selected faculty member on the research project. In Spring Quarter, the student enrolls in 98 (Honors Research) with the faculty member for close supervision on the honors essay. The essay must be submitted in final, acceptable form no later than six weeks before the date of intended graduation.

GRADUATE PROGRAMS

MASTER OF ARTS

The University’s basic requirements for the master’s degree are discussed in the “Graduate Degrees” section of this bulletin. The following are additional departmental requirements. Candidates should review the department’s “Guidelines for the A.M and Ph.D. Degrees” for further particulars concerning these requirements.

1. Courses: candidates must complete a minimum of 40 units of graduate work in linguistics, including at least four courses in the student’s area of specialization. No more than two courses should be at the 100 level.

   Individual programs should be worked out in advance with an adviser who should ascertain that the necessary courses in the area of specialization are offered over the course of the year of anticipated enrollment. The overall letter grade indicator (LGI) must be at least ‘B’ for all degree program course work.

2. Language: reading knowledge of a non-native language in which a substantial linguistic literature is written, with sufficient facility to understand and interpret linguistic research published in that language or in-depth research on the structure of a non-native language.

3. Thesis or Thesis Project: a research paper supervised by a committee of three faculty; (normally fulfilled by up to 6 units of Linguistics 398, Directed Research).

DOCTOR OF PHILOSOPHY

The following requirements are in addition to the basic University requirements for the degree sought; see the “Graduate Degrees” section of this bulletin. Candidates should review the department’s “Guidelines for the A.M. and Ph.D. Degrees” for further particulars concerning these requirements.
1. Language: candidates must demonstrate the ability to read at least one foreign language in which a substantial linguistic literature is written, with sufficient facility to understand and to interpret linguistic research published in that language. (Particular areas of specialization may require additional research languages.)

In addition, each candidate must demonstrate an explicit in-depth knowledge of the structure of at least one language (normally neither the candidate's native language nor the language used for the reading exam). This requirement is fulfilled by writing an original research paper on a language.

2. Courses: a minimum of 80 units of graduate work beyond the A.B. or B.S. exclusive of dissertation units or, beyond the A.M., 40 units exclusive of dissertation units. A basic course requirement detailed in the Ph.D. guidelines guarantees that each student covers a sufficient set of sub-areas within the field.

Candidates must maintain a satisfactory record in the number and distribution of units completed. The overall course work LGI must be at least 'B,' and all of the "basic" courses should be completed with at least a 'B.'

3. Research: the prospective Ph.D. candidate is expected to complete two substantial qualifying papers. The deadline for completion of the first qualifying paper is the end of the Autumn Quarter of the second year; the deadline for completion of the second qualifying paper is the end of Spring Quarter of the second year. Subject matter of the two papers, although it may be related (for example, same language), must be clearly distinct. The requirement is fulfilled by 395A,B, Research Workshop (2 units each), and oral discussion with a committee of at least three faculty members selected by the student and the faculty and approved by the committee.

4. Candidacy: students must complete the basic courses requirement (see item 2 above), one foreign language requirement (see item 1 above), and one qualifying paper (see item 3 above) by the end of their second year.

5. Teaching: at least three quarters serving as teaching assistant in a linguistics course; students on University fellowships teach four quarters.

6. Colloquia: two oral presentations exclusive of the oral presentation of the dissertation proposal (see item 7b below). This requirement is satisfied by class presentations, conference papers, or colloquium talks. Normally, both should be given during the first three years of study.

7. Dissertation:
   a) A written dissertation proposal required by the end of the third year
   b) Oral presentation of the dissertation 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 num-
bers are for advanced undergraduates and A.M. and Ph.D. minor candidates in Linguistics. Those with numbers 200 and above are primarily for graduate students, but with the consent of instructor some of them may be taken for credit by qualified undergraduates.

At all levels, the course numberings indicate a special area, as follows:

- 00-04 General
- 05-19 Phonetics, Phonology, and Morphology
- 20-39 Syntax, Semantics, and Pragmatics; Mathematical and Computational Linguistics
- 40-49 Language Acquisition and Psycho-linguistics
- 50-59 Sociolinguistics
- 60-69 Language Change, Language, and Culture
- 70-84 Linguistic Analysis of a Language
- 85-94 Methods
- 95-99 Directed Work, Theses, Dissertations

1. Introduction to Linguistics—The nature of human language and the methods of modern linguistics. Topics: principles of the structure of human language, how children acquire language, language change, universals, regional and social dialects, and the application of linguistic science to social, educational, and engineering problems. DR:9(4)

4 units, Win (Bresnan)

4. Language and Culture—(Enroll in Anthropology 4.) DR:9(4 or 5)

4-5 units (Fox) not given 1995-96

30. Language and Law—Topics: court decisions concerning language (e.g., freedom of speech), lawyers’ use of language in interpreting documents, plain language, the manipulation of testimony, treatment of defendants speaking non-standard English or languages other than English. Some discussion of campus codes, e.g., harassment policies, the honor code.

4 units, Win (Traugott)

35. Computers and Language—Topics: will computers use natural language to understand, communicate, or translate? Why is language processing difficult? How like a human must one be to understand human language? Conclusions of importance for machine translation, talking robots, and other technologies. The value of modern linguistic science for such technologies, and its limitations.

4 units, Aut (Kay)

52. Language in the Workplace—The forms and functions of language in the workplace; basic concepts of discourse analysis, workplace literacy, and ethnic, linguistic, and gender issues. Limited enrollment.

4 units, Spr (Staff)

54. Language, Mind, and Computation—For sophomores only.

3 units, Spr (Peters)

62. History of the English Language—(Same as English 102.) Evolution of English in Britain and the U.S.; the use of English world-wide. Emphasis on how and why language changes, issues in language contact, the effects of literacy, and standardization. DR:9(4)

5 units, Spr (Traugott)

70. The Structure of English Words—Analysis of vocabulary to determine word meanings. Goals: to increase vocabulary, and, by enumerating the principles behind changes in pronunciation and meaning, take the mystery out of the processes that have made our vocabulary what it is today. DR:9(4)

4 units, Aut (Staff)

73. African American Vernacular English—Survey of the English vernacular spoken by African Americans in big city settings, and its relation to Creole English dialects spoken on the South Carolina Sea Islands (“Gullah”), in the Caribbean, and in W. Africa. The history of expressive uses of African American English (in soundin’ and rappin’), and its educational implications. DR:3 or 9(4)

4 units, Aut (Rickford)

75. Introduction to the Germanic Languages—(Enroll in German 38A/138.) DR:9(5)

3 units, Aut (Robinson)

85. Introduction to Methods of Teaching English as a Second Language—Practical approach to teaching English to non-native speakers, focusing on a survey of features of English which present particular difficulties. Preparation of lessons, practice answering questions, and tutoring of an individual learning to speak English.

4 units, Spr (McChesney)

86. Practicum in Teaching English as a Second Language—Observation and participation in an English as a second language class on a regular basis. Weekly workshop in course planning. Prerequisite: prior or concurrent enrollment in 85.

2 units, Spr (McChesney)

97. Spring Seminar—Introduction to research goals and methods in linguistics and related disciplines. Provides a forum for students to work on a small project that helps define a focus for their linguistic studies. Presentations, discussion, and final paper.

2 units, Spr (Staff)

98A,B,C. Honors Research

2 units, Aut (Staff)

4 units, Win, Spr (Staff)

99. Independent Study

1 or more units, any quarter (Staff)

by arrangement
105/205. Phonetics—Introduction to the technical side of phonetics and phonology, including acoustics of speech production, anatomy of the vocal tract, acoustic correlates of speech sounds, aspects of speech perception, spectrogram reading, research techniques, the phonetics/phonology interface. Lab exercises. Prerequisite: 110 or consent of instructor.
4 units, Win (Flemming)

110. Introduction to Phonetics and Phonology—Introduction to the study of sounds as part of language. Phonetics or the physical aspects of speech sound production, and perception: anatomy, articulation, acoustics, auditory mechanisms. Phonetic transcription. Phonology, or the mental, abstract aspects of sound used in language: the systems of distinctions among sounds and their combinations. Surveys major research findings and develops ability to construct and evaluate phonetic experiments and phonological analyses.
4 units, Spr (Flemming)

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, Wasow)

121. Intermediate Syntax—Introduction to modern syntactic theory and its relation to sentence processing. Overview of selected grammatical problems from the perspective of post-transformational syntactic theory. Emphasis on English grammar, with some exposure to the syntax of other languages.
4 units, Win (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 (de Swart)

131. Semantics Seminar: Puzzles about Language and Time
4 units, Spr (de Swart)

135. Basic Concepts in Mathematical Logic—(Same as Philosophy 159.) Concepts and techniques used in mathematical logic, primarily through the study of the language of first-order logic. Topics: formalization, proof, propositional logic, quantifiers, sets, mathematical induction, and enumerability. DR: 4(6)
4 units, Aut (Wasow)

136. First-Order Logic—(Enroll in Philosophy 160A.) DR: 4(6)
4 units, Win (Kremer)

139/239. Introduction to Computational Linguistics—Introduction to the computational aspects of basic linguistic processes in morphology, syntax, and semantics, and their integration in applications such as machine translation and man-machine interfaces. Grades based on computer programs implementing key algorithms for parsing, generation, etc., done as homework exercises. Prerequisite: introductory course in Prolog programming.
4 units, Win (Kay)

140. Language Acquisition I—See 240.
4 units, Aut (E. Clark)

145. Language and Thought—(Enroll in Psychology 146.) DR: 9(4)
4 units, Aut (H. Clark) MWF 1:15

146. Language and Gender—Synthesis of literature on the relations between gender and speech style, distinguishing linguistic, sociolinguistic, and feminist issues. Topics: language, socialization, oral and written language, language and class membership. DR: 91(4)
4 units, Spr (Eckert)

147. Ethnography of Communication—(Same as Anthropology 167.) Language use in situations, organizations, and by members of different cultures. Speech events and the role of conversation, narratives, and performance modes in different contexts. Focuses on ethnographic methods for the study of verbal and non-verbal communication.
4 units, Win (Heath)

4 units, Win (Staff)

150. Introduction to Sociolinguistics—The study of language in society. Social dialects, class, ethnic, and gender differences in speech. Prestige and stigma associated with different ways of speaking. Stylistic variation; how speakers adapt their language to different audiences and different social contexts. For additional units, students have the option of a public service internship in an organization dealing with linguistic minorities or language-related issues (bilingual education or language rights) with additional section meeting weekly focusing on their field experience. DR: 9(5)
4-6 units, Win (Rickford)
159. Language and Youth Culture — (Same as Anthropology 170A.) Sociocultural and linguistic studies through which urban youth have been defined and debated. Gang histories and structures, ghetto and project life, socialization of children and youth, and aesthetic expression (graffiti, vernaculars, music, drama, and pictorial art). Case study with investigations of language and culture patterns within institutions (e.g., families, schools, youth groups including Boys' and Girls' Clubs, neighborhood basketball leagues, etc.), and “service” agencies. Emphasis on U.S. youth, with comparative perspectives from other nations, especially with respect to language socialization

4 units, Aut (Heath)

160. Introduction to Language Change — Variation and change as the natural state of language. Differentiation of dialects and languages over time. Determination of historical relationships among languages and reconstruction of ancestral stages. Types and explanations of change. Parallels with genetic and cultural evolutionary theory, and implications for the description and explanation of language in general. Language as a window on history: contact, migrations, the vocabulary of ancient institutions, and cultural origins of grammar. DR:9(4)

4 units, Win (Kiparsky)

162/262. English Transplanted, English Transformed — Transformations in the English language which took place as it was transplanted from Britain to the Third World and other parts of the British Empire from the 16th century on, concentrating on the language mixture, simplification, and complication processes which resulted in new “pidgins” and “creoles.” Characteristics of these languages and their social, political, and literary/expressive contexts, focusing on varieties (e.g., Cameroon, China, the Caribbean, India, Malaysia, Papua New Guinea). Possible field trip to a pidgin or creole-speaking region (e.g., Hawaii or the S. Carolina Sea Islands). DR:2 or 9(4*)

4 units, not given 1995-96

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

4-5 units, Win (Hubbard)

200. Foundations of Linguistic Theory — Theories that have shaped 20th-century linguistics; recurrent themes and descriptive practice.

4 units, not given 1995-96


4 units, Win (Zwicky)

207B. Morphosyntax — Role of morphology in grammar: how word structure serves syntax in the expression of meaning. Universal properties and typology of morphological categories; proposals towards their principled explanation in a restrictive theory of language.

4 units, Spr (Kiparsky)


4 units, Aut (Kiparsky)

217. Seminar in Phonology — Explores a model of phonology that incorporates phonetic desiderata into the grammar as violable constraints in an Optimality Theoretic framework. Accounts for the failure of specific languages to observe general tendencies in terms of language-specific ranking of conflicting phonetic goals, and analyzes non-phonetic conditions on phonetically motivated processes in terms of the interaction between phonetically-based constraints, from morphology, and other constraints.

4 units, Spr (Flemming)

219. Syllable Structure — Uses data from Australian Aboriginal languages to explore issues in syllable theory. Diachronic and synchronic initial-dropping and the evolution of onsetless syllables, feature-based restrictions on word-initial consonants, and the interaction of place-of-articulation with manner-of-articulation.

4 units, Win (Blevins)

220A. Introduction to Syntactic Theory — Overview of current syntactic issues and theory, with emphasis on work based on Government-Binding theory.

4 units, Win (Webelhut)

220B. Cross-Linguistic Syntax — Types of critical phenomena found in diverse syntactic systems and their implications for syntactic theory. Emphasis is on cross-linguistic diversity, typological variation, and their relation to general theoretical issues.

4 units, Spr (Bresnan)

221A. Head-Driven Phrase Structure Grammar I — Surveys two related approaches to syntax and semantics of natural language: Phrase Structure Grammar and Categorial Grammar. Analyses of binding, unbounded (filler-gap) dependencies, agreement, word order variation, and complementation from the tradition of Generalized Phrase Structure Grammar are reviewed critically and compared with alternative approaches. Also, Montague-
style categorical analyses, e.g., Bach, Steedman, and Dowty. A systematic presentation of theory of Head-Driven Phrase Structure Grammar.

4 units, Spr (Sag)

221B. Head-Driven Phrase Structure Grammar II — Current research on grammatical theory within HPSG and closely related frameworks. Topics selected according to the interest of participants: wh-constructions, construction hierarchies, constraints on quantifier scope, issues in Germanic syntax, Romance syntax (cliticization, causativization, negation), or linearization theory. Prerequisite: familiarity with the basics of HPSG.

5 units, Aut (Sag)

224A. Lexical-Function Grammar I — Intensive introduction to LFG. Presentation of the formal architecture for grammatical description through analytic problems in a variety of languages.

5 units, Aut (Bresnan)

225. Advanced Topics in Lexical-Functional Grammar — Syntactic dependencies and their formal encoding in LFG, concentrating on relations expressible at the level of f-structure or in the mapping between f-structure and other more abstract representations. Issues surrounding the phenomenon of constituent and nonconstituent coordination and their interaction with other grammatical phenomena, particularly the interaction of coordination with nonlocal dependencies, anaphoric binding, ellipsis, and quantification.

4 units, Spr (Dalrymple)

228A,B. Syntax Seminar — Focuses on a topic of relevance to current syntactic theory. Each quarter the seminar is principally coordinated by one or two syntax faculty; area faculty participate throughout. Topics to be announced.

228A. 4 units, Win (Bresnan)
228B. 4 units, Spr (Webelhut)

230A. Introduction to Semantics and Pragmatics — Introduction to study of meaning in natural language. Topics: elementary set theory; propositional logic, predicate logic, and lambda calculus together with their relation to semantic analysis; model theoretic characterizations of meaning and semantic properties of English conjunctions and determiners. Prerequisite: familiarity with elementary logic and set theory.

4 units, Spr (Peters)

231. Topics in Semantics and Pragmatics: Issues in Temporal Semantics

4 units, Spr (de Swart)

233. Semantics Seminar: Situation Semantics — Presents the concepts and hypotheses of situation semantics as developed by Barwise, Perry, Kratzer, and others. Applications of situation semantics to the semantics of noun phrases, conditionals, modals, and attitude verbs. Relations between this theory and other approaches to natural language semantics, including Montague grammar and Discourse Representation Theory. Prerequisite: 230A.

4 units, Aut (Peters)

234. Introduction to Discourse Analysis — Survey of approaches to language beyond the sentence, monologic and dialogic, spoken and written. Some practice in transcription.

4 units, Aut (Traugott)


3-4 units, Win (Winograd, Davis)

238. Graduate Seminar on Selected Topics in Cognition — (Enroll in Psychology 219.)

1-3 units, Aut (B. Tversky, S. Pieters)

Th 1:15-3:05

239. Introduction to Computational Linguistics — See 139.

4 units, Aut (Kay)

240. Language Acquisition I — Survey of present knowledge of processes of language acquisition from a linguistic point of view. Recent and past literature.

4 units, Aut (E. Clark)

241. Language Acquisition II: Acquisition of the Lexicon — Lexical acquisition, semantic fields, word formation; conceptual, lexical, and pragmatic constraints on word learning; crosslinguistic comparisons.

4 units, Win (E. Clark)

246. Psycholinguistics — (Enroll in Psychology 214.)

1-3 units, Spr (H. Clark)


4 units, not given 1995-96

250. Sociolinguistic Theory and Analysis — The kinds of problems with which sociolinguists deal and the theories, models, and methods of analysis which they have developed. Emphasis is on what general linguistics might gain from the socio-linguistic approach to problems of linguistic theory and description, and linguistic change. Prerequisite: graduate standing in Linguistics or consent of instructor.

4 units, Aut (Eckert)

251. Sociolinguistics and Pidgin-Creole Studies — Key issues in sociolinguistics and pidgin-creole studies, especially ones whose understanding in one field has been assisted by methods or advances in the other, including diglossia, the acts of identity model, the notion of speech community, variable
rules, implicational scaling and the scope of sociolinguistic competence.

4 units, Spr (Rickford)

254. Theories and Issues in Writing and Literacy — (Enroll in Education 248.)
4 units, Aut (Sperling)

256. Topics in Linguistic Anthropology: Language and Prehistory — (Enroll in Anthropology 278.)
5 units (Fox) not given 1995-96

260. Historical Phonology and Morphology
4 units, Spr (Kiparsky)

265. Readings in ProtoGermanic — (Enroll in German 256.)
3-5 units, Aut (Robinson)

267. Narrative and Genre — (Same as English 260A.)
4-5 units, Win (Heath)

269. The Child of Three Mothers: The Morphology of Grammars and the Roots of the Concept of “Root” — (Enroll in Comparative Literature 264.)
1-2 units, Aut (Gambarara)

287. Phonetics Field Methods — Experimental design, statistics, exploratory data analysis; presentation of results, and pitfalls in obtaining and analyzing instrumental data. Critical reading of published research for methodological soundness and exercises in analysis of data and presentation of results. Prerequisite: 205.
4 units, Aut (Flemming)

288. Structure of Hausa — Survey of the linguistics features of Hausa, and Afroasiatic language of the Chadic group, spoken in Nigeria and elsewhere in W. Africa, emphasizing topics that have figured prominently in theoretical discussions: tone and intonation, noun plural morphology, verb morphology, thematic arguments in syntax. Thorough coverage of the extensive linguistic literature on Hausa
4 units, Aut (Leben)

4-5 units, Win (Hubbard)

292. The History of Chinese — (Enroll in Asian Languages/Chinese 292.)
4 units, Spr (Sun) by arrangement

395A, B, C. Research Workshop — Restricted to students in the doctoral program. Student presentations of research toward qualifying papers.
395A. 2 units, Spr (Clark)
395B. 2 units, Win (Wasow)

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 1995-96

162/262. English Transplanted, English Transformed
175. Linguistics and the Analysis of German
200. Foundations of Linguistics
224B. Lexical-Function Grammar II
230B. Semantics and Pragmatics
253. Language Planning and Public Policy
255. Linguistic Anthropology
258. Educational Aspects of Sociolinguistics
259. Topics in Sociolinguistics
272. Introduction to Indo-European Linguistics
282. Topics in Pragmatics
286. Sociolinguistic Field Methods

LANGUAGE PROGRAMS

The Special Language Program offers a number of foreign languages not otherwise taught at Stanford. Based on current funding and student requests, the courses planned for 1995-96 are listed below; however, not every course listed will be taught. Additional languages may still be offered upon request provided funding is available. Requests for the 1996-97 academic year should be made by Spring Quarter of this year at the Special Language Program office. For further information and to request forms, consult the Special Language Program, Building 380, rooms 381A and E.

All beginning-level 3-unit courses are offered on a Satisfactory/No Credit basis only. Intermediate-level and 4-unit courses are offered with a grading option. No auditors. “Beginning” and “Intermediate” each refer to an academic year’s sequence of language study; the suffixes A, B, and C refer to 1st, 2nd, and 3rd quarter of language instruction that year. Most languages are offered for a two-year, three-quarter sequence; however, a beginning or intermediate level might be offered on alternate years.

AFRICAN LANGUAGES (600-619)

605A, B, C. Intermediate Maninka
605A. 3 units, Aut (Staff)
605B. 3 units, Win (Staff)
605C. 3 units, Spr (Staff)

606A, B, C. Beginning Swahili — Successful completion of 606C may fulfill the foreign language requirement.
606A. 4 units, Aut (Mugane)
606B. 4 units, Win (Mugane)
606C. 4 units, Spr (Mugane)

607A, B, C. Intermediate Swahili
607A. 3 units, Aut (Mugane)
607B. 3 units, Win (Mugane)
607C. 3 units, Spr (Mugane)
608A, B, C. Advanced Swahili
608A. 3 units, Aut (Mugane)
608B. 3 units, Win (Mugane)
608C. 3 units, Spr (Mugane)

OTHER LANGUAGES (620-679)

620A, B, C. Beginning Arabic — Successful completion of 620C may fulfill the foreign language requirement.
620A. 4 units, Aut (Barhoum)
620B. 4 units, Win (Barhoum)
620C. 4 units, Spr (Barhoum)

621A, B, C. Intermediate Arabic
621A. 4 units, Aut (Barhoum)
621B. 4 units, Win (Barhoum)
621C. 4 units, Spr (Barhoum)

622A, B, C. Advanced Arabic
622A. 4 units, Aut (Barhoum)
622B. 4 units, Win (Barhoum)
622C. 4 units, Spr (Barhoum)

625A, B, C, D. Topics in Arabic Literature and Culture — Designed to be taken independently. No knowledge of Arabic required.
625A. Introduction to Contemporary Arabic Literature — Introduction to different genres (i.e., poetry, novels, short stories) providing a glimpse at Arab society and culture. Readings include literary works dealing with such dominant cultural topics as nationalism, religion, gender and women issues, kinship, and social concepts. Major works by Naguib Mahfouz, Nawal El-Saadawi, Ghassan Kanafani, and samples of poetry and short stories spanning the contemporary Arab world. DR:2† or 7†(2)
4 units, Aut (Barhoum)
625B. Contemporary Arab Writers — Contemporary writings by influential Arab authors. Emphasis on texts that accentuate cultural and historical turning points in the collective experience of the modern Arab world. Readings: Naguib Mahfouz’ Trilogy (Palace Walk; Palace of Desire; Sugar Street); Nawal El-Saadawi’s Death of an ex-Minister, and other stories; Tayeb Saleh’s Wedding of Zein and Season of Migration to the North. DR:2† or 7†(2)
4 units, Win (Barhoum)
alternate years, not given 1996-97
625C. Contemporary Arab Women Writers and Issues — Fiction and non-fiction works by prominent Arab women writers. Discussion and analysis of main cultural factors contributing to the shaping of their dominant feminist conceptions and attitudes. DR:2† or 7†(2)
4 units (Barhoum)
alternate years, given 1996-97
625D. Arab World through Travel Literature — Early colonialist and post-colonialist portrayals of Arab culture in the West. Recent critical examinations of stereotypical depictions of Arabs and Islam. Readings: Elizabeth Fernea’s Guests of the Sheik; Lady Mary Wortley Montagu’s Letters; Lawrence Durrell’s The Justine; Edward Said’s Covering Islam and the introduction to Orientalism; Jack Shaheen’s The T.V. Arab; Maxime Rodinson’s Europe and the Mystique of Islam. DR:2† or 7†(2)
4 units, Spr (Barhoum)

628A, B, C. Beginning Hebrew — Successful completion of 628C may fulfill the foreign language requirement.
628A. 4 units, Aut (Berman)
628B. 4 units, Win (Berman)
628C. 4 units, Spr (Berman)

629A, B, C. Intermediate Hebrew
629A. 4 units, Aut (Berman)
629B. 4 units, Win (Berman)
629C. 4 units, Spr (Berman)

630A, B, C. Advanced Hebrew
630A. 4 units, Aut (Berman)
630B. 4 units, Win (Berman)
630C. 4 units, Spr (Berman)

637A, B, C. Beginning Siouan/Lakota
637A. 3 units, Aut (Fast Wolf)
637B. 3 units, Win (Fast Wolf)
637C. 3 units, Spr (Fast Wolf)

650A, B, C. Beginning Vietnamese
650A. 3 units, Aut (Ha)
650B. 3 units, Win (Ha)
650C. 3 units, Spr (Ha)

652A, B, C. Beginning Hindi
652A. 3 units, Aut (Singh)
652B. 3 units, Win (Singh)
652C. 3 units, Spr (Singh)

656A, B, C. Beginning Indonesian
656A. 3 units, Aut (Burke)
656B. 3 units, Win (Burke)
656C. 3 units, Spr (Burke)

659A, B, C. Beginning Punjabi
659A. 3 units, Aut (Dhillon)
659B. 3 units, Win (Dhillon)
659C. 3 units, Spr (Dhillon)

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)

672. Modern Greece: In the Shadow of Homer, Plato, and Alexander the Great — Sophomore seminar focuses on modern Greece, its heritage,
traditions and culture, political institutions, and social structures. Topics: ethnicity, language, literature, and art as national institutions. Emphasis on issues which depict historical and cultural highlights since the establishment of Modern Greece as a nation.

3-5 units, Aut (Prionas)

674A.B.C. Beginning Quechua
674A. 3 units (Fajardo)
674B. 3 units (Fajardo)
674C. 3 units (Fajardo)

678A.B.C. Beginning Sign (ASL)
678A. 3 units, Aut (Haas)
678B. 3 units, Win (Haas)
678C. 3 units, Spr (Haas)

679A.B.C. Intermediate Sign (ASL)
679A. 3 units, Aut (Haas)
679B. 3 units, Win (Haas)
679C. 3 units, Spr (Haas)

ENGLISH AS A SECOND LANGUAGE (683-699)

These courses represent the offerings for non-native speakers in Autumn, Winter, and Spring Quarters. Enrollment in one or more courses may be required of, or recommended to, current graduate students from other countries after they have taken the English screening examination. To enroll, students must come to the English for Foreign Students office in building 380, room 381A, the first day of each quarter.

During the Summer Session, courses in spoken and written English are offered. Two six-week intensive courses are also offered during the summer. Summer visitors must apply directly to the program coordinator.

690. Interacting in English — Structured practice in spoken English with emphasis on current use in daily situations. Focuses on informal language used by educated speakers. Offered if sufficient enrollment.

3 units, Aut (Staff)

691A. Academic Discussion — Practice in seminar-style discussions as active participants and leader. Emphasis on fluency and comprehensibility; feedback from instructor on language and effectiveness.

3 units, Aut, Win, Spr (Rylance, Staff)

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)

692. Speaking and Teaching in English — For non-native speakers who must teach in English. Focuses on developing clarity, intelligibility, and effectiveness through weekly presentations simulating actual teaching assistant responsibilities. Methods of feedback include videotaping and self and staff evaluations.

1-3 units, Aut, Spr (McChesney, Hubbard) by arrangement

693A. Listening Comprehension — Strategies for improving understanding and retention. Guided practice in listening, with evaluation of comprehension. Emphasis on lectures and academic settings.

3 units, Aut (Staff) by arrangement

693B. Individualized Practice in Comprehension — Strategies for improving understanding and retention. Practice in listening to videotaped and computer-based materials, emphasizing idiomatic and conversational speech and continued work with academic English. Prerequisite: 693A or equivalent.

3 units, Aut, Win (Hubbard) by arrangement

694. Interpreting English — For advanced graduate students. Analysis and practice of communicative intent in professional interaction and in the mass media. Use of language to inform, persuade, and comment.

3 units, Win, Spr (Staff) by arrangement

695. Special Topics in English — Topics, such as pronunciation and intonation, or advanced grammar, determined each quarter according to enrollment.

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

698A. Writing Academic English — Prepares graduate students for writing academic papers; emphasis on fluency, organization, documentation, and appropriateness for specific tasks. Prerequisite: consent of instructor.

3 units, Aut, Win, Spr (McChesney, Staff) by arrangement

698B. Advanced Graduate Writing — For graduate students experienced in English writing and currently required to write for courses and research. Class meetings and frequent individual conferences. Prerequisite: consent of instructor.

3 units, Aut, Win, Spr (Hubbard, Staff) by arrangement

LITERATURE IN TRANSLATION

At Stanford, courses in literature are taught in a number of departments and programs that work with texts in many languages. However,
departments and programs do offer specific courses which use texts translated into English in order to make these works available to students who do not read the original language. The following list of courses has been prepared to assist students in selecting courses which feature foreign works in English translation. Consult the department listings for further information.

### ASIAN LANGUAGES

**GENERAL**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>49/149</td>
<td><em>Rewriting the Woman’s Place: Modern Japanese Women Writers in Translation</em></td>
</tr>
<tr>
<td>51/151</td>
<td><em>Japanese Business Culture</em></td>
</tr>
<tr>
<td>53</td>
<td><em>Gender and Modernity in Japanese Cinema</em></td>
</tr>
<tr>
<td>55</td>
<td><em>New Chinese Cinema</em></td>
</tr>
<tr>
<td>91</td>
<td><em>Traditional East Asian Civilizations: China</em></td>
</tr>
<tr>
<td>92</td>
<td><em>Traditional East Asian Civilization: Japan</em></td>
</tr>
<tr>
<td>131</td>
<td><em>Chinese Poetry in Translation</em></td>
</tr>
<tr>
<td>132</td>
<td><em>Chinese Fiction in Translation</em></td>
</tr>
<tr>
<td>133</td>
<td><em>Modern and Contemporary Chinese Literature in Translation</em></td>
</tr>
<tr>
<td>134</td>
<td><em>Chinese Drama in Translation</em></td>
</tr>
<tr>
<td>137</td>
<td><em>Japanese Fiction in Translation</em></td>
</tr>
<tr>
<td>138</td>
<td><em>Modern Japanese Literature in Translation</em></td>
</tr>
<tr>
<td>141</td>
<td><em>Chinese Mythology</em></td>
</tr>
<tr>
<td>195</td>
<td><em>Modern Intellectuals in Japanese Literature</em></td>
</tr>
</tbody>
</table>

### CLASSICS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td><em>Greek Tragedy</em></td>
</tr>
<tr>
<td>18</td>
<td><em>Greek Mythology</em></td>
</tr>
<tr>
<td>114</td>
<td><em>History of Liberal Education from Greece to Renaissance</em></td>
</tr>
<tr>
<td>121</td>
<td><em>Slavery Ancient and Modern</em></td>
</tr>
<tr>
<td>139</td>
<td><em>Medicine in Ancient Greece and Rome</em></td>
</tr>
</tbody>
</table>

### FRENCH AND ITALIAN

**GENERAL**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>101E</td>
<td><em>Seminar on Literature and Institution of Literary Study</em></td>
</tr>
<tr>
<td>147E</td>
<td><em>Camus</em></td>
</tr>
<tr>
<td>158E</td>
<td><em>Modernism and the Humanities: Symbolism – From Baudelaire to T. S. Eliot</em></td>
</tr>
<tr>
<td>166E</td>
<td><em>Women’s Voices in Contemporary Italian Fiction</em></td>
</tr>
<tr>
<td>170E</td>
<td><em>Introduction to African Systems of Thought</em></td>
</tr>
<tr>
<td>191E</td>
<td><em>Italian Cinema</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>201E</td>
<td><em>Definition and Inquiry: Colloquium on Research Methods in French and Italian</em></td>
</tr>
<tr>
<td>222E</td>
<td><em>Building, Dwelling, and Thinking: or Thoreau, Vico, Heidegger</em></td>
</tr>
<tr>
<td>223E</td>
<td><em>Women and Psychoanalysis</em></td>
</tr>
<tr>
<td>225E</td>
<td><em>Pirandello, Sartre, and Beckett: Self and World in Modern Literature</em></td>
</tr>
<tr>
<td>243E</td>
<td><em>Louis Ferdinand Céline, or: The Violence of literature</em></td>
</tr>
<tr>
<td>250E</td>
<td><em>Poetry and Philosophy: History of an Antagonism</em></td>
</tr>
<tr>
<td>251E</td>
<td><em>Theories of Difference</em></td>
</tr>
<tr>
<td>252E</td>
<td><em>Languages, Structures, and Societies: An Introduction to Structuralism</em></td>
</tr>
<tr>
<td>253E</td>
<td><em>Diversity of Knowledges and the Unity of Science</em></td>
</tr>
<tr>
<td>255E</td>
<td><em>Introduction to René Girard’s Theory: Mimesis, Violence, and the Sacred</em></td>
</tr>
<tr>
<td>257E</td>
<td><em>Iconomy</em></td>
</tr>
<tr>
<td>260E</td>
<td><em>Boccaccio: Minor Works</em></td>
</tr>
<tr>
<td>261E</td>
<td>*Dante’s <em>Divine Comedy</em></td>
</tr>
<tr>
<td>268E</td>
<td><em>Italo Calvino in Translation</em></td>
</tr>
<tr>
<td>283E</td>
<td><em>The Literature of Addiction</em></td>
</tr>
<tr>
<td>304E</td>
<td><em>Seminar: Agency/Sex/Gender: Aphra Behn to George Sand</em></td>
</tr>
<tr>
<td>324E</td>
<td><em>Fascism and Culture</em></td>
</tr>
<tr>
<td>369E</td>
<td><em>Seminar: Fragments of a Material History of Literature</em></td>
</tr>
</tbody>
</table>

### GERMAN STUDIES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>7A,8A,9A</td>
<td><em>Myth and Modernity</em></td>
</tr>
<tr>
<td>7A</td>
<td><em>Reason and Revolution</em></td>
</tr>
<tr>
<td>8A</td>
<td><em>Logos</em></td>
</tr>
<tr>
<td>9A</td>
<td><em>Rationalization and Myth</em></td>
</tr>
<tr>
<td>30A</td>
<td><em>Central Europe: Geography, Institutions, and Society</em></td>
</tr>
<tr>
<td>38A</td>
<td><em>Introduction to Germanic Languages</em></td>
</tr>
<tr>
<td>156A</td>
<td><em>Introduction to the Scandinavian Languages</em></td>
</tr>
<tr>
<td>168A/268A</td>
<td><em>Hesse, Kafka, Mann</em></td>
</tr>
<tr>
<td>171A</td>
<td><em>Feminist Media Theories</em></td>
</tr>
<tr>
<td>172A</td>
<td><em>Critical Theory of the News Media</em></td>
</tr>
<tr>
<td>175A</td>
<td><em>Modernization, Technology, and Culture in Germany: 1900-45</em></td>
</tr>
<tr>
<td>179A</td>
<td><em>Questioning National Identity</em></td>
</tr>
<tr>
<td>292A</td>
<td><em>The Existentialist Novel, 1910-42</em></td>
</tr>
</tbody>
</table>
HUMANITIES SPECIAL PROGRAMS
311, 312, 313, 314, 315. Graduate Program in Humanities Seminars — Open to graduate students only, consent of the instructor.
311. Classical Seminar
312. Medieval Seminar
313. Renaissance/Early Modern Seminar
314. Modern Seminar
315. Graduate Core Colloquium: The Interdisciplinary Study of the Humanities

LINGUISTICS

625. Topics in Arabic Literature and Culture
625A. Introduction to Contemporary Arabic Literature
625B. Contemporary Arab Writers
625D. Arab World through Travel Literature
672. Modern Greece: In the Shadow of Homer, Plato, and Alexander the Great — (Sophomore seminar.)

SLAVIC LANGUAGES AND LITERATURES
145/245. The Age of Experiment (1820-1864)
146/246. Struggles with Authority in the Russian Novel, 1861-1922
147/247. State and Revolution: Russian Literature in the 20th Century
151. Dostoevsky
156. Nabokov and Modernism
161/261. Poetess: The Grammar of the Self When the Poet Is a Woman
162. Woman in 19th-Century Russian Literature
190. Modernism and the Humanities: Tolstoy’s Anna Karenina and the Social Thought of its Time
194/294. Demonology in Russian and Other Slavic Cultures

SPANISH AND PORTUGUESE

PORTUGUESE
125. Portuguese Literature in Translation: From the Middle Ages to Renaissance
126. Portuguese Literature in Translation: From the Baroque to the 20th Century
184. Traditional Oral Literature and the Modern, Post-Independence Literature of the Lusophone African Countries
188. Struggle Literature as a Discourse for Freedom in Lusophone African Nations

265. Tendencies in Contemporary Brazilian Literature

SPANISH
170. Undergraduate Colloquium: Fiction and the Political Imagination

MATHEMATICAL AND COMPUTATIONAL SCIENCE

Committee in Charge: (Chair) Bradley Efron (Statistics); Takeshi Amemiya (Economics), Richard Cottle (Operations Research), Gene Golub (Computer Science), Brad Osgood (Mathematics), George Papanicolaou (Mathematics and Computer Science), Eric Roberts (Computer Science), David Siegmund (Statistics); Ida Lee (Program Administrator)

Ex-officio Members: Takeshi Amemiya (Economics), Thomas M. Cover (Electrical Engineering and Statistics), John T. Gill III (Electrical Engineering), J. Michael Harrison (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:

Course No. and Subject  Units
Mathematics (33-34 units)
1. Math. 41, 42, 43. Calculus  
   or Math. 19, 20, 21, 43  
   Math. 44. Calculus  
   Math. 103. Matrix Theory and Its Applications  
   or Math. 113. Linear Algebra and Matrix Theory  
   Math. 104. Continuation of 103  
   or Math. 114, Continuation of 113  
   Math. 109. Modern Algebra and its Applications  
   or Math. 120. Modern Algebra I  
   Math. 130. Ordinary Differential Equations  

2. One of the following:  
   Computer Science 137. Fundamentals of Numerical Computation  
   Math. 115. Fundamental Concepts of Analysis  
   Math. 160A. First Order Logic  

Computer Science (CS) (16-18 units)  
1. CS 106X. Programming Methodology and Abstractions (Accelerated) (CS 106A and B may be substituted)  
2. CS 109A,B. Introduction to Computer Science  
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  
   CS 260. Concrete Mathematics  

Operations Research (OR) (8-9 units)  
1. OR 152. Introduction to Operations Research I (Enroll in Engineering 62)  
2. OR 153. Introduction to Operations Research II (or OR 241. Linear Programming) (or OR 340. Linear Programming)  
3. OR 243. Integer and Nonlinear Programming  
4. OR 251. Stochastic Decision Models in Operations Research  

Statistics (10 units)  
2. Stat. 200. Introduction to Statistical Inference  
   or Stat. 203. Introduction to Regression Models and Analysis of Variance  

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:  
   Comp. Sci. 108. Object-Oriented Systems Design  
   Math. 106. Introduction to Theory of Functions of a Complex Variable  
   Math. 131. Partial Differential Equations I  
   Stat. 217. Introduction to Stochastic Processes  

   Elect. Engr. 261. The Fourier Transform and Its Applications  

For Computer Science (CS), suggested electives include those courses not taken under item 3 of the above Computer Science list and the following:  
1. CS 110. Introduction to Computer Systems and Assembly Language Programming  
2. CS 112. Computer Organization and Design (Enroll in Elect. Engr. 182)  
3. CS 140. Concurrent Programming  
4. CS 143. Compilers  
5. CS 157. Logic and Automated Reasoning  
6. CS 161. Data Structures and Algorithms  
7. CS 211. Logic Design (Enroll in Elect. Engr. 381)  
9. CS 221. Introduction to Artificial Intelligence  
10. CS 237A. Numerical Linear Algebra  
11. CS 240A. Operating Systems and Systems Programming  
12. CS 243. Advanced Compiling Techniques  

With the adviser's approval, courses other than those offered by the sponsoring departments may be used to fulfill part of the elective requirement. There are courses in economics, electrical engineering, industrial engineering, and so on, that might be relevant to a mathematical sciences major, depending on the particular interest of the student. Majors must file with their advisers a plan for completing degree requirements at least three quarters before graduation. All courses used to fulfill major requirements must be taken for a letter grade with the exception of courses offered Satisfactory/No Credit only. A course used to fulfill the requirements of one section of the program may not be applied toward the fulfillment of the requirements of another section. The student must have a letter grade indicator (LGI) of 'C' or better in all course work used to fulfill the major requirement.

HONORS PROGRAM

The honors program is designed to encourage a more intensive study of mathematical sciences than the Bachelor of Science program. In addition to meeting all requirements for the B.S. in Mathematical and Computational Science, the student must:
1. Maintain, in mathematical sciences courses, an average LGI of at least 3.4.  
2. Complete at least 15 units in mathematical sciences in addition to the requirements for the major listed above. These courses should form a sustained effort in one area and constitute a program approved by the committee in charge of the Mathematical and Computational Science Program.  
3. Include in the above 15 units at least one of:  
   (a) an approved higher-level graduate course,  
   (b) participation in a small group seminar, or  
   (c) at least 3 units of directed reading.
Prospective honors students should consult with their advisers by the last quarter of the junior year to prepare a program of study for approval by the committee in charge.

MATHEMATICS


Chair: Gunnar Carlsson


Associate Professors: Jun Li, Rafe Mazzeo

Assistant Professors: Benjamin Andrews, Jared Bronski, Amir Dembo, Jiandong Guo, Andrew Hassel, Ron Karidi, Nadine Kowalsky, Gigliola Staffilani, Constantin Teleman, Taiping Wang, Bo Zhang

Courtesy Professor: Renata Kallosh

The Department of Mathematics offers programs leading to the degrees of Bachelor of Science, Master of Science, and Doctor of Philosophy in Mathematics and participates in the program leading to the B.S. in Mathematical and Computational Science. The department also participates in the M.S. and Ph.D. degree programs in Scientific Computing and Computational Mathematics.

ADVANCED PLACEMENT FOR FRESHMAN

Students of unusual ability in mathematics often take one or more semesters of college-equivalent courses in mathematics while they are still in high school. Under certain circumstances, it is possible for such students to secure both advanced placement and credit toward the bachelor's degree. A decision as to placement and credit is made by the department after consideration of the student's performance on the Advanced Placement Examination in Mathematics (forms AB or BC) of the College Entrance Examination Board. This examination is the only one used for granting credit. The department does not give its own advanced placement examination. For referral to an adviser on advanced placement, communicate with the academic associate of the department.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

The following department requirements are in addition to the University's basic requirements for the bachelor's degree.

1. Calculus and Analytic Geometry (courses 19, 20, 21, 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, 142, 155, 156; analysis—44H, 45H, 106, 115, 130, 131, 132, 134A,B, 171, 173, and 175; geometry—any of the courses numbered in the 140s; foundations—160A,B, 161, 162. Note that courses 103, 104, and 109 do not satisfy algebra requirements. Graduate courses in the same subject may be substituted for the preceding courses; for example, 206A for 106.

3. Five additional courses, each of at least 3 units, chosen from courses numbered 100 or above.

Mathematics majors must have a letter grade indicator (LGI) of at least 'C' in all courses used to fulfill the major requirement. Letter grades are required in all courses used to fulfill the major requirement except for those offered Satisfactory/No Credit only and for cognate courses (see item 4, below). Students planning graduate study in mathematics are advised to include one or more 200-level courses in their programs and, to facilitate this, to complete 113, 211, and 115 or 171 as early as possible. Students intending to go on to graduate work in mathematics are also urged to study at least one foreign language chosen from French, German, or Russian.

4. One of the following options: the choice of 'a' or 'b' is recommended—

a) Physics 51, 53, 55, 57 (total 15 units) or 61, 62, 63 (total 12 units).

b) Any four quarters of physics lecture courses numbered 51 or above.

c) A series of courses within which mathematics is applied in a significant manner. Students choosing this option must have their plans approved by the department's Committee on Undergraduate Affairs.

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. Indi-
individual programs in such cases must be approved by the department's Committee on Undergraduate Affairs.

To receive a department recommendation for graduation, a student must have been enrolled as a major in the department for at least two full quarters, including the last full quarter before graduation, and must complete at least 15 units of 100 (or higher) level courses in the department.

HONORS PROGRAM

The Department of Mathematics program leading to the degree of B.S. in Mathematics with Honors is intended for students having strong theoretical interests and abilities in mathematics. The goal is to give students a strong background in the three basic areas of pure mathematics: analysis, algebra, and geometry. Through the honors thesis program, a student is introduced to current mathematical research. The program provides an excellent background with which to enter a Ph.D. program in Mathematics.

The basic requirement for entry is the completion of Math. 45H or, equivalently, Math. 44, 113, and 130. Beyond this level, fourteen 3-unit math courses are required, as well as successful completion of a senior thesis. Of the fourteen courses, 106, 114, 120, 134A,B, 171, and 173 are required. In addition, a student must take two geometry/topology courses numbered in the 140s, one algebra course numbered in the 150s, or 121 and one course in probability or set theory (160A or 161, Statistics 116). At least three other courses numbered above 110 are required. Students are urged to include graduate-level courses numbered above 200, particularly 205A.

In addition to course requirements, an honors student must write a senior thesis worth 6 units of credit, which generally takes two quarters to complete. Typically, at the end of the junior year the student chooses a thesis adviser from the Mathematics faculty, and the adviser and the student together map out a concentrated reading program. In the senior year, the thesis is written under the direction of the adviser, on a problem or set of problems in the chosen area of study. The thesis may consist of original material or be a synthesis of work in the current research literature.

Beyond these requirements, the honors major has the same physics/applied math requirements as the regular major (see item 4 above). Below is a typical mathematics curriculum of an honors Mathematics major:

<table>
<thead>
<tr>
<th>Freshman year:</th>
<th>Autumn</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>43H</td>
<td>44H</td>
<td>45H</td>
<td></td>
</tr>
<tr>
<td>Sophomore year:</td>
<td>120</td>
<td>134A</td>
<td>134B</td>
</tr>
<tr>
<td>Junior year:</td>
<td>171</td>
<td>173</td>
<td>114</td>
</tr>
<tr>
<td>Senior year:</td>
<td>143</td>
<td>4 electives</td>
<td>from the 140s and 150s</td>
</tr>
<tr>
<td></td>
<td>205A</td>
<td>205B</td>
<td>205C</td>
</tr>
<tr>
<td>Senior Thesis</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Students with questions about the honors program should see Professor Osgood.

BACHELOR OF SCIENCE IN MATHEMATICAL AND COMPUTATIONAL SCIENCE

The Department of Mathematics participates with the Departments of Computer Science, Operations Research, and Statistics in a program leading to the degree of B.S. in Mathematical and Computational Science. See the "Department of Mathematical and Computational Science" section of this bulletin.

GRADUATE PROGRAMS

MASTER OF SCIENCE

The University's basic requirements for the master's degree are discussed in the "Graduate Degrees" section of this bulletin. The following are additional department requirements:

Candidates must complete an approved course program of 36 units beyond the department requirements for the B.S. degree. It must include 18 units in courses numbered 200 or above. The candidate must have an average letter grade indicator (LGI) of 'B' over all course work taken in Mathematics, and an LGI of 'B' in the 200-level courses considered separately. Course work for the M.S. degree must be approved during the first quarter of enrollment in the program by the department's Director of Graduate Studies.

For the degree of M.S. in Computer Science, see the "Computer Science" section of this bulletin.

TEACHING CREDENTIALS

For information concerning the requirements for teaching credentials, see the "School of Education" section of this bulletin or address inquiry to Credential Secretary, School of Education.

MASTER OF ARTS IN TEACHING (MATHEMATICS)

In cooperation with the School of Education, the department offers a program leading to a Master of Arts in Teaching (Mathematics). It is intended for candidates who have a teaching credential or relevant teaching experience and wish to strengthen their academic preparation. Detailed
requirements are outlined under the “School of Education, Master of Arts in Teaching” section of this bulletin.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the doctorate (residence, dissertation, examination, etc.) are discussed in the “Graduate Degrees” section of this bulletin. The following are additional department requirements.

To be admitted to candidacy, the student must have successfully completed 27 units of graduate courses (that is, courses numbered 200 and above). In addition, the student must pass qualifying examinations given by the department.

Beyond the requirements for candidacy, the student must complete a course of study of at least 48 units approved by the Graduate Affairs Committee of the Department of Mathematics and submit an acceptable dissertation. The course program should display substantial breadth in mathematics outside the student’s field of application 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, or Russian.

Experience in teaching is emphasized in the Ph.D. program. Each student is required to complete nine quarters of such experience. The nature of the teaching assignment for each of those quarters is determined by the department in consultation with the student. Typical assignments include teaching or assisting in teaching an undergraduate course or lecturing in an advanced seminar.

For the Ph.D. degree in Computer Science, see the “Computer Science” section of this bulletin.

For further information concerning degree programs, fellowships, and assistantships, inquire of the academic associate of the department.

Ph.D. MINOR

The student should complete both of the following:*  
1. Math. 106, 131, 132  
2. Math. 113, 114, 120 or 152  

These courses may have been completed during undergraduate study, and their equivalents from other universities are acceptable.

In addition, the student should complete 21 units of 200-level courses in mathematics. These must be taken at Stanford and approved by the Department of Mathematics’ Ph.D. minor adviser.

* A third coherent sequence designed by the student, subject to the approval of the graduate committee, may be considered as a substitute for items 1 or 2.

COURSES

INTRODUCTORY AND UNDERGRADUATE

The department offers two sequences of introductory courses in calculus.

1. Calculus and Analytic Geometry (41, 42, 43) presents one-variable calculus and plane analytic geometry in the first two quarters (41, 42), and multi-variable differential calculus in the third quarter (43).

2. Calculus and Analytic Geometry (19, 20, 21) covers the material of 41 and 42 in three quarters instead of two.

The introductory course in modern algebra is Linear Algebra (103 or 113). There are no formal prerequisites for this course, but appropriate mathematical maturity is expected.

19,20,21. Calculus — The content is the same as the sequence 41 and 42 described below, over three quarters rather than two.

19. **Calculus** — **DR:4(6)**
   - 3 units, Aut (Bronski)
   - lecture TTh 11 or 1:15,
   - section W10, 11, 1:15, 2:15, or 3:15
   - Win (Staff) MWF 9, 10

20. **Calculus** — Continuation of 19. Prerequisite: 19. **DR:4(6)**
   - 3 units, Win (Brumfiel)
   - lecture TTh 11 or 1:15,
   - section W10, 11, 1:15, 2:15, or 3:15
   - Spr (Staff) MWF 9, 10

   - 4 units, Spr (Karidi) lecture TTh 11 or 1:15
   - section W10, 11, 1:15, 2:15, or 3:15

41,42,43 — Three large lecture classes per week plus two classes in small sections.

41. **Calculus** — Introduction to differential and integral calculus of functions of one variable. Topics: review of elementary functions including exponentials and logarithms, rates of change and the derivative. More conceptual (and more applied) than traditional courses and emphasizes a numerical, graphical, and analytical approach to the subject. Prerequisites: algebra, trigonometry. **DR:4(6)**
   - 5 units, Aut (Mazzeo) MTWThF 11 or 1:15

42. **Calculus** — Continuation of 41. Methods of symbolic and numerical integration, applications of the definite integral, introduction to differential equations. Prerequisite: 41 or equivalent. **DR:4(6)**
   - 5 units, Aut (Andrews)
   - MTWThF 11 or 1:15
   - Win (R. Cohen) MTWThF 11 or 1:15
43. Calculus — Continuation of 42. Vector functions, functions of several variables, partial derivatives, gradient, Lagrange multipliers, double and triple integrals. Prerequisite: 42 or consent of department. DR:4(6)

5 units, Aut (Osgood) MTWTh 11 or 1:15
Win (Hassell) MTWTh 11 or 1:15
Spr (Teleman) MTWTh 11 or 1:15

43H, 44H, 45H. Honors Calculus — For prospective math majors in the honors program or other areas of science or engineering who have a strong math background. Three-quarter sequence, beginning in Autumn, covers 43, 44, 113, and 130, with additional advanced calculus and ordinary and partial differential equations. Provides a unified treatment of multi-variable calculus, linear algebra, and differential equations with a different order of topics and emphasis from standard courses. Students should know one-variable calculus and have an interest in a theoretical approach to the subject. Prerequisite: score of 5 on BC Advanced Placement Exam or consent of the instructor. Recommended: complete at least the first two quarters. 43H satisfies DR:4(6)

5 units, Aut, Win (Kerckhoff) MTWTh 2:15-3:15
Spr (White) MTWTh 2:15-3:15

44. Calculus — Continuation of 43. Line and surface integrals. The basic theorems of vector analysis (Green’s, Stokes, and Divergence). Prerequisite: 43 or equivalent.

3 units, Aut (Brendel, Wolfson) TTh 11-12:15
or MWFl:15
Win (Zhang, Wang) MWF 11
Spr (Liebman, Guan) MWF 11

53. The Nature of Mathematics — Introduction to the history, methods, results, and application of mathematics. Topics: from geometry and calculus to the structure of the universe; the potentialities and limitations of computation; topology, knots, and DNA; symmetry in mathematics, art, and nature; uses and misuses of statistics; logic and the philosophy of mathematics. DR:4(6)

3 units, Spr (Osgood)

80. Mathematics and Mathematica: Interactive Problem Solving — For sophomores only. Introduction to use of computers in mathematical research through use of the Mathematica environment, which supports symbolic computation. Basic functions and applicability of the software. Numerical experimenting.

3 units, Spr (Karidi) T

81. Chaos, Fractals, and Dynamics — For sophomores only. Introduction to dynamical systems, emphasizing how complexity can arise in very simple systems. Famous models, e.g., dripping taps, climate models, and population models. Development of a mathematical language to describe complicated sets such as the orbits of dynamical systems. Use of strange attractors, fractal sets, and fractional dimensions.

3 units, Win (Andrews) MW

UNDERGRADUATE AND GRADUATE

Unless explicitly stated, there are no prerequisites for the courses listed below. Where a prerequisite is stated, it may be waived by the instructor.

103. Matrix Theory and its Applications — Linear algebra and matrices, emphasizing computational and algorithmic aspects and the scientific problems in which matrix theory is applied. Solution of linear equations. Linear spaces and matrices. Orthogonal projection and least squares. Introduction to eigenvalues and eigenvectors. DR:4(6)

3 units, Win (Papanicolaou, Rogers, Guo) MWF 10, TTh 1:15-2:30, or MWF 1:15
Spr (Frestübler, Wang, Guan) MWF 10, TTh 11-12:15, or MWF 1:15
Sum (Staff) MTWTh 11


3 units, Win (Andradas) MWF 10
Spr (Papanicolaou) 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 (Weiss) MWF 9
Spr (Zhang) TTh 3-4:15
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 (Carlsson) TTh 11-12:15

113. Linear Algebra and Matrix Theory — Algebraic properties of matrices and their interpretation in geometric terms. Relationship between the algebraic and geometric points of view and matters fundamental to the study and solution of linear equations. Topics: linear equations, vector spaces, linear dependence, bases and coordinate systems;
linear transformations and matrices; similarity;
eigenvectors and eigenvalues; diagonal and Jordan
forms.
3 units, Aut (Li) TTh 9-10:15
Win (Bump) MWF 10

114. Linear Algebra and Matrix Theory — Con-
tinuation of 113. Deeper study of 113 topics plus
additional topics from invariant subspaces, canoni-
cal forms of matrices; minimal polynomials and
elementary divisors; vector spaces over arbitrary
fields; inner products; Hermitian and unitary mat-
rics; multilinear algebra.
3 units, Win (Li) TTh 9-10:15

115. Fundamental Concepts of Analysis — Devel-
opment of real analysis in Euclidean space: se-
quences and series, limits, continuous functions,
derivatives. Basic point set topology. Honors math
majors and students who intend to do graduate work
in mathematics take 171. Prerequisite: 44.
3 units, Aut (Wang) MWF 2:15
Win (Liebman) TTh 11-12:15

120. Modern Algebra I — Basic structures in alge-
bra: groups, rings, and fields. Elements of Group
Theory: permutation groups, finite Abelian groups,
p-groups, Sylow theorems. Polynomial rings, prin-
cipal ideal domains, unique factorization domains.
3 units, Aut (Li) TTh 11-12:15

121. Modern Algebra II — Continuation of 120.
Fields of fractions. Solvable and simple groups.
Elements of field theory and Galois theory. Prereq-
usite: 120.
3 units, Win (Karidi) TTh 11-12:15

124. Introduction to Stochastic Processes — El-
ementary systematic account of several principal
areas in stochastic processes including branching
processes, Markov chains, Poisson processes. Ap-
lications relevant to the natural, biological, social,
and managerial sciences.
not given 1995-96

130. Ordinary Differential Equations — Special,
extact, and linear equations; series solutions, nu-
merical solution; Laplace transform; systems of
equations. Prerequisite: 44, concurrent registration
in 44, or consent of instructor.
3 units, Aut (Guo, Guan) MWF 2:15
or TTh 1:15-2:30
Win (Schoen, Liu) MWF 2:15
or TTh 1:15-2:30
Spr (Bump, Wang)
MWF 2:15 or TTh 1:15-2:30
Sum (Staff) MTWTh 1:15

131. Partial Differential Equations I — First order
equations, classification of second order equations.
Initial-boundary value problems for heat equa-
tion, wave equation, and related equations. Separation
of variables, eigenvalue problems, Fourier series, ex-
istence and uniqueness questions. Prerequisite: 130
or equivalent.
3 units, Win (Simon) TTh 1:15-2:30
Spr (Schoen) TTh 1:15-2:30

132. Partial Differential Equations II — Initial
and initial-boundary value problems in infinite do-
 mains. Fourier transforms. Boundary value prob-
lems for Laplace equation. Bessel functions and
Legendre polynomials.
3 units, Spr (Liu) TTh 1:15-2:30

134A,B. Honors Analysis — Primarily for students
planning graduate work in mathematics of physics
who would normally enroll in an honors sequence.
Required of honors math majors, but of use and
interest to other majors at ease with rigorous proofs
and qualitative discussion. Coherent, mathemati-
cally 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 (Katznelson) MWF 2:15

141. Higher Geometries — Study of various geom-
etries, including projective, affine, and non-Euclid-
ean geometry. Prerequisite: 113.
not given 1995-96

143. Differential Geometry — Geometry of curves
and surfaces in 3-space and higher dimensional
manifolds. Parallel transport, curvature, and geode-
ses. Surfaces with constant curvature. Minimal
surfaces.
3 units, Aut (White) MWF 2:15

145. Algebraic Geometry — Affine and projective
spaces, plane curves, Bezout's theorem, singularities
and genus of a plane curve, applications of commu-
tative algebra to geometry. Prerequisites: 120, 121.
3 units, Win (Li) TTh 1:15-2:30

147. Differential Topology — Smooth manifolds,
transversality, Sards' theorem, embeddings, degree
degree of a map, Borsuk-Ulsm theorem, Hopf degree the-
orem, Jordan Curve Theorem. Prerequisites: 115 or
171, 173.
3 units, Spr (Brumfiel) MWF 1:15

148. Algebraic Topology — Fundamental group,
covering spaces, Euler characteristic, classification
of surfaces, knots. Prerequisites: 120, 171.
not given 1995-96

150. Introduction to Combinatorial Theory —
(Enroll in Computer Science 264.)
3 units (Staff) not given 1995-96

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 applica-
tions; residues of power; quadratic residues; intro-
duction to theory of binary quadratic forms.
3 units, Win (Bump) MWF 2:15
153. Combinatorics — Topics in Ramsey’s theorem, generating functions, partition functions, and in number theory (sums of integers and van der Waerden’s theorem). Recommended: general background in algebra, analysis, and some number theory. not given 1995-96

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.
3 units, Aut (Guo) TTh 11-12:15

156. Group Representations — Designed for undergraduates. Experimental, primarily examining symmetries on objects such as vector spaces (“group representations”), geometric objects (“geometric group actions”), and discrete sets (combinatorics). Topics: group representations and their characters, classification of permutation representations using partitions and Young tableaus, groups actions on sets and the Burnside ring, and spherical space forms. Prerequisites: basic knowledge of linear algebra (Math. 103 or 113) and Group Theory (Math. 109 or 120).
3 units, Spr (R. Cohen) TTh 11-12:15

160A. First-Order Logic — (Enroll in Philosophy 160A.)
4 units, Win (Kremer)

160B. Computability and Logic — (Enroll in Philosophy 160B.)
4 units, Spr (Mints)

3 units, Win (Liebman) TTh 3:15-4:30

162. Philosophy of Mathematics — (Enroll in Philosophy 162.)
3 units, Spr (Kremer)

171. Fundamental Concepts of Analysis — Recommended for math majors and required of honors math majors. Similar to 115 but altered contents and more theoretical orientation. Properties of Riemann integrals, continuous functions and convergence in metric spaces; compact metric spaces, basic point set topology. Prerequisite: 43H,44H,45H, or equivalent.
3 units, Aut (Simon) MWF 1:15

3 units, Win (Andrews) 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 (Papnicolaou) TTh 10-11:15

176. Spectral Geometry — Relations between geometry of a region and eigenvalues of the Laplace operators, starting from an introductory level. Basic properties of the Laplace and heat operators developed and applied to studying “when one can hear the shape of a drum.” Prerequisites: familiarity with vector calculus, ordinary differential equations, and linear algebra.
not given 1995-96

181. Topics in the History of Mathematics: From Antiquity to the 17th Century — (Enroll in History and Philosophy of Science 140, Philosophy 140.)

195. Teaching Practicum — Students assist in an undergraduate course, lead problems sessions, and tutor. Some reading in topics in mathematics education is required.
1 unit, Aut, Win, Spr, by arrangement

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
not given 1995-96

205A. Theory of Functions of a Real Variable — Lebesgue measure and integration, LP spaces and convergence theorems. Prerequisite: 171 or equivalent.
3 units, Aut (Simon) MWF 10
Spr (Zeldith) MWF 1:15

3 units, Win, Spr (Schoen, Ornstein) MWF 10

206A. Theory of Functions of Complex Variable — Complex integration. Cauchy’s theorem, Residue theorem, argument principle, power series, conformal mapping. Prerequisite: 171.
3 units, Aut (P. Cohen) MWF 11
206B. Theory of Functions of Complex Variable — Riemann mapping theorem, product developments, entire functions, elliptic functions, Dirichlet problem, Picard’s theorem. Prerequisites: 171, 206A.
3 units, Win (P. Cohen) MWF 11

210A. Modern Algebra — Groups, rings and fields, Galois theory, ideal theory. Prerequisite: 120 or equivalent.
3 units, Aut (Bump) TTh 11-12:15

210B,C. Modern Algebra — Introduction to algebraic geometry representation of groups and rings, multilinear algebra. Prerequisites: 120 or equivalent, 206A.
3 units, Win (Milgram) TTh 11-12:15

3 units, Win, Spr (Karidi, Schoen)

220A,B,C. Methods of Mathematical Physics — (Same as Engineering 220A,B,C.) Exposition of characteristic and Green’s function, integral transform, variational, perturbation, and distribution theoretic methods for the analysis of differential, difference, and integral equations, with illustrative examples. Prerequisite: some familiarity with differential equations and functions of a complex variable.
220A. 3 units, Aut (Zhang) TTh 9:30-10:45
220B. 3 units, Win (Papanicolaou) 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 1995-96

not given 1995-96

230A. Theory of Probability — (Enroll in Statistics 310A.)
3 units, Aut (Walther) MWF 10

not given 1995-96

234. Large Deviations — Combinatorial estimates and the method of types. Large deviation probabilities for partial sums and for empirical distributions, Cramér’s and Sanov’s theorems and their Markov extensions. Application in statistics, information theory, and statistical mechanics. Prerequisite: 230A or Statistics 310.
not given 1995-96

235A,B,C. Selected Topics in Ergodic Theory — Topics from the Kolmogorov-Sinai theory of entropy; the isomorphism theorem for Bernoulisi shifts and Bernoulli flows; K-automorphisms applications to mechanical systems, and automorphisms of compact groups.
3 units, Aut, Win, Spr (Ornstein)

3 units, not given 1995-96

not given 1995-96

242. Difference Equations
not given 1995-96

not given 1995-96

248A,B. Analytic Number Theory — The theory of modular forms.

not given 1995-96

250. Complex Dynamics — The behavior of holomorphic maps (especially rational maps) under iteration. Topics: fixed and periodic points, Siegel dummies, Fatou sets, Julia sets, Sullivan’s theorem on non-wandering sets, the Mandelbrot set, etc. Prerequisite: 206A or equivalent. Recommended: 206B, 250.

3 units, Win (Katznelson)

252A. Matrix Theory and Inequalities

not given 1995-96

253. Regularity of Sets and Mappings — For students interested in any area of analysis. Topics: Lipschitz functions, C^r functions, Sobolev functions, various regularity and extension theorems, including Rademacher, Kirzbraun, Whitney, Sard, C^r-Sard. Critical sets of real-analytic, complex analytic functions. Affine approximation properties of subsets of R^n, including a discussion of rectifiability and non-rectifiability, structure theorem, and Reifenberg’s topological disc theorem.

3 units, Win (Simon)

254A,B. Ordinary Differential Equations — Qualitative theory of ordinary differential equations, analytic and geometric methods. Topics from the stability and perturbation theory of dynamical systems; Hamiltonian systems; applications to the theory of oscillations and celestial mechanics.

not given 1995-96

255A,B. Dynamics on the Circle and Annulus — Known results on dynamics on the circle and in the annulus, avoiding much of the classical formalism (KAM, implicit function theorem). Topics: aspects of the smoothness of the conjugation of circle diffeomorphisms, existence and smoothness of invariant curves for twist maps and other maps.

not given 1995-96


3 units, Aut (Hassell) TTh 11-12:15


3 units, Win, Spr (Liu)

257A,B. Symplectic Geometry and Topology — Linear symplectic geometry and linear Hamiltonian systems. Symplectic manifolds and their Lagrangian submanifolds — local properties. Symplectic geometry and mechanics. Contact geometry and contact manifolds. Relations between symplectic and contact manifolds. Hamiltonian systems with symmetries. Momentum map and its properties.

not given 1995-96

259. Microlocal Analysis — The basic calculus of pseudodifferential operators, focusing on the parametrix construction for elliptic operators, leading to various applications in geometry (Hodge theorem, index theorem for Dirad operators). Possible topics: pseudodifferential operators on singular and noncompact spaces, the microlocal theory of elliptic boundary value problems, Atiyah-Patodi-Singer index theorem.

3 units, Win (Mazzeo)


not given 1995-96


not given 1995-96


not given 1995-96

267A,B. Harmonic Analysis — Topics from the “L^p theory” of harmonic analysis — the singular integral theory of Calderon and Zygmund and its extensions, interpolation of operators, multiplier transformations, and smoothness properties of functions: sets of uniqueness for trigonometric series, spectral syntheses, thin sets, spectral theory of convolution operators, and applications. Prerequisite: knowledge of the elements of Fourier analysis.

not given 1995-96

272A,B. Topics in Partial Differential Equations

not given 1995-96

274. Wave Propagation — Basic concept, waves, wavefronts, rays, phase and amplitude functions;
ray, eikonal, and transport equations; reflection, transmission, edge diffraction, and surface diffraction coefficients; asymptotic expansions, wave equations. Applications to electromagnetic, acoustic, elastic, and other types of waves.
3 units, Win (Keller) TTh 9:30-10:45

276A. Dynamical Systems — (Enroll in Mechanical Engineering 233A.)
3 units (Staff) given 1996-97

276B. Numerical Analysis of Dynamical Systems — (Enroll in Mechanical Engineering 233B.)
3 units (Staff) given 1996-97

277. Mathematical Theory of Relativity — Ricci calculus; variational principles and covariance properties; differential geometry of space-time; Cauchy's problem for the differential equations of gravitation and electromagnetism; relativistic hydrodynamics; unified field theories.
not given 1995-96

281A,B. Introduction to Algebraic and Differential Topology — Fundamental group, covering spaces, embeddings and immersions of manifolds, transversality, homotopy theory, homology and cohomology of complexes, differential forms, fiber and vector bundles and their characteristic classes.
3 units, Aut (Kerckhoff) MWF 11-12:15
Win (Kerckhoff)

282. Moduli Spaces
3 units, Win (Milgram)

283. Topics in Topology
not given 1995-96

285A. Geometric Measure Theory — Hausdorff measures and dimensions, area and co-area formulas for Lipschitz maps, integral currents and flat chains, minimal surfaces and their singular sets.
not given 1995-96

3 units, Aut (Mints) MW 3:15-4:30

not given 1995-96

292A,B. Set Theory — The basics of Zermelo Fränkel set theory. Topics: cardinal and ordinal numbers, the cumulative hierarchy and axiom of choice, and the universe of constructible sets. Models of set theory, including admissible sets, and models constructed by forcing. Prerequisites: 160A,B and 162, or equivalent.
not given 1995-96

293A,B. Proof Theory — Gentzen's natural deduction and/or sequential calculi for first-order predicate logic. Normalization of cut-elimination procedures. Extensions to infinitary calculi; ordinal complexity of proof trees. Subsystems of analysis and their reduction to constructive theories. Prerequisites: 160A,B and 162, or equivalent.
3 units (Mints) not given 1995-96

294. Topics in Logic — Normalization of finite objects using infinite expansions. Extraction of information from proofs often uses normal forms obtained by a series of reduction steps, e.g., realization of probable existential formulas, normalization of natural deductions in the predicate logic and arithmetic. Infinite expansions of finite objects can be used to estimate the rate of convergence (termination) of the reduction process and investigate properties of the objects. Topics: normalization (cut-elimination) in the first-order arithmetic with omega-rule, primitive recursive cut-elimination, preservation of the additional structure, and stability of program extraction (E-theorems). Prerequisites: 160B and 290, or equivalent.
3 units, Spr (Mints)

295. Topics in the Philosophy of Mathematics — Surveys various views on the philosophy of mathematics. Topics: The Three Foundational Crises; the Greek view and Platonism; the views of Frege, Russell, Hilbert, and Brouwer; Bishop's Constructive Analysis; pragmatism. An articulation of a Formalist View of Mathematics. Prerequisite: 205 or consent of instructor.
not given 1995-96

296. Logic and Set Theory — Basic theorems of logic. Completeness and incompleteness theorems, Lowenheim-Skolem, etc. Development of axiomatic set theory leading to undecidability theorems on Continuum Hypothesis and Axiom of Choice. Accessible to non-specialists without previous background in logic.
3 units, Win (P. Cohen)

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
MEDIEVAL STUDIES

Committee in Charge: (Chair) Hester Gelber; Theodore Andersson, Seth Lerer, William Mahrt, Laura Smoller
Affiliated Faculty: Theodore M. Andersson (German Studies), George H. Brown (English), Philippe Buc (History), Brigitte Cazelles (French and Italian), Hester Gelber (Religious Studies), Seth Lerer (English), Suzanne Lewis (Art), William Mahrt (Music), Jeffrey Schnapp (French and Italian, and Comparative Literature), Laura Smoller (History)

The Medieval Studies Program is administered through Humanities Special Programs. Although there is no formal undergraduate degree program, students may propose individually designed majors in Medieval Studies. Such majors must be proposed to and approved by the Dean of Undergraduate Studies’ Advisory Committee on Individually Designed Majors. Guidelines may be found under the “Program for Individually Designed Majors” section of this bulletin. Students interested in planning a course of studies should consult the chair of Medieval Studies.

Additional information about this option, as well as referral to faculty advisers, is available through the Humanities Special Programs office. For information about proposing individually designed majors, students should go to the Undergraduate Advising Center. Students who are members of the Humanities Honors Program may petition to major in Humanities with a self-designed program in Medieval Studies. See the “Humanities Special Programs” section of this bulletin. The major is normally declared by the beginning of the student’s third year.

The major combines interdisciplinary breadth with a disciplinary focus. The interdisciplinary emphasis is provided by 165, Introduction to Medieval Culture, by upper-level interdisciplinary colloquia, and by the requirement that students take courses in three different areas. Depth is ensured by the requirement that students take at least four courses in one area. A faculty adviser helps each student choose courses that integrate the requirements of breadth and depth. To that end the following guidelines are provided.

The student should take a minimum of ten courses dealing directly with the Middle Ages and distributed as follows:
1. The introductory course, Medieval Studies 165, Introduction to Medieval Culture.
2. Two upper-level interdisciplinary courses in medieval subjects.
3. Four courses in one of the following categories:
   a. Literature: English, French, German and Scandinavian, Italian, Latin, Slavic, Spanish
   b. History
   c. Art History, Drama, Music
   d. Humanities, Philosophy, Religious Studies.(certain Humanities courses may fulfill requirements within other categories).
4. Two courses in a second category chosen from the above list.
5. One course in a third category chosen from the above list.

In addition to the ten courses, a language proficiency equal to two years of college-level study is suggested in Latin or one of the following: French, German, Italian, or Spanish.

COURSES

165. Introduction to Medieval Culture — (Same as English 165A.) Introduction to the development of medieval culture through religious, philosophical, literary, artistic, social, and political sources with emphasis on the interrelationships among them. Lectures by faculty from various departments. DR: 7(2) or 8(3)
5 units, 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 department headings. See quarterly Time Schedule for changes in listings.

ART
103. Late Roman and Byzantine Empire
104. Early Middle Ages
MODERN THOUGHT AND LITERATURE

Chair: Joel Beinin (History)
Committee in Charge: Joel Beinin (History), Jane Collier (Anthropology, on leave Autumn), Theodore L. Glasser (Communication), Akhil Gupta (Anthropology), Elizabeth Hansot (Political Science), Gabrielle Hecht (History and Philosophy of Science), Sharon Holland (English), Purnima Mankekar (Anthropology), Valentin Mudimbe (French and Comparative Literature), David Palumbo-Liu (Comparative Literature), Lora Romero (English), Debra Satz (Philosophy), Peter Stansky (History), Michael Tratner (English), Robert Weisberg (Law)

The Program in Modern Thought and Literature is administered through the office of Humanities Special Programs. The program admits students for the Ph.D. and sponsors an undergraduate major through the Humanities honors program.
UNDERGRADUATE PROGRAMS
HONORS PROGRAM

This undergraduate program is designed for students with a strong commitment to the interdisciplinary study of modern literature (since the 18th century), 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 department major in order to be able to graduate, should the honors essay not be completed in acceptable form. Program requirements include:

1. Admission to the Humanities Honors Program (see the “Humanities Special Programs” section of this bulletin).
2. Humanities 160 (5 units).
3. Two seminars drawn from the series Humanities 191-198, of which one must be Humanities 197 or 198.
4. Six courses in a single literature, read in the original language, and covering a wide range of periods and genres.
5. Three courses, to be chosen in consultation with the adviser, covering major movements in intellectual history since the Enlightenment.
6. One course in the history or philosophy of modern science or technology or its impact on modern culture.
7. One course in modern art or music.
8. One course in history or social science addressing modernization or modernity.
9. Completion of at least two years of college-level study of a modern foreign language or demonstration of equivalent proficiency.
10. Honors essay written from an interdisciplinary perspective (2 units, Spring Quarter, junior year; 5 units, Autumn Quarter; 5 units, Winter Quarter, senior year). A letter grade indicator (LGI) of at least 'B' is required on the essay for graduation with honors in Humanities.

Note — With the consent of the adviser, courses on cultural studies may be used to satisfy some of the requirements 4-8.

COTERMINAL PROGRAM

Each year, one or two undergraduate students, who are exceptionally well-prepared in literature and at least one foreign language and whose undergraduate course work includes a strong interdisciplinary component, may petition to be admitted to the program for the purpose of completing a coterminal A.M. degree. Admission to this program is granted only on condition that in the course of working on their master's degree they do not apply to enter the Ph.D. program in Modern Thought and Literature. The deadline for application is March 1.

To apply, applicants submit:
1. An unofficial grade sheet from the Credentials window of the Registrar's Office or from AXESS.
2. A "Petition for Admission to the Coterminal Program" from the Graduate Degree Progress Section of the Registrar's Office.
3. A statement giving the reasons the student wishes to pursue this program and its place in his or her future plans. This statement should pay particular attention to the reasons why the student could not pursue the studies he or she desires in some other way.
4. A plan of study listing, quarter by quarter, each course by name, units, and instructor to be taken in order to fulfill the requirements for the degree, including 361, at least 20 units of advanced work in one literature, and at least 20 units in a coherent interdisciplinary program of courses taken in non-literature departments.
5. A writing sample of critical or analytical prose.
6. Two letters of recommendation from members of the faculty who know the applicant well and who can speak directly to the question of his or her ability to do graduate-level work.

REQUIREMENTS

The candidate for the A.M. must complete at least 45 units of graduate work, to be divided in the following manner:

1. The introductory seminar, 361, The Modern Tradition (5 units).
2. Twenty units of advanced course work in literature, to be approved by the chair.
3. Twenty units of course work in a coherent and individually arranged interdisciplinary program, to be approved by the chair.

By the end of the course of study each candidate must also demonstrate a reading knowledge of at least one foreign language.

GRADUATE PROGRAMS

The Ph.D. in Modern Thought and Literature is an interdisciplinary program combining work in modern literary/cultural studies with work in one or more other modern disciplines.

The Ph.D. program is designed specifically for students who have a strong interest in literature or culture, but whose approach or focus requires an interdisciplinary program — for example, stu-
tudents interested in anthropological or philosophical approaches to literature and culture; gender studies; ethnic studies; or in topics such as legal humanities, popular culture, and social or cultural theory.

Modern Thought and Literature is intended for students who plan to teach and write in literature departments or in interdisciplinary programs in the humanities, cultural studies, or humanistic social sciences, or for students intending to formulate cultural policy.

Course work in the program is divided about evenly between advanced courses in literary departments and advanced courses in non-literary departments.

MASTERS OF ARTS

The Master of Arts is available to students who are admitted to the doctoral program. Students are not admitted into the program for the purpose of earning a terminal Master of Arts degree. Candidates for the Ph.D., who satisfy the committee of their progress and satisfactorily complete 45 units of course work forming a coherent program of study, may apply for an A.M. in Modern Thought and Literature.

DOCTOR OF PHILOSOPHY

A candidate for the Ph.D. degree in Modern Thought and Literature must complete three years (nine quarters) of full-time work, or the equivalent, in graduate study beyond the A.B degree. He or she is expected to complete at least 18 courses of graduate work in addition to the dissertation. At least three consecutive quarters of graduate work must be taken at Stanford. Students may spend one year of graduate study abroad.

Requirements for the Ph.D. in Modern Thought and Literature are:

1. An introductory seminar (361), The Modern Tradition (5 units).
2. Nine courses of advanced work in literary studies in one language, usually English. (Literature in another language taught at Stanford may be substituted.) Of the nine courses, at least six must be regularly scheduled courses in literary studies focused on the period from 1750 to the present, of which at least two must be regularly scheduled seminars. Courses in the teaching of composition (English 396, 397), ad hoc graduate seminars (395), research courses (398), and thesis registration (802) may not be counted among these six courses. 396, 397, 399, 802 may not be counted toward these requirements under any circumstances.
3. Eight courses of advanced work in non-literature departments comprising a coherent program. This component must be worked out individually with the student's adviser. Of these eight courses, at least six must be regularly scheduled substantive courses, of which at least one must be a regularly scheduled seminar. Course restrictions noted above in item 2 also apply.
4. Qualifying Paper: by the end of the first year, the student must submit a 25-30 page paper based on a term paper written during the first year, or organize a colloquium developed from work done in a seminar. Either the paper or the colloquium must be completed at least two weeks before the end of Spring Quarter.
5. Teaching, an essential part of the program, is normally undertaken in conjunction with the Department of English. Candidates are required to demonstrate competence in teaching.
6. Students must demonstrate, by the end of the third quarter of the first year, a reading knowledge of one foreign language and, by the beginning of the first quarter of the third year, a reading knowledge of one other foreign language. Reading knowledge means the ability to make a genuine scholarly use of the language: that is, to read prose of ordinary difficulty.

Students may not take the University oral examination before completion of the foreign language requirement.
7. Candidacy: at the end of the second year, students apply for candidacy. The following qualifications are required before candidacy can be certified: the earlier submission of a satisfactory qualifying paper, demonstration of a reading knowledge of one foreign language, satisfactory progress in course work, a list of courses applicable to the degree, distinguishing between courses appropriate to the literary component from courses appropriate to the interdisciplinary component and the submission of a statement outlining the scope and coherence of the interdisciplinary component of the program in relation to the literary component, and noting the relevance of the course work to that program.
8. Annual Review: the program and progress of each student must be approved by the Committee-in-Charge at the end of each academic year.
9. University Oral Examination: this examination, covering the student's areas of concentration, normally is taken in the third year of graduate study. It is a two-hour oral examination administered by four faculty members specializing in the student's areas of concentration, and a chair from another department. The exam is based on a substantial reading list prepared by the student in conjunction with the faculty committee and designed to cover the areas of expertise pertinent to the student's dissertation project.
10. **Colloquium on the Dissertation Proposal:** several weeks after the University oral examination, or in conjunction with that examination, the dissertation committee assembles for up to one hour to discuss the dissertation proposal with the student. Prior to this meeting, the student should have consulted each member of the committee to discuss the proposal and compile a bibliography.

11. **Dissertation:** the fourth year is devoted to the dissertation, which should be a substantial and original contribution acceptable to the Committee on Modern Thought and Literature. The subject is drawn from the literature of specialization and the area of non-literary studies.

**HUMANITIES**

The program participates in the Graduate Program in Humanities leading to a joint Ph.D. degree in Modern Thought and Literature, and Humanities. For a description of the Humanities program, see "Humanities Special Programs" section of this bulletin.

**COURSES**

The courses listed below are specifically sponsored by the Program in Modern Thought and Literature or are required for the doctoral program. For literature courses, students should consult the listings of the various literature departments at Stanford. For other offerings, students should consult listings in the individual departments of interest. Consent of instructor is often required.

Students in the doctoral program in Modern Thought and Literature are advised to read through the offerings in the Department of English (or in their foreign literature of choice) as well as offerings of the non-literature departments in which they wish to concentrate: for example, courses dealing with culture listed under Anthropology, courses dealing with film under Communication, courses in intellectual history under History. If the area of nonliterary interest is thematic rather than disciplinary, doctoral students should look under various program listings, such as Feminist Studies, African and Afro-American Studies, or Chicano Fellows.

175. **Individual Work** — Directed reading or research for undergraduates. Individual work does not count towards unit requirements for undergraduate Humanities major with a concentration in Modern Thought and Literature. Prerequisite: consent of instructor.

2-5 units, any quarter (Staff)

214. **Deviants in Literature** — (Same as Psychiatry 214.) A psychological approach in interpreting unforgettable literary characters. Authors: Dostoevsky, Kafka, Conrad, Capote, Albee.

3 units, Spr (Van Natta)

**361. The Modern Tradition: Capitalism, Imperialism, and their Critics** — (Enroll in History 306A) Elaborates on the tradition of social theory that begins with Marx’s conceptualization of capitalism and Lenin’s theory of imperialism, arguing that gender and racial hierarchies are constitutive of capitalism. The dimension of ideological and cultural domination using writings of Marx, Gramsci, and representatives of the cultural studies and subaltern schools (Stuart Hall, Gyan Prakash, Edward Said, and Paul Gilroy). The debate over post-modernism/late capitalism and theory and strategy after the Gulf War.

4-5 units, Aut (Beinin)

395. **Ad Hoc Graduate Seminars** — Graduate students (three or more) who wish to study a subject or an area not covered by regular courses and seminars may plan an informal seminar and approach a suitable member of the faculty to supervise it.

any quarter, by arrangement

396L. **Laboratory in Pedagogy** — (Enroll in English 396L) Required for first-year Ph.D. students in English, Modern Thought and Literature, and Comparative Literature (except for Comparative Literature students who are doing their teaching in a foreign language). Preparation for TAing in undergraduate literature courses. Focus is on leading discussions and grading papers.

2 units, Aut (Fields, Reichard)

397A. **Teachers Workshop I** — (Enroll in English 397A) Seminar and apprenticeship required for second-year graduate students in English, Modern Thought and Literature, and Comparative Literature teaching in the Writing and Critical Thinking program. Each student is assigned as an apprentice to an experienced teacher and sits in on classes, conferences, and tutorials, with eventual responsibility for conducting a class, grading papers, holding conferences. Seminar meetings discuss rhetoric, theories of composition, and the teaching of writing. Readings in rhetoric and pedagogy. Each student designs a two-quarter syllabus in preparation for teaching English 1 and 2.

1-5 units, Aut (Fields, Reichard)

397B. **Teachers Workshop II** — (Enroll in English 397B) Seminar for second-year graduate students teaching the first quarter of composition in the Writing and Critical Thinking Program. Focuses on the students’ concurrent teaching and preparation for teaching the second quarter of the sequence.

1-5 units, Win (Fields, Reichard)

397C. **Teaching Workshop III** — (Enroll in English 397C) See 397B.

1-5 units, Spr (Fields, Reichard)
Research Courses — Student pursues a special subject of investigation under supervision of a member of the committee or another faculty member. Thesis work is not to be registered under this number.

any quarter, by arrangement

AFFILIATED DEPARTMENT OFFERINGS

The following courses, offered in 1995-96 by faculty on the Committee in Charge of Modern Thought and Literature, may be of interest to students in the program. Course descriptions can be found in the sponsoring department’s section of the Stanford Bulletin.

ANTHROPOLOGY

60. Environmental Problems and Development (Gupta)
90. Theory in Social Anthropology (Mankekar)
120. Modern India: History, Society, Cultures (Gupta, Mancall)
147A. Comparative Feminisms (Mankekar)
235. Mass Media and Subjectivities (Mankekar)
247. Feminist Mythologies (Mankekar)
250. Nationalism and Gender (Mankekar)
257. Law and Culture (Collier)
259A. Political Economic and Poststructuralist Theories of the State (Gupta)
289. Anthropological Research Methods (Gupta)
291. History of Anthropology: The 20th Century (Collier)

COMMUNICATION

125/225. Perspectives on American Journalism (Glasser)
131/213. Media Ethics and Responsibilities (Glasser)
333G. Seminar in Communication and Culture (Glasser)

COMPARATIVE LITERATURE

141. Self as Other: Interpellating Minority Subjectivities (Palumbo-Liu)
142. Ethnic Memory and Cultural Nationalism (Palumbo-Liu)
230. Comparative Literature and Minority Discourse (Palumbo-Liu)
311. Hybridity and Diaspora (Palumbo-Liu)

ENGLISH

127D. American Literature, 1820-65 (Romero)
163J. 19th- and 20th-Century African-American Writers (Holland)
163K. Contemporary Latina Culture (Romero)
189A. Seminar: Second Wave of U.S. Feminism (Holland)
289. 20th-Century Literature and Economics (Tratner)
308H. Colloquium: American Primitivisms (Romero)
309A. Colloquium: Modernisms (Tratner)

FRENCH AND ITALIAN

GENERAL (In Translation)

170E. Introduction to African Systems of Thought (Mudimbe)
251E. Theories of Difference (Mudimbe)
253E. Diversity of Knowledges and the Unity of Science (Mudimbe)

FRENCH

291. Geography as Fiction and Science (Mudimbe)

HISTORY

187C. Women in the Modern Middle East (Beinin)
231A. Undergraduate Colloquium: Technology, the State, and Social Order in Modern France (Hecht)
287S/487. Undergraduate/Graduate Research Seminar: Topics in the Modern History of Egypt, Palestine, and Israel (Beinin)
336A. Graduate Colloquium: Technology, Work, and Culture in Comparative Perspective (Hecht)
344A. Graduate Colloquium: Problems in Modern British Society (Stansky)
445. Graduate Seminar: Research – Modern Britain
   (Stansky)

PHILOSOPHY
30. Introduction to Political Philosophy
   (Satz)
175. Feminism
   (Rozemond, Satz)
177. Antiracism, Multiculturalism, and Common Humanity
   (Satz)
275. Marx and Weber
   (Satz)

POLITICAL SCIENCE
153. Utopian Political Thought
   (Hansot)

MUSIC
Emeriti: (Professors) John M. Chowning, William L. Crosten, George Houle, Wolfgang E. Kuhn, Herbert B. Nanney, William H. Ramsey, Leonard G. Ratner, Sandor Salgo, Earl Schubert (by courtesy, School of Medicine), Leland C. Smith, (Professors, Performance) Arthur P. Barnes, Marie Gibson, Andor Toth; (Senior Lecturer) Naomi Sparrow; (Lecturers) Frances Blaisdell, Edward C. Colby
Chair: Christopher Chafe
Professors: Karol Berger, Albert Cohen, Jonathan Harvey
Associate Professors: Christopher Chafe, Stephen Hinton (on leave Autumn), William P. Mahrt, Julius O. Smith
Assistant Professors: Thomas Grey, Melissa M. S. Hui (on leave Autumn), Jody Rockmaker, David Soley
Professor (Research): Max V. Matthews
Associate Professor (Performance): George Barth
Senior Lecturers: Judith Bettina (Voice, on leave), Susan Freier* (Violin), Stephen Harrison* (Violoncello), Gennady Kleyman (Violin, Viola), Phillip Levy* (Violin), Benjamin Simon* (Viola), Gregory A. Wait (Voice), Frederick R. Weldy (Piano)
Lecturers: Fredrick Berry (Jazz Ensemble), Marjorie Chauvel (Harp), Robert Claire (Baroque Flute), Perry Cook (Theory), Floyd O. Cooley (Tuba), John Dornenburg (Viola da Gamba), Gregory Dufford (Clarinet), Charles A. Ferguson (Guitar), Claire Giovannetti (Voice), Alexandra Hawley (Flute), Joyce Johnson-Hamilton (Trumpet), Elizabeth Harrison (Organ), Jay Kadis (Audio Recording), McDowell Kenley (Trombone), Mary Linduska (Voice), Janet Maestre (Flute), Anthony Martin (Baroque Violin), James Matheson (Oboe), melinda McGee (Arts Management), Jose Montalvo (Latin American Music), Herbert Myers (Early Winds), James O. Nadel (Jazz), Karen Nagy (Bibliography), Rufus Olivier (Bassoon), Larry S. Ragent (French Horn), Grover Sales (Jazz History), Stephen Sano (Choral Activities), Thomas Schultz (Piano), Harold Stein ( Saxophone), Stephen Tramontozzi (Contrabass), Mark Veregg (Percussion), Timothy Zerlang (Piano)
Acting Assistant Professor: J. Karla Lemon (Director of Orchestras)
Visiting Professor, Emeritus: John R. Pierce
Acting Instructor: Matthew Dirst (Harpischord)

* 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.

Varied opportunities for instrumental and vocal study and performance are available to majors and nonmajors alike. Students wishing to obtain individual instruction, to participate in chamber music, or to play in department ensembles should note that auditions are held during registration week in Autumn Quarter; while there may be openings in some private studios for qualified students during other quarters, it is to the student's advantage to audition in autumn.

The department is housed in Braun Music Center, Dinkelspiel Auditorium, and The Knoll, including two theaters for concert and recital productions, two rehearsal halls, and a small chamber hall. 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 recordings. Supplementing this is the Stanford Memorial Library of Music, an invaluable collection of musical manuscripts and first editions, and the Archive of Recorded Sound.

The Doreen B. Townsend Center for Computer Research in Music and Acoustics (CCRMA) provides one of the top-rated facilities for digital sound research in the world. It includes a large computer room with a control room and studio, an all-digital recording studio, a MIDI-based small systems studio, and work areas with terminals, personal computers, synthesizers, and speakers. Offices and workspaces connect with a workstation network; and a gateway connects to the campus-at-large and to national and international networks. CCRMA software consists of a vast set of programs and system tools for editing, view-
ing, 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 coursework, practice, and University requirements outside the major. Early planning is especially important for students contemplating overseas study during their undergraduate years, and for those with particular musical talents and interests.

1. Students are required to include the following music foundation courses in their programs:
   a) Theory: 21, 22, 23
   b) History: 40, 41, and three from the series 140-145
   c) Analysis: 121 and two from 122A,B,C

2. Additionally, music majors must fulfill the following two performance requirements:
   a) Individual studies in performance: five quarters.
   b) Ensemble: five quarters of work in one or more of the department’s organizations or chamber groups. 161C (Sports Activity Band) does not satisfy this requirement.

3. Majors are required to pass a Piano Proficiency examination as a prerequisite for Music 22, 23, 121, and the 140 series. Offered at the end of the Autumn and Spring Quarters, it consists of scales and arpeggios, performance of a simple tune (to be set by the examiner), sight reading, and the performance of prepared pieces (consult the music office for details). Remedial skills are taught in Music 12A,B,C.

4. Majors must also pass an Ear Training Proficiency examination offered at the end of each quarter which demonstrates a student’s ability to hear music accurately and to perform it at sight. The successful completion of the examination is a prerequisite for all higher-level theory and analysis and courses (Music 121, 122A,B,C).

**RECOMMENDED SCHEDULE FOR THE MUSIC MAJOR**

The following sample schedule shows how a student may include substantial work on a major in music while also fulfilling the University Distribution Requirements during the freshman and sophomore years. The schedule also includes foreign language study, which is strongly recommended for all music majors and especially for those expecting to continue into graduate work in any area of music.

### FIRST YEAR

<table>
<thead>
<tr>
<th>Courses</th>
<th>A</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman English</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Music 19 (if needed), 21, 22</td>
<td>(3)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Individual Instruction and/or</td>
<td>1-4</td>
<td>1-4</td>
<td>1-4</td>
</tr>
<tr>
<td>Ensemble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultures, Ideas, and Values</td>
<td>3-5</td>
<td>3-5</td>
<td>3-5</td>
</tr>
<tr>
<td>Choice of Foreign Language,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution Requirement,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>or Freshman Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SECOND YEAR

<table>
<thead>
<tr>
<th>Courses</th>
<th>A</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Music 23, 40, 41, and 121</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Individual Instruction and/or</td>
<td>1-4</td>
<td>1-4</td>
<td>1-4</td>
</tr>
<tr>
<td>Ensemble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution Requirement</td>
<td>3-5</td>
<td>3-5</td>
<td>3-5</td>
</tr>
<tr>
<td>Elective</td>
<td>3-5</td>
<td>(3)</td>
<td>(3)</td>
</tr>
</tbody>
</table>

### THIRD AND FOURTH YEARS

<table>
<thead>
<tr>
<th>Courses</th>
<th>A</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three from Music 140-145 and</td>
<td>4-8</td>
<td>4-8</td>
<td>4-8</td>
</tr>
<tr>
<td>two from 122A, B, or C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>(4)</td>
<td>(4)</td>
<td>(4)</td>
</tr>
</tbody>
</table>

**MUSIC, SCIENCE, AND TECHNOLOGY**

The specialization in Music, Science, and Technology is designed for those students with a strong interest in the musical ramifications of rapidly evolving computer technology and digital audio, and in the acoustic and psychoacoustic foundations of music. The program entails a research project under faculty guidance and makes use of the highly multidisciplinary environment at CCRMA. This program can serve as a complementary major to students in the sciences and engineering.

1. Students in the program are required to include the following foundation courses in their studies:
   a) Theory: Music 21, 22, 23, 121, 151 (3 units), 220A,B,C,D (4 units each); Physics 51 (or equivalent)
   b) History: Music 40, 41; 154
   c) Applied: individual studies in performance (two quarters), or Music 192A,B and Ensemble or 192C (five quarters)

2. Students in Music, Science, and Technology must also pass the Piano and Ear-training Proficiency examinations required of Music majors.

3. Students may petition for honors on the basis of a substantial project such as a research paper or composition.

**CONCENTRATIONS**

Concentrations are offered in performance, composition, or history and theory. In each con-
centration, six additional course units in music beyond the basic requirements for the major are required. In addition, each concentrator registers for an independent project (4 units) in the senior year under faculty supervision, leading to a senior recital, a composition, or a senior research paper.

HONORS PROGRAM
Honors in music is awarded by the faculty to concentrators who have produced an independent project of exceptional quality and distinction. To be eligible for honors, a student must petition the department by the end of the junior year. A faculty committee evaluates projects (recitals, compositions, or research papers) considered for honors.

GRADUATE PROGRAMS
The following statements apply to all the graduate degrees described below, unless otherwise indicated.

Admission — Applicants should arrange to take the Graduate Record Examination (GRE), including the advanced music section. Because the Music GRE is only given twice a year, applicants are urged to register for the exam well in advance of the January 1 application deadline. Students are also required to submit a departmental entrance test in theory and musicianship, which is sent along with the application, and to submit evidence of accomplishment (scores, tapes, and/or research papers, according to the proposed field of concentration) when they return the application form. All components of the application are due by January 1.

Department Examinations — (1) A placement examination testing the student in theory (counterpoint, harmony, and analysis) and history of Western music, and (2) a proficiency examination in sight-singing and piano sight-reading are given at the beginning of study in the department (usually the week before school begins). None of Stanford's required undergraduate courses may be credited toward an advanced degree. Only work that receives a letter grade indicator (LGI) of 'A,' 'B' or 'Satisfactory' in music courses taken as a graduate student is 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 a language other than English must be demonstrated at the beginning of graduate study.

Study Program — Students may concentrate in composition, history, or performance. To be recommended for the A.M. degree, a candidate must complete a program of 36 units of graduate course work. Depending on the concentration, the A.M. project will be an investigative essay, a composition, or a demonstration of performance supported by a written commentary on the performance practice involved.

Required are:

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>200. Graduate Proseminar</td>
<td>4</td>
</tr>
<tr>
<td>Three quarters of work in the student's area of concentration</td>
<td>9-12</td>
</tr>
<tr>
<td>Three quarters of ensemble performance</td>
<td>3</td>
</tr>
<tr>
<td>223. Composition</td>
<td>4</td>
</tr>
<tr>
<td>or 269A or B. Performance Practices</td>
<td>4</td>
</tr>
<tr>
<td>299. Master of Arts Project</td>
<td>4</td>
</tr>
</tbody>
</table>

Students in the doctoral program may, upon completion of the above requirements and the doctoral qualifying examination, be recommended for the A.M. degree. The A.M. project is not required of these students.

DOCTORAL PROGRAMS
Residence — The candidate must complete a minimum of three years of full-time work, some of which is planned individually, for each concentration. Doctoral candidates working in absentia on Ph.D. dissertations or D.M.A. final projects that require consultation with faculty members must continue enrollment in the University under Terminal Graduate Registration (TGR).

Foreign Language Requirement — At the beginning of graduate study, all D.M.A. and Ph.D. students in the Computer-Based Theory and Acoustics program are required to demonstrate a reading knowledge of a language other than English and the ability to translate into idiomatic English. Ph.D. candidates in musicology are required to demonstrate proficiency in German and a similar competence in a second language, chosen from French, Italian, or Latin, before the beginning of the second year of doctoral study.

Qualifying Examination — A written and oral examination for admission to candidacy is given in the fourth quarter of full-time residence. This exam tests knowledge of history, repertory, and analysis.

Teaching — All students in the Ph.D. or D.M.A. degree programs, regardless of sources of financial support, are required to complete six quarters of supervised teaching at half time.

Basic Requirements — Doctoral programs in the Department of Music do not require the A.M. degree as a prerequisite, but students entering with only a bachelor's degree are required to take the following course:
All doctoral candidates must take:

**301A,B,C. Music Analysis: Modal, Tonal, and Post-Tonal** 12

**DOCTOR OF MUSICAL ARTS IN COMPOSITION**

The Doctor of Musical Arts (D.M.A.) degree in Composition is given breadth through collateral studies in other branches of music and in relevant studies outside music as seems desirable. A minimum of 72 units of credit is required for the degree.

**Examinations** — A written and oral examination in the candidate's special area of concentration is given no later than the third quarter after passing the qualifying examination. A public lecture-demonstration is given during the last quarter of residence. It should be one hour in length, treating aspects of the final project.

Candidates are expected to produce a number of works demonstrating their ability to compose in a variety of forms and for the common media: vocal, instrumental, and electronic music. If possible, the works submitted are presented in public performance prepared by the composer. Annual progress is reviewed by the composition faculty. The final project in composition is an extended work for instruments, voices, electronic media, or a combination of these. Music 323, D.M.A. Seminar in Composition (16 units) is a required course.

**DOCTOR OF PHILOSOPHY**

General University regulations for the Ph.D. are discussed in the “Graduate Degrees” section of this bulletin. The Ph.D. in Music can be pursued in two concentrations: Musicology or Computer-Based Music Theory and Acoustics.

**Examinations** — (1) An examination testing knowledge of music and research in the area of special concentration is given no later than the third quarter after passing the qualifying examination. This includes an oral defense of the dissertation proposal. The examining committee comprises prospective readers of the dissertation. (2) The University oral examination, taken once the dissertation is substantially underway, is an oral presentation and defense of dissertation research methods and results. Music 221, History of Music Theory (8 units) is a required course for both concentrations.

**MUSICOCYLOGY**

- 269A or B. Performance Practices 4
- 300. History of Notation 8
- 310. Research Seminars in Musicology 16
- 312A,B. Aesthetics and Criticism of Music 8

**COMPUTER-BASED MUSIC THEORY AND ACOUSTICS**

- 220A,B,C. Computer-Generated Music Seminars 12
- 220D. Research in Computer Music 12
- 320. The Discrete Fourier Transform 4

**JOINT Ph.D IN MUSIC AND HUMANITIES**

The department participates in the Graduate Program in Humanities leading to a joint Ph.D. degree in Music and Humanities. For a description of the program, see the “Humanities Special Program” section of this bulletin.

**COURSES**

**GENERAL**

1. **Introduction to Music** — Techniques of active listening for an enhanced understanding of various musical styles. Awareness of the basic elements of music is applied to the appreciation of a repertoire from Western art music from the Middle Ages to the present, and traditions of popular and non-Western music. Questions of musical form, style, expression, and meaning in different historical and cultural contexts. DR:7(2) 3 units, Aut (Grey)

2A. **The Symphony** — Symphonic literature from 1750 to the present, emphasizing developing skills in critical listening. Ability to read music not required. DR:7(2) 3 units, Win (Hinton)

2B. **The Concerto** 3 units, Spr (Barnes)

2C. **Opera** 3 units (Mahrt)

3C. **Medieval Music** 3 units (Mahrt)

3F. **Franz Liszt and the Music of the Romantic Era** — Western musical culture of the 19th century from the perspective of Hungarian-born pianist and composer Franz Liszt. The wider intellectual context of European Romanticism through writers, artists, statesmen, aristocrats, and famous or notorious personalities with whom Liszt was connected. Historical-stylistic survey of the works of Liszt and his contemporaries (Beethoven, Paganini, Chopin, Wagner, and others), emphasizing specific listening skills applicable to this repertoire. DR:7(2) 3 units (Grey)

4A. **The Music of J. S. Bach** — Develops awareness and skill in listening to the music of Bach: structure, style, instruments, and aesthetics. Music for the church and chamber: dance music, concerti, cantatas, sonatas, preludes and fugues, and Passions. 3 units (Staff)

4B. **The Music of Mozart** 3 units (Staff)
4C. The Music of Beethoven — The composer's music and personality through selected masterworks. Ability to read music not required.  
3 units (Grey)

4D. The Operas of Mozart  
3 units (Berger)

4E. The Music of Debussy and Ravel  
3 units (Cohen)

4F. The Music of Stravinsky  
3 units (Staff)

4G. The Music of Wagner  
3 units (Staff)

5A. Music in America — Development of popular folk and art music in America from the Pilgrims to the present. DR:7(2)  
3 units, Win (Cohen)

5B. Contemporary Latin Music — 20th-century Latin American composers who have contributed extensively to the modern symphonic and chamber music repertoire, looking at the region as a whole and presenting an overview of its culture, history, and endemic musical instruments. Mexico and Central America; Brazil and Andean S. America; Argentina and Austral S. America; the Caribbean region. Representative and distinguished composers and their works analyzed.  
3 units, Aut (Montalvo)

7B. Explorations in World Music — Introduction to select musical traditions of the world, examining diverse musical languages, styles, and aesthetics within their cultural and social contexts. Develops critical listening and analytic skills in understanding each tradition, focusing on the perception of musical time. Hands-on workshops.  
3 units, Spr (Hui)

15A,B. Sophomore Seminars  
15A. Topics in Interactive Computer-Music Performance — For sophomores only. Real-time interactive performance for interested musicians combining composition, performance, MIDI instruments, and computer programming. Introduction to programming, composition of short pieces, moving beyond familiar styles. Prepares students for work in ensembles such as ALEA II, and CCRMA courses in musical acoustics, advanced programming, and related research issues.  
4 units (Chafe)

15B. North American Taiko — For sophomores only. Japanese music and Japanese American history through the focal point of taiko. Hands-on experience, readings, discussion, and workshops.  
3-4 units, Spr (Sano)

16A,B. Dialogue Tutorials  
16A. Contemporary Music — A Reflection of the Times — For sophomores only. Critical listening of new music, focusing on varying conceptions of time and cross-cultural influences. Emphasis on understanding composers' intents and developing new listening strategies for the diverse musical languages of today.  
2 units, Win (Hui)

16B. Readings in Early Romantic Music and Aesthetics, 1780-1850 — For sophomores only. The interactions between an emerging Romantic aesthetic of music and the development of a Romantic musical language or style in music from the late Viennese classical period of the 1780s through the generation of Berlioz, Chopin, and Liszt. Readings from early Romantic fiction, poetry, and philosophical and critical literature relating to music illustrate the extent to which prior critical and ideological concepts of Romanticism determined musical practice after 1800, while also influencing the ways in which earlier music is received and interpreted. Recommended: some ability to read music.  
2 units, Spr (Grey)

18. Jazz History — Slides, recordings, and personal interviews trace the history of jazz from Black entertainment beginnings to a complex and varied art form.  
18A. Ragtime to Bebop (1900-1945) — DR:7(2)  
3 units, Win (Sales)

18B. Bebop to Present (1945-) — Prerequisite: 18A. DR:7(2)  
3 units, Spr (Sales)

19. Introduction to Music Theory — For non-music majors and music majors unable to pass proficiency test for entry to 21. Fundamentals of music notation, basic sight reading, sight singing, ear training, keyboard harmony; also melodic, rhythmic, and harmonic dictation. Skill oriented, using piano and voice as basic tools to develop listening and reading skills. DR:7(2)  
3 units, Aut (Sano)

20A. Jazz Theory — Introduces the language and sounds of jazz through listening, analysis, and compositional exercises. Students apply the fundamentals of Western music theory to the study of jazz. Prerequisite: 19 or consent of instructor.  
3 units, Win (Nadel)

20B. Advanced Jazz Theory — By analyzing a variety of approaches to improvising, composing, and arranging jazz, students develop familiarity with important contributors to this music. Topics: scale theory, altered dominants, substitute harmony, and transcribing solos. Prerequisite: 20A or consent of instructor.  
3 units, Spr (Nadel)

191. Arts Management for Performing Artists — Managing a career in the arts as a performer, admin-
istrator, concert producer, or promoter. Basic principles of arts management, including public relations, concert production, professional presentation, booking, and fund-raising. Applicable to all performing arts.

1 unit, Win (McGee)

FOUNDATION FOR A.B. MAJOR

21, 22, 23. Elements of Music — Melody, harmony, counterpoint, and rhythm studied through analysis, composition, and exercises in practical musicianship. Emphasis is on four-part writing and species counterpoint. Analysis and compositional projects in historical styles are part of series. Students with previous training in theory are urged to take a placement exam given at the beginning of each quarter for admission to more advanced courses.

21. Elements of Music I — Introduction to scales, basic elements of melody and rhythm, simple harmony, sight singing, and dictation. Students intending to continue with 22-23 who do not have piano proficiency should begin 12 (class piano) concurrently. Prerequisite: pass proficiency examination in basic musical skills given on first day of class. DR: 7(2)

4 units, Aut (Soley)

22. Elements of Music II — Extension of melody, counterpoint and harmony, introduction of simple forms, chorale harmonizations. Prerequisites: 21; pass minimum proficiency test in piano, or concurrent enrollment in 12; or consent of instructor.

4 units, Spr (Hui)

23. Elements of Music III — Chromatic harmony, complex forms. Prerequisites: 22; pass minimum proficiency test in piano, or two quarters prior and concurrent enrollment in 12; or consent of instructor.

4 units, Aut (Rockmaker)

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: 23.

40. Music History to 1750

4 units, Win (Berger)

41. Music History since 1750

4 units, Spr (Hinton)

121. Analysis of Tonal Music — Complete movements or entire shorter works of the 18th and 19th centuries, analyzed in a variety of theoretical approaches. Prerequisites: 23, successful completion of the Ear Training proficiency examination.

4 units, Win (Barth)

122A. 18th-Century Counterpoint — Analysis and composition of two- and three-part inventions and three- and four-voice fugues. Use of keyboard, ear training, and sight singing underlies all written work. Prerequisites: 23, successful completion of the Ear Training Proficiency examination.

4 units, Aut (Soley)

122B. Harmonic Materials of the 19th Century — Analysis of 19th-century music, with compositional exercises based on 19th-century models. Prerequisites: 121, successful completion of the Ear Training Proficiency examination.

4 units, Spr (Grey)

122C. Introduction to 20th-Century Composition — Projects in free composition based, at first, on 20th-century models analyzed in class. Final projects are performed in an informal setting. Prerequisites: 23 or consent of instructor, successful completion of the Ear Training Proficiency examination.

3 units, Win (Soley)

COMPOSITION AND THEORY

120. Introduction to Music Composition and Programming Using MIDI Based Systems — Composition projects demonstrate participant’s own software for voicing and controlling MIDI synthesis. Extensive individual lab time required during week days. Prerequisite: consent of instructor.

4 units, Win (Staff)

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)

127. Orchestration — Prerequisite: 23.

3 units (Barnes) given 1996-97

220. Computer-Generated Music

220A. Fundamentals of Computer-Generated Sound — Techniques for digital sound synthesis, effects, and reverberation. Topics: summary of digital synthesis techniques (additive, subtractive, nonlinear, wavetable, spectral-modeling, and physical-modeling); digital effects algorithms (phasing, flanging, chorus, pitch-shifting, and vocoding); and techniques for digital reverberation.

2-4 units, Aut (Smith)

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, Aut (Smith)

220C. Seminar in Computer-Music Research — Individual projects in composition, psychoacoustics, or signal processing. Prerequisite: 220B.

4 units, Spr (Chafe)
220D. Research — Independent research projects in composition, psychoacoustics, or signal processing. Prerequisite: 220C.
1-4 units, any quarter (Staff)

HISTORY AND LITERATURE
140,141,142,143,144,145. Seminars in Music History — Specialized topics in music history, each offered at least once within any two-year period. Topics vary each year.
140. Studies in Medieval Music — Prerequisite: 40.
4 units, Spr (Mahrt)
141. Studies in Renaissance Music — Prerequisite: 40.
given 1996-97
142. Studies in Baroque Music — Prerequisite: 40.
4 units, Aut (Cohen)
143. Studies in Classic Music — Prerequisite: 41.
given 1996-97
144. Studies in Romantic Music — Prerequisite: 41.
given 1996-97
145. Studies in Modern Music — Prerequisite: 41.
4 units, Win (Rockmaker)

150A. Gregorian Chant
4 units (Mahrt)

151. Psychophysics and Cognitive Psychology for Musicians — (Same as Psychology 268.) Basic concepts and experiments relevant to use of sound, especially synthesized, in music. Introduction to elementary concepts; no previous background assumed. Listening to sound examples important. Emphasis is on salience and importance of various auditory phenomena in music. Prerequisite: some basic knowledge of music.
1-3 units, Aut (Cook, Matthews, Pierce, Shepard)

154. Introduction to Computer Music — Survey of recent works and computer-based techniques.
4 units, Win (Staff)

198. Concentrations Project
4 units, Aut, Win, Spr (Staff)

199. Independent Study — For advanced undergraduates and graduate students who wish to do work outside the regular curriculum. Before registering, student must present a specific project and enlist a faculty sponsor.
1-4 units, Aut, Win, Spr (Staff)

PERFORMANCE GROUP INSTRUCTION

Note — Special fee of $85 per quarter (subject to revision) for 12A,B,C (non-majors); 65A,B, 72, 73, 74, 75, 76, 77.

12A,B,C. Introductory Piano — (A=level 1; B=level 2; C=level 3) Preference given to music majors.
1 unit, Aut, Win, Spr (Zerlang)

13A. Voice Class I — Large-group beginning voice for the non-major.
1 unit, Aut, Win, Spr (Giovannetti)

13B. Voice Class II — Large-group instruction for non-majors with previous vocal training.
1 unit, Aut, Win, Spr (Giovannetti)

13C. Voice Class — For music majors, and non-majors who are members of departmental performing organizations.
1 unit, Aut, Win, Spr (Giovannetti)

13D. Jazz Solo Voice Class — For students with previous experience in solo singing. The study and performance of contemporary solo vocal repertoire of the popular and jazz idioms. Recommended: basic knowledge of music theory/harmony.
1 unit, Spr (Sano)

72,73,74,75,76,77. Small Group Instruction — Minimum enrollment required.
1 unit, Aut, Win, Spr

72A. Piano Class — For intermediate students.
(Staff)

72B. Organ Class — For beginning organ students who have keyboard skills.
(Staff)

73. Voice Class
(Giovannetti)

74A. Stringed Instruments Classes
(Harrison, Kleyman)

74C. Classical Guitar Class
(Ferguson)

74D. Harp Class
(Chauvel)

75A. Wind Instruments Classes
(Maestre)

75B. Renaissance Wind Instruments Class
(Myers)

76. Brass Instruments Classes
(Kenley)

77. Percussion Class
(Veregge)

INDIVIDUAL INSTRUCTION

172/272, 173/273, 174/274, 175/275, 176/276, 177/277. Individual Vocal and Instrumental Instruction — Special fee of $165 per quarter for majors and $330 for non-majors (subject to revision). Prospective students must demonstrate, by audition with the appropriate teacher, a minimum proficiency on instrument. Minimum proficiency requirements for each instrument are at department office. 270-level courses are for advanced students.
3 units, Aut, Win, Spr
### Keyboard Instruments
- **172A/272A. Piano** (Barth, Schultz, Weldy)
- **172B/272B. Organ** (Staff)
- **172C/272C. Harpsichord** (Staff)
- **172E/272E. Early Piano** (Barth)

### Voice
- **173/273. Voice** (Giovannetti, Linduska, Wait)

### Stringed Instruments
- **174A/274A. Violin** (Freier, Kleyman, Levy)
- **174B/274B. Viola** (Kleyman, Simon)
- **174C/274C. Violoncello** (Harrison)
- **174D/274D. Contrabass** (Tramontozzi)
- **174E/274E. Viola da Gamba** (Dornenburg)
- **174F/274F. Classical Guitar** (Ferguson)
- **174G/274G. Harp** (Chauvel)
- **174H/274H. Baroque Violin** (Martin)
- **174I/274I. Early Plucked Strings** (Staff)

### Woodwind Instruments
- **175A/275A. Flute** (Blaisdell, Hawley, Maestre)
- **175B/275B. Oboe** (Matheson)
- **175C/275C. Clarinet** (Dufford)
- **175D/275D. Bassoon** (Olivier)
- **175E/275E. Recorder** (Myers)
- **175F/275F. Saxophone** (Stein)
- **175G/275G. Baroque Flute** (Claire)

### Brass Instruments
- **176A/276A. French Horn** (Ragent)
- **176B/276B. Trumpet** (Johnson-Hamilton)
- **176C/276C. Trombone** (Kenley)
- **176D/276D. Tuba** (Cooley)

### Percussion
- **177/277. Percussion** (Veregge)

### Performance Practices

#### 130. Elementary Conducting
- **130A. Introduction to Conducting** — Fundamentals of baton techniques and rehearsal procedures. Development of coordination of the members of the body involved in conducting; fluency in the various beat patterns and meters; dynamics, tempi, cueing, and use of the left hand in conducting.
- 3 units (Sano) given 1996-97

#### 130B. Elementary Orchestral Conducting — Techniques specific to the conducting of orchestral ensembles. Prerequisites: 127, 130A.
- 3 units (Lemon) given 1996-97

#### 130C. Elementary Choral Conducting — Techniques specific to the conducting of choral ensembles: warm-ups, breathing, balance, blend, choral tone, isolation principles, recitative conducting, preparation, and conducting of choral/orchestral works. Prerequisite: 130A.
- 3 units (Sano, Wait) given 1996-97

#### 181. Performance of Vocal Literature
- **181A. Standard Repertoire**
  - 1 unit, Aut, Win, Spr (Wait)

### Ensembles
- 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. These courses may be repeated for credit, but music majors are limited to 12 units of ensemble within the minimum 180 units needed for the A.B. degree.

#### 158. Contemporary Performance Ensemble
- 1 unit, Aut, Win, Spr (Lemon)

#### 159. Early Music Singers
- 1 unit, Aut, Win, Spr (Mahrt) TTh 12-2

#### 160. University Orchestra
- 1 unit, Aut, Win, Spr (Lemon) TTh 7:15 p.m.

#### 161. University Bands
- **161A. University Symphonic Band**
  - 1 unit, Aut, Win, Spr (Barnes) MF 12-1, W 7:30-9:30 p.m.
161B. Jazz Ensemble
1 unit, Aut, Win, Spr (Berry) MW 4:15-6:05

161C. Sports Activity Bands — May be repeated for credit but subject to the 12-unit activity class limitation policy.
1 unit, Aut (Barnes) MWF 4:15-5:30
Win, Spr (Barnes) by arrangement

162. University Symphonic Chorus
1 unit, Aut, Win, Spr (Sano) M 7:30-10 p.m.
W 4:15-5:30

163. University Choir — Official choir of Memorial Church, which furnishes music for Sunday services and special occasions in the church calendar.
2 units, any quarter (Wait)
Th 6:30-8:30 p.m. and Su 10-12

165. Stanford Chamber Chorale — Small vocal ensemble specializing in performance music of all periods for the chamber chorus.
1 unit, Aut, Win, Spr (Wait) MWF 12

166. Chamber Orchestra — Open to advanced players who have had orchestral experience.
1 units, Aut, Win, Spr (Barnes)

167. University Singers
1 unit, Aut, Win, Spr (Sano) TTh 12-1:30

170. Piano Accompanying
1 unit, Aut, Win, Spr (Weldy)

171. Chamber Music — Open to any student with sufficient technical ability to play in small combinations for strings, winds, and keyboard instruments.
1 unit, Aut, Win, Spr (Staff, Freier, Levy)

192A. Foundations of Sound Recording Technology — Topics: elementary electronics, physics of transduction and magnetic recording of sound, acoustic measurement techniques, operation and maintenance of recording equipment, recording engineering principles. Prerequisites: 151, 220A, B, C; high-school level algebra and physics.
3 units, Aut (Kadis)

192B. Advanced Sound Recording Technology — Topics: digital audio including current media, formats, editing software, and post-processing techniques. Also, microphone selection and placement, grounding and shielding techniques, noise reduction systems and advanced multi-track techniques. Prerequisite: 192A.
3 units, Win (Kadis)

192C. Session Recording — Independent engineering of recording sessions. Prerequisites: 192A, B.
1 unit, Aut, Win, Spr (Kadis)

192A. Foundations of Sound Recording Technology — Topics: elementary electronics, physics of transduction and magnetic recording of sound, acoustic measurement techniques, operation and maintenance of recording equipment, recording engineering principles. Prerequisites: 151, 220A, B, C; high-school level algebra and physics.
3 units, Aut (Kadis)

192B. Advanced Sound Recording Technology — Topics: digital audio including current media, formats, editing software, and post-processing techniques. Also, microphone selection and placement, grounding and shielding techniques, noise reduction systems and advanced multi-track techniques. Prerequisite: 192A.
3 units, Win (Kadis)

192C. Session Recording — Independent engineering of recording sessions. Prerequisites: 192A, B.
1 unit, Aut, Win, Spr (Kadis)

Graduate Research and Special Studies

200. Graduate Proseminar — Required of first-year graduate students in music. Introduction to research in music, bibliographical materials, major issues in the field, philosophy and methods in music history. Guest lecturers and individual research topics.
4 units, Aut (Berger, Nagy)

221. History of Music Theory — Principal theories, theorists, and treatises of Western music, from ancient times to the present.
221A. Ancient Through Renaissance
4 units, Spr (Cohen)
221B. Baroque Through Modern
4 units (Cohen) given 1996-97

242. Seminar: Topics in Computer Music
242A. Musical Information: An Introduction
1-3 units, Win (Selfridge-Field)
242B. Computer Analysis and Synthesis of the Voice
1-3 units, Spr (Cook)
242C. Digital Multimedia Tools and Environments — (Enroll in Computer Science 377D.)
3 units, Spr (Schwanauer)

269A. Seminar in Performance Practice
4 units, Spr (Barth)

269B. Research in Performance Practices — Performance techniques, theoretical principles, aesthetics, and musical resources of various historical periods.
4 units, Aut, Win, (Staff) by arrangement

299. Master of Arts Project
4 units, any quarter (Staff)

300A, B. History of Notation
4 units (Mahrt) given 1996-97

301A. Modal Analysis
4 units, Spr (Mahrt)
301B. Tonal Analysis
4 units, Aut (Grey)
301C. Post-Tonal Analysis
4 units, Spr (Harvey)

302. Research in Musicology
4 units, Aut, Win, Spr (Staff) by arrangement

310. Research Seminar in Musicology
4 units, Aut (Mahrt)
Win (Hinton)
Spr (Berger)

312A, B. Aesthetics and Criticism of Music — Intensive reading of selected major primary texts.
312A. 4 units, Aut (Berger)
312B. 4 units, Win (Berger)

319. Research Seminar on Computational Models of Sound Perception
1-3 units, Aut, Win, Spr (Schubert)

320. Introduction to Digital Audio Signal Processing and the Discrete Fourier Transform (DFT) — Introduction to the mathematics of digital signal processing and spectrum analysis in music and audio research. Topics: complex numbers, sinusoids, spectra, aspects of audio perception, the DFT, and basic Fourier time-frequency relationships in the discrete-time case. Prerequisite: 220A.
2-4 units (Smith) given 1996-97

321. Readings in Music Theory
3 units, any quarter (Staff) by arrangement

323. Doctoral Seminar in Composition
4 units, Aut, Win (Harvey)
Spr (Rockmaker)

325. Individual Graduate Projects in Composition
1-4 units, any quarter (Staff) by arrangement

341. Ph.D. Dissertation
1-12 units, any quarter (Staff) by arrangement

399. D.M.A. Final Project
1-9 units, any quarter (Staff) by arrangement

420. Applications of the Fast Fourier Transform (FFT) — Spectrum analysis and signal processing using the FFT, emphasizing audio applications. Topics: FFT windows, cyclic and acyclic convolution, zero padding, spectrum analysis of deterministic and stochastic signals, the overlap-add and filter-bank-summation methods for short-time Fourier analysis, modification, and resynthesis; transform coders, tracking sinusoidal peaks across FFT frames, and modeling time-varying spectra as sinusoids plus filtered white noise using the FFT for both analysis and resynthesis. Prerequisites: Electrical Engineering 104, 261.
2-4 units (Cook)

421. Signal Processing Methods in Musical Acoustics — Computational models of musical instruments in the string and wind families based on physical models implemented using signal processing methods. The models capture only the “audible physics” of musical instruments using computationally efficient algorithms. Topics: mass-spring systems and their discrete-time simulation, sampled traveling waves, lumping of losses and dispersion, allpass techniques for tuning and stiffness simulation, use of lattice/ladder digital filters in acoustic models, and models of winds and strings using delay lines, scattering junctions, digital filters, and nonlinear junctions implementing oscillation sources such as bow-string and reed-bore couplings. Prerequisites: Engineering 15, Electrical Engineering 104.
2-4 units, Spr (Smith)

OVERSEAS STUDIES PROGRAM

Stanford Program in Berlin
Director: Karen Kramer
Associate Director: Maria Biege
Faculty: Dubravka Friesel-Kopecki, Therese Hörnigk, James Howell, Judith Koch, Stephen Krasner, Hans-Peter Krüger, Franz Neckenig, Orrin Robinson, Sylke Tempel, Jochen Wohlfeil

Stanford Program in Florence
Director: Ermelinda Campani
Faculty: Nicola Bellini, Francesco Benvenuti, Patrizio Bianchi, Dario Biocca, Roberto D’Alimonte, Antonello La Vergata, Giuseppe Mammarella, Timothy Verdon, Sylvia Yanagisako

Stanford Center for Technology and Innovation – Kyoto
Director: Terry MacDougall
Faculty: Toshiko Fujiwara, Fujiko Hotta, Colin McKenzie, Haruka Ueda, Mariko Uemiya, Chihiro Yamaoka

Stanford Program in Moscow
Director: Maxim Bratersky
Faculty: Tatyana Boldyreva, Svetlana Grinyuk, Zinaida Kuznetsova, Galina Panova, Andrew Yurevitch, Andrei Zorin

Stanford Program in Oxford
Director: Geoffrey Tyack
Faculty: Ian Christie, John Darwin, Paul David, James Forder, Philip Davies, Michael Gearin-Tosh, Joshua Getzler, Anthony Kirk-Greene, Laurence Lustgarten, John Manley, Ruth Maeter, Gerald Meier, Glyn Redworth, Peter Stansky, Gerald Bowen Thomas, Jonathan Wordsworth

Stanford Program in Paris
Director: Estelle Halevi
Faculty: Brigitte Cazelles, Chantal Georgel, Fédéric Charillon, Alexandra Giraud, Marie Grée, Nancy Green, Marc Lazar, Florence Leca, Nonna Mayer, Claire Nacher, Marie-Odile Ottenwaelt, Marie-Christine Ricci, Barbara Shapiro-Comte

Stanford Program in Santiago
Director: Edmundo Fuenzalida
Faculty: Roberto Duran, Ricardo Ffrench-Davis, Ernesto Hajek, María de la Luz Hurtado, María Isabel Mízón, Oscar Muñoz, Marcela Oyanedel, Hernán Pons, Alfredo Rehren, Bernardo Subercaseaux, Teresa Valdés
Stanford University believes that every student should have the opportunity for academic study abroad as part of his or her academic program. Overseas Studies maintains centers in Berlin, Florence, Kyoto, Moscow, Oxford, Paris, Rome, and Santiago. Course offerings from the sciences, social sciences, and humanities provide full Stanford credit. Most courses are also reviewed by specific departments and count toward major requirements. Courses that fulfill Distribution Requirements in Areas 7(2) and 9(5) are usually offered at every center. Academic or paid internships are available at the Berlin, KyotSCTI, and Moscow centers. While all of the centers sponsor research opportunities or on-one-one tutorials, the Santiago and Moscow centers offer research as part of the regular curriculum. Minimum required language preparation varies among centers: Florence, Moscow, Paris, and Santiago require one full year; Berlin requires one or two quarters; Kyoto-SCTI requires two quarters for students interested in a technical internship and five for those interested in a nontechnical one. Students may enroll for one or two quarters at most centers and for three quarters in Berlin and Oxford. Depending on language proficiency, students may attend local universities in Berlin, Florence, and Paris. Students remain registered at Stanford and pay regular tuition along with the Overseas Studies fee, which is based on Stanford room and board rates. Regular financial aid applies, and may be increased to cover additional costs. At most centers, students live with a family from the host culture, or with local students in apartments or in the Stanford center. Overseas Studies, located on the first floor of Sweet Hall, has a full-time staff to assist students in planning their programs abroad. The information below, while accurate at the time of printing, is subject to change. Overseas Studies updates this information periodically.

COURSES
BERLIN

30. Berlin vor Ort: A Field Trip Module — The cultures of Berlin as preserved in museums, monuments, and architecture. Berlin’s cityscape as a narrative of its history from baroque palaces to vestiges of E. German communism, from 19th-century industrialism to grim edifices of the Sachsenhausen concentration camp. Competing political agendas and criteria of historical selection in monument-alteration and removal, renaming streets, and structuring the capital city. Focus is on interface between sociopolitical life and artistic expression. In German

1 unit, Aut, Win, Spr (Neckenig)

34. Directed Research — Continuation of 177A. Research conducted under the guidance of a local specialist.

3-4 units, Spr (Krüger)

100X. The History of German and European Economic Philosophy — (Same as Economics 100X, History 129V, Political Science 161X; also listed as International Relations Cluster A and C.) Intellectual history of a region that had fascist, socialist, communist, and conventional liberal-democratic governments within a single generation. Chronological and systematic review of seven aspects of German political and economic thinking since 1870. Economics majors take 5 units. DR:8(3)

4-5 units, Spr (Krüger)

101A. German Theater — (Same as Drama 101A, German Studies 195.) Texts of plays supplemented by theoretical writings of respective playwrights and background reading in theater history and theory. Weekly theater trips, a tour of backstage facilities, attendance at a rehearsal, and discussions with actors, directors, or other theater professionals. DR:7(2)

4-5 units, Spr (Krüger)

117V. The Industrial Revolution and Its Impact on Art, Architecture, and Theory — (Same as Science, Technology, and Society 117V; Art 173Y.) 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. DR:7(2)

5 units, Win (Neckenig)

127X. The Political Economy of Contemporary Germany — (Same as Economics 127X; also listed as International Relations Cluster C.) Survey of the German economy since WW II. Topics: consequences of the Hitler years and the war; establishment of the W. German economy, the “Wirtschaftswunder,” and subsequent developments; the organization of the economy in E. Germany; economic relations between the two German states; economic integration since unification; and the role of Germany in the world economy. Economics majors take 5 units. DR:9(5)

4-5 units, Spr (Krüger)

128X. Transition in Germany and Eastern Europe — (Same as Economics 128X; also listed as International Relations Cluster C.) The transformation process in Eastern Europe has goals of gaining political democracy and a market economy within the shortest time. The economic and political as-
pects: macroeconomic stability, international opening, and privatization. Reasons behind the division of Europe after WW II, emphasizing the division of Germany, commonalities, and special features of the emerging Stalinist societies. Revolutions and tasks of revolutionary governments after the breakdown of communism. Role of the West, especially the EC. Economics majors take 5 units. DR:9(5)

4-5 units, Win (Kräger)

132X. International Political Economy — (Same as Political Science 132X; also listed as International Relations Clusters A and C.) Political determinants of international economic relations. Theoretical perspectives including realists, liberals, Marxism, and domestic politics. Empirical issues of trade, investment, north-south relations, economic sanctions, regionalism, and multinational corporations. DR:9(5)

5 units, Win (Krasner)

134X. Contested Sovereignty — (Same as Political Science 134X.) The way sovereignty has changed and is being challenged in the contemporary international system. Nature of sovereignty from two theoretical perspectives, both focusing on the nature of institutions, one derived from sociology, the other from economic analysis. Challenges to sovereignty from the European Community, economic interdependence, global human rights agreements, coercive interventions, and Soviet control over the domestic politics of eastern European countries during the Cold War.

5 units, Win (Krasner)

139. Introduction to the German Dialects — (Same as German Studies 139B.) Introduction to major German dialects by data-gathering sessions with native speakers, professionally-made tapes, and readings from secondary sources. Acquaints students with the history of the study of language variation in German: traditional dialect grammars, the dialect-geographical revolution, insights of modern sociolinguistics. DR:9(4)

4 units, Spr (Robinson)

143U. Architecture and the City, 1871-1990: Berlin as a Nucleus of Modernity — (Same as Urban Studies 143U; Art 174Y, History 229V.) Urban Berlin since the Gründerzeit. Architectural “corrections” attempted in post-Communist E. Berlin and on the drawing boards. Dual perspective of the major architectural movements of the century and reconstruction of shifting roles of Berlin during unifications of 1871 and 1990. DR:7(2)

4 units, Aut, Spr (Neckenig)

159. Berlin Sociolinguistics — (Same as German Studies 159B.) The German capital city from the late 19th century to the end of WW II, a divided metropolitan area during the Cold War, a peninsula of High German stretching into Low German territory, and the home of thousands of permanent “guest workers” and their families, Berlin as a sociolinguistic paradise. Seminar on the socio-linguistic problems of present-day Berlin, focusing on individual research projects.

2-4 units, Spr (Robinson)

166B. Women, Literature, and Transitions in Germany — (Same as German Studies 166B.) The emergence of new types of women’s writing which challenge social and political tradition and established literary practices and discourses. Topics: turn-of-the-century social and political discourse of the women’s movement and women’s literature, new worlds opening between the two world wars, women under National Socialism, poetic subject and women’s perspective in post-WW II literature, influence of feminism after 1968, effects of German unification and the backlash. Language credit for advanced German students. DR:8(3)

4 units, Aut (Hörnigk)

166X. The Economics of Europe — (Same as Economics 166X; also listed as International Relations Cluster C.) Western European economic development in the second half of the 20th century: recoveries from stagnation, shocks, and collapses in the first half of the century; the parallel emergence of the Europeanist movement; economic stagnation after 1975 with a widening of the technical-economic gap with the U.S. and Japan; and attempts in the 1980s and 90s to deal with these events. The impact of German unification on European economic prospects. Emphasis on concepts and facts. DR:9(5)

5 units, Aut (Howell)

177A. Culture and Politics in Modern Germany — (Same as German Studies 177A; also listed as International Relations Cluster B.) Key paradigms of modern Germany: German romanticism, the belated state and national identity, National Socialism and the Holocaust, Germany divided and unified. Literary, analytical, and theoretical texts; newspaper articles; film/TV, oral history. DR:9(5)

4-5 units, Win (Kramer)

177B. Nationalism and Political Culture in Contemporary Germany — (Same as German Studies 177B; History 228V, Political Science 116X; also listed as International Relations Cluster A.) Contemporary political discourse in Germany against the backdrop of the historical legacies of nationalism, militarism, and anti-Semitism. The emergence and historical permutations of these phenomena in the Weimar Republic, the Third Reich, and the two postwar German states, exploring stated and unstated traces of the legacies in contemporary political culture. Language credit for advanced German students. DR:9(5)

4 units, Spr (Tempel)

179B. Split Images: Post-War German Cinema — (Same as German Studies 179B; also listed as International Relations Cluster B.) New German
film cultures in the postwar period. Critical tools of film literacy and political and aesthetic representations of two cultures. Contemporary trends in cinema, including participation in the Berlin Film Festival. DR:7(2)

4 units, Aut (Kramer)

GERMAN LANGUAGE PROGRAM

2B. Special Intensive German — (Same as German Studies 2B.) Designed for students in technical or scientific majors with only 1 unit of German.

10 units, Aut (Staff)

3B. German Language and Culture — (Same as German Studies 3B.) Grammar, composition, and conversation. Designed to increase students' fluency in German language as rapidly as possible and to help them take advantage of the many opportunities in Berlin. Corequisite: German Studies 100B.

4 units, Aut, (Friesel-Kopecki)

Win (Staff)

Spr (Wohlfeil)

22B. Intermediate German — (Same as German Studies 22B.) For students who wish to improve their knowledge of the German language and begin reading texts in history, literature, politics, and economics.

4 units, Aut, Win (Wohlfeil)

Spr (Friesel-Kopecki)

100B. Aktives Deutsch — (Same as German Studies 100B.) Active usage of German including vocabulary from variety of fields and disciplines and discussion on current issues. Required for students enrolled in German Studies 3B; open to students in other German language classes

2 units, Aut (Koch)

Win (Biege)

Spr (Staff)

101B. Advanced German — (Same as German Studies 101B.) For advanced students who wish to expand their knowledge of the German language and become more familiar with the finer points of German grammar and style. See German Studies 166B and 177B for Autumn and Spring Advanced German.

4 units, Win (Friesel-Kopecki)

ON VIDEOTAPE

See the “School of Engineering” section of this bulletin for course descriptions.

50. Introductory Science of Materials — (Same as Engineering 50.) DR:6(8)

3 units, Aut, Win, Spr

40. Introductory Electronics — (Same as Engineering 40.) DR:6(8)

5 units, Aut, Win, Spr

52. Realism, Utopia, Myth, and Society in Italian Cinema: Bernardo Bertolucci, Pier Paolo Pasolini, and Federico Fellini — (Same as Communication 52, Italian 190F.) Major films in the careers of Bertolucci, Pasolini, and Fellini are used to assess ways in which realism, myth, utopia, and society are theorized and problematized. Topics: ideology and representation, class and specificity of intellectual labor, canonicity, creation of personal mythology of imagination, and memory and reality. DR:7(2)

5 units, Win (Campani)
ITALIAN LANGUAGE PROGRAM

215V. The Scientific Revolution: From the Renaissance to the 18th Century — (Same as History 215V, Philosophy 145P.) Focuses on crucial changes in man’s view of nature and himself, ca. 1400 to 1750. The interplay between ideas and the ways of thinking across disciplinary boundaries. Scientific developments as major intellectual changes. Topics: Renaissance man, the new attitude toward machines and technology, the birth of a new physics, medicine and natural history, the artist and the scientist.

4-5 units, Win (La Vergata)

234V. Rebellion and Renewal: The Italian Renaissance — (Same as History 234V.) The Italian Renaissance as a transition from rural to urban, from tradition to innovation, from cosmology to individualism, and from religion to politics. Readings: Boccaccio, Machiavelli, Pico della Mirandola, and Leonardo da Vinci. The decline of the Renaissance and the depth of its cultural legacy. DR:8(3)

4-5 units, Aut (Biocca)

ITALIAN LANGUAGE PROGRAM

20F. Second-Year Italian, First Quarter — (Same as Italian 20F.)

5 units, Aut, Win (Staff)

24F. Second-Year Italian, Second Quarter — (Same as Italian 24F.)

5 units, Aut, Win (Staff)

98F. Intensive Italian — (Same as Italian 98F.) Required of all students wishing to attend courses at the University of Florence (UF). Facilitates immersion into UF and includes relevant information regarding the Italian university system. Only students who pass the proficiency exam are admitted to the UF.

2 units, Aut (Staff)

110F. Advanced Grammar and Composition — (Same as Italian 110F.)

4 units, Aut (Staff)

111F. Advanced Grammar and Composition — (Same as Italian 111F.)

4 units, Win (Staff)
21. Research Project — Independent research projects on significant aspects of Japanese culture or society, and compiled in a format suitable for inclusion on the center’s on-line World Wide Web server. Prerequisite: Overseas Studies class on creating pages for the World Wide Web or equivalent.

2 units, Spr (MacDougall)

121X. Economics and Business in Japan — (Same as Economics 121X; also listed as International Relations Cluster C.) Introduction to the operation and management of the Japanese economy. Unusual features of Japanese economy (the main bank system, lifetime employment, and keiretsu); comparison with Western economies. Topics: economic growth, the savings rate, financial institutions, corporate and international finance, labor markets, corporate adjustment and assistance, foreign investment, international trade, and international economic conflicts. The role of labor markets and the structure of the firm.

4-5 units, Spr (McKenzie)

198K. Japanese Technology Management: Technology and Innovation in Electrical and Electronic Engineering — (Same as Engineering 198K.) Focuses on issues and processes of technological innovation, employing a case study method of analysis and meetings with technologists and other leaders of Kansai area companies. Required field trips.

3 units, Spr (Staff)

215X. The Political Economy of Japan: Critical Issues in Contemporary Japanese Politics and Foreign Affairs — (Same as Political Science 215X; also listed as International Relations Cluster C.) Institutions and processes in the political organization of economic activity in modern Japan. The interaction of public and private sector institutions in the growth of Japan’s postwar economy. Organization and workings of key economic ministries and agencies of the government, private sector business groupings, government interaction and public policy making. The transformation of Japanese industrial policy from the rapid growth of heavy and chemical industries to the promotion of high technology and communications industries. International, political, and economic ramifications of the structure and importance of Japanese capitalism. DR:9(5)

4-5 units, Spr (MacDougall)

JAPANESE LANGUAGE PROGRAM

3K. First-Year Modern Japanese — (Same as Asian Languages/Japanese 3K.)

5 units, Spr (Fujiiwara, Ueda)

21K. Second-Year Modern Japanese, First Quarter — (Same as Asian Languages/Japanese 21K.)

5 units, Spr (Uemiya)

23K. Second-Year Modern Japanese, Third Quarter — (Same as Asian Languages/Japanese 23K.)

5 units, Spr (Yamaoka)

100K. Advanced Japanese — (Same as Asian Languages/Japanese 100K.)

5 units, Spr (Hotta)

ON VIDEOTAPE

See the “School of Engineering” section of this bulletin for course descriptions.

40. Introductory Electronics — (Same as Engineering 40.) DR:6(8)

5 units, Aut, Win, Spr

50. Introductory Science of Materials — (Same as Engineering 50.) DR:6(8)

3 units, Aut, Win, Spr

113. Electronic Circuits — (Same as Electrical Engineering 113.)

3 units, Aut, Win, Spr

182. Computer Organization — (Same as Electrical Engineering 182.)

3 units, Aut, Win, Spr

MOSCOW

15. Academic Internship — Placements in, e.g., journalism, publishing, American and joint firms, museums, and technology. An introduction to Russian society and work experience. Regular meetings with a mentor to develop an in-depth evaluation of observations. Findings and analysis are summarized in an academic paper.

5 units, Win (Bratersky)

16. Tutorial — Meet with tutors individually or in very small groups on chosen topic.

3-5 units, Win (Bratersky)

17. Contemporary Issues of Russian Society — Forum addresses major issues of Russian society today. Problems facing an individual in Russia, issues confronting Russia, issues confronting Russian society, and the main aspects of multiple crises evolving after the collapse of the Soviet Union on post-Soviet space. Prerequisite: some background in Russian studies.

4 units, Win (Bratersky)

113W. Sociology and Social Psychology of Modern Russian Society — (Same as Psychology 129P, Sociology 113W.) Focuses on the social and psychological processes that are an integral part of the Russian mentality by surveying issues in Russian contemporary life. Topics: the sociology of enterprise, political life, everyday culture, business negotiation, and science and education.

5 units, Aut (Yurevitch)

119X. Russian Politics — (Same as Political Science 119X; also listed as International Relations Cluster A.) Introduces the political, cultural, social,
and historical background of Russian domestic life and foreign politics, the major issues in Russian political life, and political forces currently playing a role in the Russian arena. The origin of major interest groups and political concepts affecting the struggle in Russia. The inter-relationship among politics, economic issues, ethnic-territorial problems, and security matters in Russia itself, in the countries of the former Soviet Union, and on an international level. DR:9(5)

5 units, Aut (Bratersky)

121V. Russia in the Age of Nobility 1700-1840: State, Society, and Culture — (Same as History 121V; also listed as International Relations Cluster B.) Insight into a period of Russian history and culture where Russians produced achievements in literature and the arts, but failed to resolve the social and institutional problems created by rapid transformation. Reforms of Peter the Great through the Slavophile-Westernisers controversy established the paradigms of Russia’s historic development and raised issues still determining the intellectual agenda today. DR:9(5)

5 units, Aut (Zorin)

125X. Russian Economy: Past Experience, Current Reform, and Prospects — (Same as Economics 125X; also listed as International Relations Cluster C.) The Russian economy before October 1917, special features of Russian capitalism, and the main reasons for the October revolution. Analysis of the Soviet economy and the principals of central planning.

5 units, Aut (Panova)

RUSSIAN LANGUAGE PROGRAM

51M. Second-Year Russian I — (Same as Slavic Languages 51M.)
6 units, Aut (Kuznetsova)

53M. Second-Year Russian II — (Same as Slavic Languages 53M.)
6 units, Win (Kuznetsova)

111M. Third-Year Russian I — (Same as Slavic Languages 111M.)
6 units, Aut (Boldyreva)

113M. Third-Year Russian II — (Same as Slavic Languages 113M.)
6 units, Win (Boldyreva)

177M. Fourth-Year Russian I — (Same as Slavic Languages 177M.)
6 units, Aut (Grinyuk)

179M. Fourth-Year Russian II — (Same as Slavic Languages 179M.)
6 units, Win (Grinyuk)

OXFORD

36. From Decolonization to Democratization, 1965-1995: Britain and Africa in the Post-Colonial Era — Starting from Harold Macmillan’s “wind of change,” Britain’s relations with her former African colonies and on the evolving role of the Commonwealth. Wider international issues as they relate to Africa. Defining features of the postcolonial African continent such as military coups, internal conflict and external intervention, regional cooperation, aid, and the democratization movement.

4 units, Win (Kirk-Greene)

37. Fiction and English Society — Connections between English history and literature. Major English novels from the 18th to the 20th century. Novels as literary works, and the ways they illuminate the history of England itself.

5 units, Spr (Stansky)

92Z. Poetic Appreciation: The 20th Century — (Same as English 92Z.) Open only to students majoring in English. Critical appreciation of poetry through a close study of the works of selected 20th-century British and Irish poets: Yeats, Hardy, Owen, Eliot, Auden, and Larkin.

5 units, Win (Wordsworth)

111X. Race and Ethnicity in Modern Britain — (Same as Political Science 111X, Sociology 145X; also listed as International Relations Cluster B.) A history of immigration and the settlement of ethnic minority groups in Britain: work, discrimination, attempts to achieve economic opportunity and equality. Synthesis between W. Indian, Asian, African, and traditional English cultures. DR:9(5)

3 units, Spr (Lustgarten)

114Z. English Literature 1509-1642 — (Same as English 114Z.) Open only to students majoring in English and related subjects. Taught jointly for Stanford students and second-year St. Catherine’s undergraduates. English literature from the beginning of Henry VIII’s reign to the onset of the Civil War, excluding Shakespeare. The poetry, prose, and drama of the period is placed in its literary, cultural, and historical contexts, and key texts are read closely.

5 units, Aut (Gearin-Tosh)

116Z. English Literature 1642-1740 — (Same as English 116Z.) Open only to students majoring in English and related subjects. Taught jointly for Stanford students and second-year St. Catherine’s undergraduates. English literature from the Civil War to the middle of the 18th century. The poetry, prose, and drama of the period is placed in its literary, cultural, and historical contexts, and key texts are read closely.

5 units, Win (Gearin-Tosh)

117W. Social Change in Modern Britain — (Same as Sociology 117W.) Changes in the social institutions, attitudes, and values in Britain over the past 20 years. Social changes occurring as a consequence of the Thatcher years of government. Changes to the British economy, Welfare State, National
The legacy of imperialism and decolonization to the modern world. DR:9(5)

imperialism in different parts of the “Third World.”
decolonization after WW II. The effects of western its zenith in the late 19th century to the era of
political Science 148X; also listed as International World,
1870-1970-(Same as History 141V, Po-
development economics. Prerequisite: Economics 1 or
presents the historical evolution from colonial to devel-
tures complement lecture-discussions on the
International Relations Cluster C.) Small group
nomics—(Same as Economics 132X; also listed as
European Community from an empirical perspec-
ture. The poetry, prose, and drama of the period is
undergraduates. Survey of English romantic litera-
(English major Area:H) DR:7(2)

5 units, Win (Forder)

122X. Thatcherism — (Same as Political Science 122X). “Thatcherism,” a political-economic approach to the secular decline of England as a world power and to the crisis that beset England in the 1970s and 80s, in the context of post-WW II English history and the relationship between the state, the economy, and society. Guest lectures. DR:9(5)
units by arrangement, Win (Manley)

123X. Economics of European Integration — (Same as Economics 123X.) The economics of the European Community from an empirical perspective. Key areas: the Common Agricultural Policy, European trade policy, the Single Market, the European Monetary System and the prospects for monetary union, the Maastricht Treaty, relations with eastern Europe, and current British attitudes to integration.
5 units, Win (Forder)

132X. Oxford Economists and Development Economics — (Same as Economics 132X; also listed as International Relations Cluster C.) Small group tutorials complement lecture-discussions on the problems of economic development in poor countries. Reconsideration of the development thought of five economists associated with Oxford (Smith, Myint, Hicks, Little, Sen) whose thinking represents the historical evolution from colonial to development economics. Prerequisite: Economics 1 or equivalent.
5 units, Aut (Meier)

141V. European Imperialism and the Third World, 1870-1970—(Same as History 141V, Political Science 148X; also listed as International Relations Cluster A.) European imperialism from its zenith in the late 19th century to the era of decolonization after WW II. The effects of western imperialism in different parts of the “Third World.” The legacy of imperialism and decolonization to the modern world. DR:9(5)
5 units, Spr (Darwin)

143X. British Post-War Cinema: Between Reality and Fantasy — (Same as Communication 143X,) British cinema between peaks of confidence in the late 40s and the 60s, tracing an underlying dialogue between realism and fantasy. The relationship between “industry” and “authorship” as these apply to the relatively small scale of British filmmaking. Films include: A Matter of Life and Death, Kind Hearts and Coronets, The Man in the White Suit, The Sporting Life.
4 units, Aut (Christie)

146V. African History through the African Novel: Tropical Africa 1914-1994—(Same as History 146V, English 189Y; also listed as International Relations Cluster B.) Analysis from historical texts of selected themes in the modern history of tropical Africa, c. 1900-1970, and how these topics have been portrayed in the African novels. DR:2(*) or 9(5*)
5 units, Aut (Kirk-Greene)

147X. European Integration — (Same as Political Science 147X; also listed as International Relations Clusters A and C.) Themes: the institutional arrangements that have been made and how industry and citizens adapt. National sovereignty, political and human rights, social welfare, increased competitiveness in a world of rapid technological and political change. The effects of the dissolution of the Soviet Union on Europe’s changing political and security interests. DR:9(5)
4-5 units, Win (Thomas)

148Z. Modern Drama and its Roots — (Same as English 148Z, Drama 158M.) The thread of continuity between ancient Greek plays and later drama. The genres of tragedy and comedy. Political theater, including feminist theater, with its beginnings in the Greeks. Attendance of four plays during the quarter. (English major Area:H) DR:7(2)
4 units, Spr (Mateer)

150Z. Poetic Appreciation: The 19th Century — (Same as English 150Z.) Open only to students majoring in English. Critical appreciation of poetry through a close study of the works of selected 19th-century British poets, from Tennyson to Yeats.
3 units, Aut (Wordsworth)

154Z. English Literature 1740-1832 — (Same as English 154Z.) Open only to students majoring in English and related subjects. Taught jointly for Stanford students and second-year St. Catherine’s undergraduates. Survey of English romantic literature. The poetry, prose, and drama of the period is placed in its literary, cultural, and historical contexts, and key texts are read closely.
3 units, Spr (Wordsworth)

164X. Europe in the World Economy — (Same as Economics 164X; also listed as International Relations Cluster C.) The roles of Britain, the European Union, and Eastern European transition economies
in the world economy. Emphasis on international trade, trade policy, international capital movements, and balance of payments policy. Prerequisite: Economics 1 or equivalent.

5 units, Aut (Meier)

168X. The Economic Organization of Science and Technology in the West Since 1600 — (Same as Economics 168X.) Comparative institutional analysis of the historical emergence and development of three modes of organizing scientific pursuit of knowledge. The underlying economic logic of salient institutional features and social norms of modern, autonomous, "open" science communities. The differentiation from modes of organization associated with proprietary and state-controlled scientific activity. The implications of different institutional structures and their interactions for efficiency of research resource allocation.

5 units, Spr (David)

171X. Constitutional Law in Britain — (Same as Political Science 171X.) The historical foundations of constitutional law in Britain and its philosophical framework; comparisons with the constitutional law of other countries where appropriate. Lectures analyze the main features of the British constitution, the Cabinet government, the role of Parliament, the question of sovereignty, the nature of the judiciary, civil rights, and the implications of membership of the EC. DR:9(5)

5 units, Aut (Getzler)

173X,Y,Z. Shakespeare — (Same as English 173X,Y,Z.) Open only to students majoring in Drama, English, and related subjects. Taught jointly for Stanford students and second-year St. Catherine's undergraduates. A study of the complete dramatic oeuvre of Shakespeare. Focus is on the sources of the plays, historical and dramatic content, and use of language.

173X. The Comedies
5 units, Aut (Gearin-Tosh)

173Y. The Tragedies
5 units, Win (Gearin-Tosh)

173Z. The Late and Problem Plays
5 units, Spr (Gearin-Tosh)

221Y. Art and Society in Britain — (Same as Art 221Y, History 244V.) Themes in late 19th- and early 20th-century British art. Painting, sculpture, architecture, and design compared to the British experience and that of the continent of Europe and the U.S. Problems relating to the role of art and the artist in modern society. Prerequisite: Art 120Y or equivalent. DR:7(2)

5 units, Win (Tyack)

242Z. Britain and Ireland in Europe: 1450-1650 — (Same as History 242Z.) Highlights the political, social, and cultural interaction between early modern Europe and the British Isles. Aim to break down barriers between British and continental history and between political and non-political issues.

5 units, Win (Redworth)

243V. Urban History in Britain, 1500 to the 20th Century — (Same as History 243V, Urban Studies 146U.) The development of Britain's towns and cities: the physical growth, why towns grew at different periods, the effect of Britain's changing economy over past 200 years, housing and community problems, and contemporary urban problems. DR:9(5)

4 units, Aut (Tyack)

254Z. Drama in Britain Today — (Same as English 254Z, Drama 158D.) The classics of world drama and some contemporary plays. The meanings of the works and the theatrical techniques used to complete them on stage. Weekly visits to the theater. DR:7(2)

4 units, Aut (Mateer)

PARIS


4 units, Win (Georgel)

111. Health Systems and Health Insurance: France and the U.S. — A Comparison — (Same as Public Policy 111, Human Biology 153X.) Health systems respond to the health needs of a given population. Must they be organized, or left to the free play of the market? What is the role of the state in the delivery of health care? Focus is on the evolution of the health profession in France and the U.S. Developments in health policy and reform. The Clinton health reform, the Oregon plan, measures restraining professional autonomy such as prescription guidelines in the French Medical Convention between doctors and the state. Is the solution the increase of health expenditures and reduced access to health care the end of autonomy for the medical profession?

4 units, Win (Giraud)

120X. French Painting from 1780-1900 — (Same as Art 120X.) Changes in artistic aims throughout the period, the use of perspective and its significance, and the relation to 18th-century society. Field trips to museums holding paintings of David, Daumier, Degas, Delacroix, Courbet, Ingres, Manet, and others. DR:7(2)

4 units, Win (Halevi)

121X. The Left in Europe — (Same as Political Science 121X, Sociology 115W; also listed as International Relations Cluster A.) Left and Right are the two most important categories of European political
127P. Humanities Seminar, Part 1: Theater in Paris — (Same as French 127P.) First of a series on the French theatrical tradition, providing a historical background with which to consider French drama. The emergence of the theater in the Middle Ages, its evolution from the 16th to 20th centuries, and its manifestations in contemporary France. Theatrical genres (e.g., children’s theater, theater of the absurd, techniques of performance). (In English)
4 units, Win (Lazar)

128P. Humanities Seminar, Part 2: Theater in Paris — (Same as French 128P.) Second of series, providing a “focus” for the development of research initiated in 127P. Students explore their topic by visiting relevant Parisian playhouses, reading appropriate secondary materials, and attending performances. Draft paper for group discussion; 10-12 pg. research paper. (In English)
3 units, Win (Cazelles)

131X. New Factors in World Affairs as Challenges to Foreign Policy: The Case of French-African Relationship — (Same as Political Science 131X.) Global interdependence, military, diplomatic, economic, humanitarian, religious, and cultural issues are linked, as are domestic and external fields. The postcolonial link between France and Africa. The role of French firms in Africa, Islam in France, migrations, NGOs, smuggling, etc. in the French-African relationship. This test case illuminates one of the theoretical stalemates of today’s world politics.
4-5 units, Aut (Charillon)

134P. 19th-Century Paris: Children of Paradise — (Same as French 134P.) Marcel Carné’s film Children of Paradise (1945) serves as the basis for an examination of life in 19th-century Paris. Topics in Carné’s movie encourage an assessment of the interest of the film as a document of cultural and cinematographic value. In French. DR:7(2)
5 units, Aut (Cazelles)

Discussion, site visits, readings, and essays on contemporary city life. DR:7(2)
4-5 units, Aut (Shapiro-Comte)

194P. Monstrosity in French Culture — (Same as French 194P.) The representation of otherness and anomaly in French literature, art, and science. The significance of monstrosity as an epistemological category that informs a specific and changing approach to knowledge and science according to periods and generations. Monstrosity’s origins in the medieval tradition, and primarily biological (17th and 18th centuries), ethical (19th century), and aesthetical (20th century) significances. In English. DR:7(2)
4 units, Win (Cazelles)

211X. Political Attitudes and Behavior in Contemporary France — (Same as Political Science 211X.) The institutions of the Fifth Republic, the main political forces and their evolution. Electoral behavior, taking into account other forms of political action such as the demonstrations for the defense of schools (1984) and the “lycee” students (1990), or the protest that followed the desecration of the Jewish cemetery in Carpentras. Attitudes and values are linked to voting choice. DR:9(5)
4-5 units, Aut (Mayer)

230V. Social History of Modern France — (Same as History 230V.) Seminar on the social underpinnings of the transformation of modern France. Economic and social change with regard to long-term historical trends from the perspective of social actors. Topics: structure of the labor force, women’s role in economy and society, demographic questions, immigration since the turn of century, Jewish experience in France, colonialism and the social impact of decolonization. DR:9(5)
3 units, Win (N. Green)

284P. Love: A Comparative Study in Classic and Modern French Novels — (Same as French 284P.) French novels, 17th-20th century, where the theme of love plays an important role (la Princesse de Clèves, Manon Lescaut, les Secrets de la Princesse de Cadignan, la Chartreuse de Parme, A l’ombre de jeunes filles en fleur, Belle du Seigneur, l’Amant). Emergence of love, confession, death as dénouement, and narrative variants (form of narrative, the narrative statement and point of view). The evolution of French culture and sensibility. In French and English
4 units, Aut (Ottenwaelder)

FRENCH LANGUAGE PROGRAM

21P. Intermediate French I — (Same as French 21P.)
5 units, Aut, Win (P. Green)

23P. Intermediate French II — (Same as French 23P.)
5 units, Aut, Win (Grée)
problems. Consequences of human action on the
tion of the landscape), all closely linked to social
tion, over-exploitation of resources, and deteriora-
ies 122X.) Problems in rural and urban areas (pollu-
Biology 106H, Biology 106Z, Latin American Stud-
27. Research Seminar: Women in Latin Ameri-
5 units, Win (Hurtado)
118X. Cultural Modernization: The Case of
Chile — (Same as Latin American Studies 118X.)
Cultural changes that have taken place in Chile
under conditions of economic liberalization and
political democratization at all three levels of cul-
ture: elite, mass-media, and popular or folk. The
reception of cultural meanings from the world so-
cial system (the U.S., EU, and Japan), its reformu-
lation to respond to local conditions, and its export
under the shape of cultural artifacts that can be
understood by the non-Latin American members.
Innovative elements rooted in the regional-local
culture.
5 units, Win (Fuenzalida)
120X. Modernization and Culture in Latin
America — (Same as Latin American Studies 120X,
Anthropology 104X, Spanish 290Z; also listed as
International Relations Cluster B.) The intellectual
and cultural expressions of Latin America against
the background of modernization. Latin American
modernization as a constant tension between: ratio-
nalization and subjedification, change and identity
preservation, and the logic of economic develop-
ment and the logic of the culture. DR:9(5)
5 units, Aut (Subercaseaux)
121X. Latin America: Democracy in the South-
ern Cone — (Same as Latin American Studies 121X.)
The contemporary politics of Southern Cone coun-
ctries. Conceptual schemes developed in the litera-
ture on democratic transitions. External factors and
constraints, the political economy of neo-literalism;
the changing role of the State civil-military rela-
tions; the impact of presidentialism on political
stable.
5 units, Aut (Rehren)
130X. Latin American Economies in Transi-
tion — (Same as Latin American Studies 130X, Eco-
nomics 165X.) Introduction to main debates and
approaches developed to understand and analyze
the economies of Latin America. Recent processes
of transition to market economies. Common charac-
teristics among countries of region; the differences
and special traits of individual countries. Historical,
analytical, and empirical perspectives on topics at
the center of controversies and specific policy problems over several decades.

5 units, Aut (Munoz)

158S. Theater and Society — (Same as Drama 158S, Latin American Studies 127X.) The creation, production, and communication of Chilean theater in its correspondence and enlightenment of Chile's and Latin America's economic, political, cultural, and social changes during the last three decades. Theater in its institutional organization, its ways of elaborating an aesthetic "language" as a form of knowledge and expression of reality, and its affect on theater audiences and cultural life in the whole. The ways theater reconstructs and interprets cultural heritage and how it activates critical thought and new perceptions in the context of different cultural climates and dominant projects of life and development.

5 units, Aut (Hurtado)

162X. Core Seminar: Ecology-Policy Studies — (Same as Latin American Studies 162X.) Provides students the intellectual depth and background to carry on research in the field and exposes them to the environment of functioning research groups.

5 units, Win (Hajek)

163X. Latin America in the International Economy — (Same as Economics 163X, Latin American Studies 116X.) Features of external economic relations of Latin American countries. Similarities and differences among countries, focusing on the last 15 years. Analytical and empirical elements for interpretation of policies and outcome in this period. Trade, external debt, capital flows, and the inter-relationships between domestic economy and overall growth.

5 units, Win (Ffrench-Davis)

SPANISH LANGUAGE PROGRAM

11. Oral and Written Spanish for Foreigners: Level I — (Same as Spanish 11.) Instituto de Letras, Catholic University of Chile.

5 units, Aut, Win (Staff)

12. Oral and Written Spanish for Foreigners: Level II — (Same as Spanish 12.) Instituto de Letras, Catholic University of Chile.

5 units, Aut, Win (Staff)

201. Oral and Written Spanish for Foreigners: Level III — (Same as Spanish 201.) Instituto de Letras, Catholic University of Chile.

5 units, Aut, Win (Staff)

PHILOSOPHY

Emeriti: (Professors): Stuart Hampshire, Georg Kreisel, David S. Nivison, Patrick Suppes, James O. Urmson

Chair: Fred Dretske

Director of Undergraduate Study: Marleen Rozemond

Professors: Michael Bratman, Fred Dretske, John Dupré, John Etchemendy, Solomon Feferman (on leave), Dagfinn Føllesdal (Spring), Wilbur Knorr, Grigori Mints, Julius Moravcsik, John Perry, Johan van Benthem (Spring), Thomas Wasow

Associate Professors: Eckart Förster, Kenneth Taylor

Assistant Professors: Rachel Cohon (on leave Autumn), Peter Godfrey-Smith, Yair Guttman, Philip J. Ivanhoe (on leave), Philip Kremer, Ariela Lazar, Marleen Rozemond, Debra Satz

Courtesy Professor: Denis Phillips

Lecturer: Brad Wilburn

Consulting Associate Professors: David Israel, C. Raymond Perrault, Brian Smith

Visiting Professors: Rosalind Hursthouse (Winter), Robert Kraut

Visiting Associate Professor: Christopher Shields (Autumn)

Visiting Assistant Professor: Houston Smit

Acting Instructors: Amir Alexander, Avram Faderman, Todd Franklin, Martin Gammon, Scott Gravlec, Jonathan Kaplan, Stephen Käufel

Philosophy concerns itself with fundamental problems. Some are abstract and deal with the nature of truth, justice, value, and knowledge; others are more concrete and their study may help guide our conduct or enhance our understanding of other subjects. In addition, philosophy examines the efforts of past thinkers to understand the world and our experience of it.

Although it may appear to be an assortment of different disciplines, there are features common to all philosophical enquiry. These include an emphasis on methods of reasoning and the way in which our judgments are formed, on criticizing and organizing our beliefs, and on the nature and role of fundamental concepts.

Students of almost any discipline can find something in philosophy which is relevant to their own specialties. In the sciences, it provides a framework within which the foundations and scope of a scientific theory can be studied, and it may even suggest directions for future development. Since philosophical ideas have had an important influence on human endeavors of all kinds — artistic, political, even economic — students of the humanities will find their understanding deepened by some acquaintance with philosophy.

Philosophy is an excellent major for those planning a career in law, medicine, or business. It provides analytical skills and a breadth of perspective helpful to those called upon to make decisions about their own conduct and the welfare of others. Philosophy majors who have care-
fully planned their undergraduate program have
an excellent record of admission to professional
and graduate schools.

The Special Program in the History and Phil-
osophy of Science enables students to combine
interests in science, history, and philosophy. Stu-
dents 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 dis-
cussion of philosophical issues and reading of
papers by students, faculty, and visitors. These
associations elect student representatives to de-
partment meetings.

UNDERGRADUATE
PROGRAMS

BACHELOR OF ARTS

There are two ways of majoring in philoso-
phy: the “General Program” and the “Special
Program in the History and Philosophy of Sci-
ence.” A student completing either of these re-
ceives 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 de-
partment strongly urges proficiency in at least
one foreign language.

GENERAL PROGRAM

1. Course requirements, minimum 55 units:
   a) Preparation for the major: an introductory
course (under 100) and 80.
   b) The core: 24 additional philosophy units as
      follows.
         1) Logic: one from 57, 159, 160A, 169
         2) Philosophy of Science: any course from
            60, 61, 156, 163-168
         3) Moral and Political Philosophy: one from
            170-173
         4) Metaphysics and Epistemology: one from
            180-188
         5) History of Philosophy: two history of
            philosophy courses numbered 100 or
            above.
   c) One undergraduate philosophy seminar from
      the 194 series.
   d) Electives: courses numbered 10 or above,
      at least 13 units of which must be in courses
      numbered above 99.
2. Units for Tutorial or Directed Reading (Phi-
   losophy 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 Di-
   rector of Undergraduate Studies, in writing,
at the time of declaring a major. In general,
transfer courses cannot be used to satisfy the
five area requirements or the undergraduate
seminar requirement.

SPECIAL PROGRAM IN HISTORY
AND PHILOSOPHY OF SCIENCE

Undergraduates may major in Philosophy with
a degree field in History and Philosophy of Sci-
ence under the Department of Philosophy. Each
participating student is assigned an adviser who
approves the course of study. A total of 61 units
are required for the sub-major, to be taken ac-
cording to requirements 1 through 5 below. Sub-
titutions for the listed courses are allowed only
by written consent of the undergraduate adviser
for History and Philosophy of Science. Students
are encouraged to consider doing honors work
with an emphasis on the history and philosophy
of science. Interested students should see the
description of the honors thesis in Philosophy
and consult their advisers for further informa-
tion.

1. Three science courses (for example, physics,
chemistry, biology) for 12 units.
2. The following core courses must be completed
with a letter grade by the end of the junior year:
   a) Philosophy: one from 57, 159, 160A, 169
   b) Philosophy 60
   c) Philosophy 80
3. Three history of science courses.
4. Three philosophy of science courses, of which
   one must be Philosophy 164.
5. Three additional courses related to the major,
in philosophy or history, to be agreed on by
the adviser.
6. At least six courses in the major must be com-
pleted at Stanford with a letter grade. Units
for Tutorial or Directed Reading (196, 197)
may not be counted in the requirement. No more
than 10 units completed with grades of “Satis-
factory” may be counted in the requirement.
7. Transfer units must be approved in writing by
the Director of Undergraduate Study at the time
of declaring a major. Transfer courses are
strictly limited when used to satisfy major re-
quirements.

HONORS PROGRAM

Students who wish to undertake a more inten-
sive and extensive program of study, including
seminars and independent work, are invited to
apply for the honors program during Winter Qua-
ter of the junior year. Admission is selective on
the basis of letter grade indicator (LGI), demon-
strated ability in philosophy, and progress towards satisfying the requirements of the major.

With their application, candidates should submit an intended plan of study for the remainder of the junior year and the senior year. It should include at least 5 units of Senior Tutorial (196) during Autumn and/or Winter Quarters of the senior year. In the quarter preceding the tutorial, students should submit an essay proposal to the Philosophy Undergraduate Director and determine an adviser.

In the senior tutorial, students write an essay on some philosophical problem. This essay is usually about 7,500 words for those taking one quarter of the tutorial, and about 12,500 for those taking two quarters of the tutorial. Length may vary considerably depending on the problem and the approach. The tutorial essay may use work in previous seminars and courses as a starting point.

A completed draft of the essay is submitted to the adviser at the end of the Winter Quarter. If rewriting is necessary, the student may enroll in 2 units of the Spring Quarter senior tutorial. Three copies of the essay must be given to the department by the end of the fifth full week of the Spring Quarter.

The honors tutorials represent units in addition to the 55-unit requirement.

The Department of Philosophy cooperates with the honors component of the “Humanities Special Program” as described in that section of this bulletin.

JOINT MAJOR IN PHILOSOPHY AND RELIGIOUS STUDIES

The joint major in Philosophy and Religious Studies consists of 60 units of course work with approximately one third each in the philosophy core, the religious studies core, and either the general major or the special concentration.

No courses in either the philosophy or religious studies core may be taken Satisfactory/No Credit.

In general, transfer units cannot be used to satisfy the core requirements. Transfer units and substitutions must be approved by the director of undergraduate studies in the appropriate department.

CORE REQUIREMENTS

1. Philosophy courses:
   a) Philosophy 80
   b) 16 units, including at least one course from each of the following areas:
      1) Logic and philosophy of science: Philosophy 57, 60, 61, 156, 159, 160A, 162-169
      2) Ethics and value theory: Philosophy 170-173
      3) Epistemology, metaphysics, and philosophy of language: Philosophy 180-188
      4) History of philosophy: Philosophy 100-103

2. Religious Studies courses: 20 units, including at least two courses in diverse religious traditions (for example, an Eastern and a Western or a literate and a preliterate tradition) and including at least one seminar.

General Major Requirements — Five additional courses (approximately 20 units) divided between the two departments. No more than 5 of these units may come from courses numbered under 99 in either department. Each student must also take at least one undergraduate seminar in religious studies and one undergraduate seminar in philosophy.

Special Concentration — With the aid of an adviser, students pursue a specialized form of inquiry in which the combined departments have strength; for example, American philosophy and religious thought, philosophical and religious theories of human nature and action, philosophy of religion. Courses for this concentration must be approved in writing by the adviser.

Directed Reading and Satisfactory/No Credit Units — Units of directed reading for fulfilling requirements of the joint major are allowed only with special permission. No more than 10 units of work with a grade of “Satisfactory” count toward the joint major.

HONORS PROGRAM

Students pursuing a joint major in Philosophy and Religious Studies may also apply for honors by following the procedure for honors in either of the departments.

COTERMINAL DEGREE

It is possible to earn an A.M. in Philosophy while earning an A.B. or B.S. This can usually be done by the end of the fifth undergraduate year, although students whose degree is not in philosophy may require an additional year. Standards for admission to, and completion of, this program are the same as for A.M. applicants who already have the bachelor’s degree when matriculating. Applicants for the coterminal program are not, however, required to take the Graduate Record Exam. Information about application is available from the Graduate Degree Progress Section of the Registrar’s Office.

GRADUATE PROGRAMS

The department is prepared to direct and supervise individual study and research to supplement instruction offered in courses listed below. In addition, advanced seminars unlisted in the catalog are frequently organized in response to student interest. Candidates for advanced degrees
are urged to discuss their entire program of study with their department advisers as early as possible.

Applications to graduate programs in the Department of Philosophy can be obtained from Graduate Admissions, the Registrar's Office. Applicants must take the Graduate Record Examination by October of the year the application is submitted.

MASTER OF ARTS

Two programs lead to the A.M. in Philosophy. One is a general program providing a grounding in all branches of the subject. The other provides special training in one branch. A suitably qualified applicant may arrange a specialized program in any subject, analogous to those in the philosophy of science or philosophy of language described below, provided that the department offers sufficiently intensive teaching in the special subject.

Admissions—All prospective master's students, including those currently enrolled in other Stanford programs, must apply for admission to the program. The application deadline is April 1 of the academic year preceding entry into the program. In exceptional circumstances, consideration may be given to applications received after the April 1 deadline but before April 30. No fellowships are available. Entering students must meet with the director of the master's program and have their advisers' approval, in writing, of program proposals. The master's program should not be considered a stepping-stone to the doctoral program; these two programs are separate and distinct.

Unit Requirements—Each program requires a minimum of 36 units in philosophy, though students in a special program may be allowed or required to replace up to 9 units of philosophy by 9 units in the field of specialization. Although the requirements for the A.M. are designed so that a student with the equivalent of a strong undergraduate philosophy major at Stanford might complete them in one year, most students need longer. Students should also keep in mind that although 36 units is the minimum required by the University, quite often more units are necessary to complete department requirements. Up to 6 units of directed reading in philosophy may be allowed. There is no thesis requirement, but an optional master's thesis or project, upon faculty approval, may count as the equivalent of up to 8 units. A special program may require knowledge of a foreign language. At least 36 units must be completed with an LGI of 'B-' or better at Stanford. Students are reminded of the University requirements for advanced degrees, and particularly of the fact that for the A.M., students must complete three full quarters as measured by tuition payment.

GENERAL PROGRAM

The General Program requires a minimum of 36 units in Philosophy courses numbered above 99. Courses taken to satisfy the "undergraduate core" may not be counted in the 36 units. The requirement has three parts:

1. Undergraduate Core: students must have when they enter, or complete early in their program, the following undergraduate courses. (Students entering from other institutions should establish equivalent requirements with a master's adviser upon arrival or earlier):
   a) Logic 57, 159, or 160A
   b) Philosophy of science: any course from 60, 61, 163-168
   c) Moral and political philosophy: one from 170-173
   d) Metaphysics and epistemology: one from 170-173
   e) History of Philosophy: two history of philosophy courses numbered 100 or above

2. Graduate Core: students must take at least one course numbered over 105 from three of the following five areas (courses used to satisfy the undergraduate core cannot also be counted toward satisfaction of the graduate core).
   a) Logic and semantics
   b) Philosophy of science and history of science
   c) Ethics, value theory, and moral and political philosophy
   d) Metaphysics, epistemology, and philosophy of language
   e) History of Philosophy

3. Specialization: students must take at least three courses numbered over 105 in one of the five areas.

SPECIAL PROGRAM IN THE HISTORY AND/OR PHILOSOPHY OF SCIENCE

Only students with substantial preparation in philosophy or in the history of science in one of the natural or social sciences are admitted. Entering students whose primary preparation has been in science may be required to satisfy all or part of the undergraduate core requirement as described in the General Program. Students whose preparation has not been in science may be required to take additional science courses.
COURSE REQUIREMENTS

1. At least four courses in the Department of Philosophy in the history or philosophy of science. At least two of these must be graduate-level courses, or graduate sections of undergraduate courses, and at least one of the four must be in the philosophy of science and one in the history of science.

2. In most cases, one upper division or graduate course outside the Department of Philosophy in the natural or social sciences or in history.

3. Remaining courses are to be chosen in consultation with and approved by an adviser.

SPECIAL PROGRAM IN SYMBOLIC SYSTEMS

Students should have the equivalent of the Stanford undergraduate major in Symbolic Systems. Students who have a strong major in one of the basic SSP disciplines (philosophy, psychology, linguistics, computer science) may be admitted but are required to do a substantial part of the undergraduate SSP core in each of the other basic SSP fields. This must include the following three philosophy courses or their equivalents: (1) 80, (2) 160A, and (3) one from 181, 183, 184, 186. This work does not count towards the 36-unit requirement.

COURSE REQUIREMENTS

1. Four courses in philosophy at the graduate level, including courses from three of the following five areas:
   a) Philosophy of language
   b) Logic
   c) Philosophy of mind
   d) Metaphysics and epistemology
   e) Philosophy of science

At most two of the four courses may be graduate sections of undergraduate courses numbered 100 or higher.

2. Three courses numbered 100 or higher from outside Philosophy, chosen in consultation with an adviser. These courses should be from two of the following four areas:
   a) Psychology
   b) Linguistics
   c) Computer Science
   d) Education

Remaining courses are to be chosen in consultation with and approved by an adviser.

SPECIAL PROGRAM IN THE PHILOSOPHY OF LANGUAGE

Admission is limited to students with substantial preparation in philosophy or linguistics. Those whose primary preparation has been in linguistics may be required to satisfy all or part of the undergraduate core requirements as described in the General Program. Those whose preparation is primarily in philosophy may be required to take additional courses in linguistics.

COURSE REQUIREMENTS

1. Philosophy of language: two approved courses in the philosophy of language numbered 180 or higher.


3. Logic: at least two approved courses numbered 160A or higher.

4. An approved graduate-level course in mathematical linguistics or automata theory.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the Ph.D. degree (residence, dissertation, examination, etc.) are discussed in the “Graduate Degrees” section of this bulletin. The requirements detailed here are department requirements. There are six basic areas (Philosophy of Science, Ethics, Metaphysics and Epistemology, Philosophy of Language, Logic, and History) in which students should have proficiency in order to obtain a Ph.D. Demonstrating proficiency takes the form of course work, intensive seminars, and papers, as detailed below.

Students must have completed this work by the end of their second year and all courses must be passed with a 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 department requirements have been met.

PROFICIENCY REQUIREMENTS

1. Course requirements, to be completed during the first two years:
   a) Seven of the eight items listed below:
      1) Four “core” graduate courses and seminars, in philosophy of language (281); philosophy of mind, metaphysics, and epistemology (280); value theory (270); and philosophy of science (260). To enroll, the student must be a Ph.D. student in Philosophy or have special permission of the instructor.
      2) Three history courses, each consisting of an approved graduate-level course in the history of philosophy. The seven-out-of-eight requirement must include at least one history course in ancient philosophy, one in modern.
      3) Philosophy 160A
   b) Philosophy 159 or the equivalent.
c) Breadth requirement: a course in Eastern or Continental philosophy, or some other course establishing breadth.

d) A total of at least 39 units of course work in the Department of Philosophy, numbered above 110 but not including Teaching Methods (Philosophy 239). Units of Individual Directed Reading (Philosophy 240) may be included only with the explicit approval of the Director of Graduate Studies.

2. Teaching assistance: a minimum of four quarters of teaching assistance at 25 percent time, usually during the second and third years.

3. Candidacy: to continue in the Ph.D. program, each student must be approved for candidacy during the sixth academic quarter (normally the Spring Quarter of the student’s second year). Students may be approved for candidacy on a conditional basis if they have only one or two outstanding deficiencies, but are not officially advanced to candidacy until these deficiencies have been removed. Approval for candidacy indicates that in the department’s judgment the student can successfully complete the Ph.D. In reaching this judgment, the department considers the overall quality of the student’s work during the first six quarters and the student’s success in fulfilling course requirements.

4. During the third year of graduate study, and after advancement to candidacy, a Ph.D. student should successfully complete at least three graduate-level courses/seminars, at least two of which must be in philosophy. Courses required for candidacy are not counted toward satisfaction of this requirement. Choice of courses/seminars outside philosophy is determined in consultation with a student’s adviser.

5. During the summer of their second year, students are eligible to attend a Dissertation Development seminar given by the department.

6. Dissertation work and defense: the third and fourth (and sometimes fifth) years are devoted to dissertation work.

a) Dissertation Proposal: by Spring Quarter of the third year, students select a dissertation topic, a reading committee, and some possible thesis relative to that topic. The topic and thesis should be sketched in a proposal of three to five pages, plus an annotated bibliography indicating familiarity with the relevant literature. The proposal should be approved by the reading committee before the meeting on graduate student progress late in Spring Quarter.

b) Departmental Oral: during Autumn Quarter of the fourth year, students take an oral examination, called the “Departmental Oral,” based on at least 30 pages of written work, in addition to the proposal. The aim of the exam is to help the student arrive at an acceptable plan for the dissertation and to make sure that the student, thesis, topic, and adviser make a reasonable fit. In cases where such an exam is deemed inappropriate by the reading committee, the student may be exempted by filing a petition with the Director of Graduate Studies, signed by the student and the members of the reading committee.

c) University Oral Exam: once a draft of the dissertation has been essentially completed, there is a second exam, called the “University Oral Exam.” A portion of it consists of a student presentation based on the dissertation and is open to the public. A closed question period follows. If the draft is ready by Autumn Quarter of the fourth year, the student can request that the University oral count as the department oral.

SPECIAL GRADUATE PROGRAMS

The department recognizes that some students may need to spend a large amount of time preparing themselves in some other discipline related to their philosophical goals, or in advanced preparation in some area within philosophy. In such circumstances, the department is willing to waive some of the Ph.D. requirements. Such an exemption is not automatic; a program must be worked out with an adviser and submitted to the department some time in the student’s first year. This proposal must be in writing and must include:

1. The areas to be exempted (see below).

2. A program of additional courses and seminars in the special area (usually at least 12 units).

3. A justification of the program that considers both intellectual coherence and the student’s goals.

The department believes there is plenty of room for normal specialization within the program as it stands, and that all students will specialize to some extent. Thus, the intent is not to exempt courses on a one-to-one basis, but only to grant exemptions when a student plans an extensive and intensive study of some relevant area.

Special-program students may be exempted from two of the following:

1. One additional item from the items listed above in requirement la.

2. Philosophy 159 (but then they must take Philosophy 57).

3. The breadth requirement.

If a student’s special program involves substantial course work outside of philosophy then, with the approval of the adviser, the student may petition the department to reduce requirement ld (the Philosophy unit requirement for the first two years). Normally this requirement is not reduced below 32 units.
Ph.D. MINOR

To obtain a Ph.D. minor in Philosophy, students must follow these procedures:
1. Consult with the Director of Graduate Studies to establish eligibility, and select a suitable adviser.
2. Give to the department academic assistant a signed copy of the program of study (designed with the adviser) which offers:
   a) 30 units of courses in the Department of Philosophy with a LGI of ‘B-’ or better. No more than 3 units of directed reading may be counted in the 30-unit requirement.
   b) At least one course or seminar numbered over 99 to be taken in each of these five areas:
      1) Logic
      2) Philosophy of science
      3) Ethics, value, theory, and moral and political philosophy
      4) Metaphysics, epistemology, and philosophy of language
      5) History of Philosophy
   c) Two additional courses numbered over 199 to be taken in one of those (b) five areas.
3. A faculty member from the Department of Philosophy (usually the student's adviser) serves on the student's doctoral oral examination committee and may request that up to one third of this examination be devoted to the minor subject.
4. Paperwork for the minor must be submitted to the department office before beginning the program.

INTERDEPARTMENTAL PROGRAMS

GRADUATE PROGRAM IN HUMANITIES

The Department of Philosophy also participates in the Graduate Program in Humanities leading to the joint Ph.D. degree in Philosophy and Humanities. It is described in the “Humanities Special Programs” section of this bulletin.

GRADUATE PROGRAM IN COGNITIVE SCIENCE

Philosophy participates with the Departments of Computer Science, Linguistics, and Psychology in an interdisciplinary program in Cognitive Science. It is intended to provide an interdisciplinary education as well as a deeper concentration in philosophy and is open to doctoral students. Students who complete the requirement within Philosophy and the Cognitive Science requirements receive a special designation in Cognitive Science along with the Ph.D. in Philosophy. To receive this field designation, students must complete 30 units of approved courses, 18 of which must be taken in two disciplines outside of philosophy. The list of approved courses can be obtained from the Cognitive Science program located in the Department of Psychology.

SPECIAL TRACK IN PHILOSOPHY AND SYMBOLIC SYSTEMS

Students interested in interdisciplinary work relating philosophy to artificial intelligence, cognitive science, computer science, linguistics, or logic may pursue a degree in this program.

Prerequisites — Ideally, admitted students have covered the equivalent of the core of the undergraduate Symbolic Systems Program requirements as described in that section of this bulletin, including courses in philosophy, logic, artificial intelligence (AI), cognitive science, and linguistics. The graduate program is designed with this background in mind. Students missing part of this background may need additional course work. Aside from the required course work below, the Ph.D. requirements are the same as for the regular program.

Courses of Study — The program consists of two years of courses and two years of dissertation work. Students are required to take the following courses in the first two years:
1. Six Philosophy courses:
   a) Two of the following: 260, 270, 280, 281.
   b) One course in the history of modern philosophy.
   c) Two quarters of graduate logic courses from among 290A, 291A, 292A, 293A.
   d) At least one additional seminar in the general area of symbolic systems: that is, Philosophy 296, 382, 395, and so on.
2. Five cognitive science and computer science courses:
   a) At least two courses in cognitive psychology.
   b) Two or three graduate courses in computer science, at least one in AI and one in theory.
3. Three linguistics and computational linguistics courses.
   a) Graduate courses on natural language that focus on two of the following areas: phonetics and phonology, syntax, semantics, or pragmatics.
   b) One graduate course in computational linguistics, typically Linguistics 239.
4. At least two additional graduate seminars, at a more advanced level, in the general area of the program, independent of department. These would typically be in the area of the student's proposed dissertation project.

The requirements for the third year are the same as for other third-year graduate students in philosophy: a dissertation proposal, creation of a dissertation committee, and at least three approved graduate courses and seminars. The dissertation committee must include at least one member of the Department of Philosophy and one member of the Program in Symbolic Systems outside the Department of Philosophy.
The requirement for the fourth year is the same as for the other graduate students in philosophy: a department oral on an initial draft of part of the dissertation, and a University oral exam when the dissertation is essentially complete.

GRADUATE FELLOWSHIPS AND ASSISTANTSHIPS

A limited amount of fellowship support is available for Ph.D. students in philosophy. Students request aid by checking the appropriate box on the application form. Details of this program may be obtained from the department. Note that a condition of financial aid may be teaching assistance that goes beyond the Ph.D. requirement.

COURSES

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 Program in Cultures, Ideas, and Values sequence, sponsored by the Department of Philosophy as part of the Program in Cultures, Ideas, and Values. Any one of 5A, B, C may count as the introductory philosophy course requirement for the major.

5A, B, C. Philosophy and Human Existence — The philosophical roots of Western culture with some comparison/contrast to Chinese thought. Central theme: the way in which humans' understanding of themselves and their relation to the world affects the organization of society and individual lives. Subtheme: how these understandings shape and are shaped by conceptions of gender, race, and social class.

5A. Cultures, Ideas, and Values: Philosophy and Human Existence, Classical Foundations — Recommended for entering students. Orientation to philosophic argument and themes. Origins of philosophical thought traced in Greek and Chinese classical periods and situated within other forms of understanding. The nature of human being, of morality, and of the world. Western conceptions of the soul from the Greeks to Descartes. Readings: Homer, Plato, the Bible, Mencius, Aristotle, Aquinas, Averroes, Descartes. Recommended for entering students. DR: 1 (three-quarter sequence.)

5 units, Aut (Staff) MW 9
plus two 90-minute sections

5B. Cultures, Ideas, and Values: Philosophy and Human Existence, the Enlightenment and its Shadow — Major western scientific, philosophical, and political ideas of the 17th and 18th centuries. The origins of notions of gender in antiquity and gender issues embedded in Enlightenment thought. The exclusion of non-Europeans from, and the place of slavery within, Enlightenment ideals such as liberty and equality. Readings: Copernicus, Galileo. Locke, Mill, Newton, de Pizan, Rousseau, Wolstoncraft, and Native American narratives. DR: 1 (three-quarter sequence)

5 units, Win (Staff) MW 9
plus two 90-minute sections

5C. Cultures, Ideas, and Values: Philosophy and Human Existence, the Present Age — 19th-and 20th-century contributions to philosophy of science and to moral and political philosophy which have significantly shaped the intellectual and political movements of the present age. The positive and negative aspects of these developments. Readings: Darwin, Marx, Freud. DR: 1 (three-quarter sequence)

5 units, Spr (Staff) MW 9
plus two 90-minute sections

10. God, Self, and the World — The basic concepts, methods, and problems of Western philosophy. The nature and existence of God, minds, and the physical world are approached through contemporary and classical philosophical texts. DR: 8(3)

5 units, Aut, Spr (Lazar) MW 10 plus section


5 units, Win (Cohon) MW 11 plus section

30. Introduction to Political Philosophy — (Same as Public Policy 103A.) Introduction to some fundamental issues of political life. Why do laws have authority? Can it be fair for some people to be wealthier than others? How free should society be? Do we need a government at all? These questions are explored through a reading of the classic texts in political philosophy, from the 4th century B.C. to the present. DR: 8(3)

5 units, Aut (Satz) MW 11 plus section

43. Sophomore Seminar: Introduction to Philosophical Aesthetics — For sophomores only. What is beauty? How is it related to taste? What is aesthetics? Examination of the historical evolution of the notion of aesthetic experience, culminating in Kant's Critique of Judgment.

3-4 units, Win (van Heerden)
46. Introduction to Chinese Thought — (Same as 104, Religious Studies 55.) Religious and philosophical thought of early China, especially the “Classical period,” 550-200 B.C. Development of Chinese thought as an extended dialogue among thinkers who provided uncommon and often contradictory answers to a common set of problems. Limited enrollment. DR:2(4) or 8(3)
4 units (Ivanhoe) not given 1995-96

57. Logic, Reasoning, and Argumentation — Study of propositional and predicate logic, emphasizing translating English sentences into logical symbols and constructing derivations of valid arguments. DR:4(6)
5 units, Aut, Spr (Kremer) MTWThF 9

60. Introduction to the History and Philosophy of Science — (Same as History and Philosophy of Science 60.) Positivism, Popper, and the old “received view” of scientific theories; problems involving explanation and induction; Kuhn and subsequent attempts to rebuild moderate empiricist positions; case study on the dispute between early geneticists and Darwinians, and the inauguration of modern evolutionary theory. DR:8(3)
5 units, Win (Godfrey-Smith) MWF 1:15

62. Sophomore Dialogue: Genes and Genetic Determinism — For sophomores only. Examination of a variety of views concerning the role of genes in the causation of behavior and biological structure. Under what circumstances is it accurate to say that a behavior is “programmed” by genes? 2 units, Spr (Godfrey-Smith)

77. The Ethics of Social Decisions — (Same as Ethics in Society 77.) Application of moral reasoning to a particular social or political topic. Topics change each year.
4 units, Win (Hursthouse) TTh 11-12:15

78. Medical Ethics — Introduction to ethical theory. Topics: models of the doctor-patient relation, confidentiality, informed consent, abortion, euthanasia, criteria for death, distribution of scarce medical resources, genetic manipulation.
4 units (Staff)

80. Mind, Matter, and Meaning — Intensive survey of some central and perennial topics in philosophy: free will and determinism, the mind-body problem, and personal identity. Writing focus course. Prerequisite: one course in philosophy other than logic. DR:8(3)
5 units, Aut (Bratman) TTh 11-12:15

HISTORY OF PHILOSOPHY

100-103 are surveys of some of the most important figures and movements in Western philosophy. Other courses cover particular periods, movements, and figures in the history of Eastern and Western philosophy. Prospective philosophy majors should take as many as possible during the sophomore year.

100. Greek Philosophy — The philosophies of Plato and Aristotle, with some pre-Socratic background. DR:8(3)
4 units, Aut (Shields) MW 11-12:15

102A. 17th-Century Philosophy — Epistemological and metaphysical issues in the works of Descartes, Leibniz, Locke, and other philosophers of the 17th century. The origins and scope of human knowledge, substance, causation, mind-body dualism, and the role of God in a philosophical system. DR:8(3)
4 units, Aut (Rozemond) MWF 1:15

102B. 18th-Century Philosophy — Epistemological and metaphysical issues in the works of philosophers of the 18th century (e.g., Berkeley, Hume, and Kant). The relation between external reality and our ideas, the nature of the self, the reality of space and time, causation, God. DR:8(3)
4 units, Win (Perry) MWF 1:15

103. 19th-Century Philosophy — Ideas and conceptions that shaped 19th-century philosophy. Fichte, Hegel, Marx, Kierkegaard, Nietzsche.
4 units, Spr (Forster) TTh 11-12:15

104. Introduction to Chinese Thought — (Same as 46.) For philosophy majors. DR:2(4) or 8(3+)

113/213. Zhuang Zi — (Graduate students register for 213; same as Religious Studies 113.) History of Western philosophical interpretations of the Daoist text Zhuang Zi. Survey of interpretations emphasizing works of A. C. Graham, Chad Hansen, Wu Kuang-ming, Lee Yearley, and David Wong. No knowledge of Chinese required. Separate readings for those who know Classical Chinese. Prerequisite: 46 or consent of instructor.
5 units (Ivanhoe) not given 1995-96

114/214. Neo-Confucianism — (Graduate students register for 214; same as Religious Studies 119A.) Introduction to later Confucian thought as represented in the Song through Qing dynasties. Introduction to Buddhist concepts which provided some of the theoretical foundations for reinterpretation of Confucian thought in its later phase. The thought of Cheng Hao, Cheng Yi, Zhu Xi, Wang Yangming, Dai Zhen, and Zhang Xuecheng. Prerequisite: 46 or consent of instructor.
4 units (Ivanhoe) not given 1995-96

116/216. Plato's Philosophy — (Graduate students register for 216.) The development of Plato’s metaphysical theories.
4 units, Win (Moravcsik) TTh 2:15-3:30

121/221. Descartes — (Graduate students register for 221.) Descartes’s philosophy is fundamental to modern Western thought. His views, focusing on mind-body dualism. Descartes’s novel way of distinguishing between the corporeal and the incorporeal. Why he adopted his form of dualism and
various problems for this view. Related questions about science, religion, and knowledge.
4 units (Rozemond) not given 1995-96

122. Leibniz — Survey of Leibniz’s logic, epistemology, and metaphysics, emphasizing his monadology. How Leibniz’s work revives some central scholastic Aristotelian views.
4 units, Spr (Smít) MWF 11

125A/225A. Kant’s Critique of Pure Reason — (Graduate students register for 225A.) In-depth study of Kant’s greatest work with selected secondary literature.
4 units ( Förster) not given 1995-96

125B/225B. Kant’s Second Critique — (Graduate students register for 225B.) Historical and systematic study of Kant’s ethics and philosophy of religion, with emphasis on Kant’s second Critique.
4 units ( Förster) not given 1995-96

125C/225C. Kant’s Third Critique — (Graduate students register for 225C.) Focuses on the contrast between reflecting and determining judgment.
4 units (Smit) not given 1995-96

127A,B,C. From Kant to Hegel — (Graduate students register for 227A,B,C) Three-quarter, in-depth study of the 25 years from Kant’s Critique of Pure Reason to Hegel’s Phenomenology of Spirit.
127A. 1781-90 — The formation of Kant’s critical philosophy and its early critics. The importance of “Spinozastreit” between Jacobi and Mendelssohn. Readings from Kant’s three Critiques, the Groundwork, the Metaphysical Foundations of Natural Science, from Jacobi, Mendelssohn, Garve.
4 units, Aut (Forster) T 2:15-5:05

127B. From 1790 to 1800 — The emergence of alternatives to Kant’s program. Kant’s philosophy put to the test. Readings from Fichte, Schiller, Goethe, Helderlin, Schelling, Hegel.
4 units, Win (Forster) T 2:15-5:05

127C. 1800-1806 — The formation of Hegel’s dialectics. Readings from Schelling’s System of Transcendental Idealism, Hegel’s Jena writings, and the Phenomenology of Spirit.
4 units, Spr ( Förster) T 2:15-5:05

129/229. Pragmatism — (Graduate students register for 229.) Introduction to Pierce, James, Dewey, and some recent writers such as Rorty. Focus is on questions of truth, belief, knowledge, and the nature of philosophical inquiry. DR:8(3)
4 units, Aut (Guttmann) MWF 1:15

131/231. The Structure of Cognition: Introduction to Husserl’s Phenomenology — (Graduate students register for 231.) Its background and basic concepts. Emphasis on the concept of intentionality, and its role in Husserl’s theory and in contemporary philosophical debates.
3 units, Spr (Føllesdal) TTh 1:15-2:30

132/232. Existentialism — (Graduate students register for 232.) Heidegger’s and Sartre’s existentialisms, based on a close reading of parts of Being and Time, Being and Nothingness, and Sartre’s novels and plays. The historical background of existentialism, notably in Kierkegaard and Husserl, and the relation between the existentialist ideas, politics, literature, and the arts.
4 units (Føllesdal) not given 1995-96

133/233. Hermeneutics and Critical Theory — (Graduate students register for 233.) Introduction to two of the most important and influential schools in 20th-century German philosophy through the leading representatives of these schools: Heidegger, Gadamer, Horkheimer, and Habermas.
4 units (Förster) not given 1995-96

HISTORY OF SCIENCE

138A. Ancient Period — DR:4(6) or 8(3)
4 units, Aut (Knorr) MWF 2:15

138B. Cosmology: Middle Ages and the Renaissance — DR:4(6) or 8(3)
4 units, Win (Knorr) MWF 2:15

138C. Modern Period: Newton to Einstein — DR:4(6) or 8(3)
4 units, Spr (Knorr) MWF 2:15

140. Topics in the History of Mathematics: From Antiquity to the 17th Century — (Same as History and Philosophy of Science 140.) Origins and development of concepts and techniques in their social and philosophical context. Emphasis is on ancient Greek geometry, its adoption of the idea of proof and interaction with early philosophy, its application in optics and mechanics, its significance and limitations.
4 units, Win (Knorr) TTh 2:15-3:30

LOGIC AND PHILOSOPHY OF SCIENCE

155. Concepts of Freedom — Historical and current concepts of freedom. The views of Hume, Kant, Mill, A. V. Dicey, and Hayek; recent work, including economic concepts of freedom.
4 units, Spr (Føllesdal, Suppes) MWF 10

156. Popper, Kuhn, and Lakatos — (Same as Education 214X.) Popper, Kuhn, and Lakatos are 20th-century philosophers of science who raised fundamental issues while dealing with the nature of scientific progress: the rationality of change of scientific belief, science vs. non-science, role of induction in
science, truth or verisimilitude as regulative ideals. Their impact in the natural and social sciences and applied areas such as educational research.

3 units (Phillips) given 1996-97

159. Basic Concepts in Mathematical Logic — (Same as Linguistics 135.) Concepts and techniques used in mathematical logic, primarily through the study of the language of first-order logic. Topics: formalization, proof, propositional logic, quantifiers, sets, mathematical induction, and enumerability. DR:4(6)

4 units, Aut (Wasow) MWF 9

160A. First-Order Logic — Syntax and semantics of sentential and first-order logic. Introduction to basic concepts of model theory. Gödel’s Completeness Theorem and its consequences: the Löebnheim-Skolem Theorem and the Compactness Theorem. Prerequisite: 159 or consent of instructor. DR:4(6)

4 units, Win (Kremer) MWF 9 plus section

160B. Computability and Logic — Different approaches to effective computation: recursive functions, register machines, and various programming styles. Proof of their equivalence, discussion of Church’s Thesis. Development of some elementary recursion theory. These techniques are used to prove Gödel’s Incompleteness Theorem for arithmetic, whose technical and philosophical repercussions are surveyed. Prerequisite: 160A.

4 units, Spr (Mints) MWF 9 plus section

162. Philosophy of Mathematics — Introduction to 20th-century approaches to the foundations and philosophy of mathematics. Background in mathematics, set theory, and logic. The schools and programs of logicism, predicativism, platonism, formalism, and constructivism. Readings from leading thinkers. Prerequisites: 160A, 161, or consent of the instructor.

3 units, Spr (Kremer) MWF 11

163. Philosophy of Statistics — Introduction to and definition of the concept of probability in a philosophically motivated fashion. Emphasis on the use of probabilities for decision-making under uncertainty.

4 units (Guttmann) not given 1995-96

164/264. Central Topics in the Philosophy of Science — (Graduate students register for 264.) Intermediate-level treatment of some fundamental issues in the philosophy of science. Possible topics: explanation, confirmation and induction, theory change, the structure of theories, causation, realism, theory and observation, reductionism and the unity of science.

4 units, Win (Dupré) MW 10-11:15

165/265. Philosophy of Physics — (Graduate students register for 265.) Methodological and philosophical issues in modern physics.

4 units, Win (Guttmann)

167/267. Philosophy of Biology — (Graduate students register for 267.) Questions about explanation and theory construction in evolutionary biology. Analysis of key concepts: adaptation, fitness, function, units of selection, species.

4 units, Spr (Godfrey-Smith) TTh 11-12:15

168/268. Philosophy of Logic — (Graduate students register for 268.) The liar’s paradox has been taken as evidence that something is wrong with our ordinary concept of truth, or at least with a naive analysis of that concept. Partly in response to the liar’s paradox and its cousins, philosophical logicians have proposed formal theories of truth. The classic work of Tarski, and the last two decades (Kripke, Gupta and Belnap, McGee, Barwise and Etchemendy, Grover, etc.). Prerequisite: competence in logic at the level of 159.

3 units (Kremer) not given 1995-96

169. Intensional Logic — Logical analysis of intensional notions like modality, time, conditionals, knowledge, and action, starting from their philosophical background. Development of the basic model theory and proof theory of Modal Logic (possible worlds semantics). Transition to newer developments: partiality, dynamics, type structure.

4 units, Spr (van Benthem) MW 1:15

ETHICS, AESTHETICS, AND SOCIAL AND POLITICAL PHILOSOPHY

170. Ethical Theories — What sort of conduct is right and what sort of person is a good person? Is it irrational to be immoral? What is the connection between morality and human nature? Morality and human emotion? Are moral duties a matter of social invention? Readings from influential 17th- and 18th-century moral thinkers (the moral sense and sentiment schools, the self-interest school, moral rationalists, utilitarians) and some of their followers today.

4 units, Spr (Cohon) MWF 11

171. Political Philosophy — Highlights of the re-birth of liberal political theory in the last 25 years, with emphasis on the concerns of liberalism’s critics. Topics: Rawlsian liberalism, libertarianism, communitarianism, and feminism. The question of special rights for ethnic minorities, and the question of secession.

4 units (Satz) not given 1995-96

172/272. Topics in Moral Philosophy — (Graduate students register for 272.) Moral realism and anti-realism. Theories asserting the objective reality of moral values, and challenges to such theories, including moral subjectivism, relativism, and noncognitivism. Mainly 20th-century articles by Blackburn, Hare, Harman, Mackie, McDowell, Railton, and Williams.

4 units (Cohon) not given 1995-96
174/274. Hume's Moral and Political Philosophy — (Graduate students register for 274.) David Hume’s ethics and political philosophy, emphasizing historical context and relevant debates today. Possible topics: reason and motivation, the rationality of moral conduct, virtue and sentiment, the nature and conditions of moral judgment, “artificial” virtues, how promises obligate, the origins of the state. Prerequisite: one course in moral philosophy.
4 units (Cohon) not given 1995-96

175. Feminism — How does gender influence knowledge? Is there a “feminine” way of knowing and if so, how should we understand differences between women, e.g., based on race, class, and sexual orientation? What are the implications of traditional views about knowledge, reason, and evidence for feminism? How do we understand gender inequality? What are its significant dimensions? Readings from contemporary and historical feminist writings.
4 units (Cohon) not given 1995-96

176. Aesthetics — Philosophical examination of the concepts of beauty and art, and theories concerning appropriate response. Ancient and modern proposals.
4 units, Win (Moravcsik) MW 2:15-3:30

177. Antiracism, Multiculturalism, and Common Humanity — The philosophical and political consequences of heterogeneity and racial division in contemporary U.S. politics. How can we balance a recognition of, and attachment to, different cultures with respect for our common humanity? What laws, values, and political arrangements best embody this balance? What are the appropriate remedies to the legacies of racism and injustice? Topics: racism, multiculturalism, cultural pluralism, assimilation, and affirmative action.
4 units, Spr (Satz) MW 1:15-2:30

178. Ethics in Society Honors Seminar — (Same as Ethics in Society 190.) Interdisciplinary. Students present issues of public and personal morality. Topics chosen with the advice of instructors. Student-prepared reading list made available a week prior to the presentation. Group discussion follows.
3 units, Win (Okin, Satz) W 3:15-5:05

179. Philosophy of Friendship
4 units (Moravcsik) not given 1995-96

180. Philosophy of Language — Notions of meaning, reference, and language use; with relations to psycholinguistics and formal semantics. Prerequisite for the 180 series: 80 and some background in logic. DR:9(4)
4 units, Win (Lazar) MWF 2:15

183/283. Meaning and Experience — (Graduate students register for 283.) Interrelationships between meaning and experience, emphasizing how our judgments concerning meaning may be based on empirical evidence. Philosophers: W. V. Quine and Donald Davidson. Recommended: some acquaintance with the philosophy of language.
4 units (Føllesdal) not given 1995-96

184. Theory of Knowledge — Some central problems of epistemology, including the analysis of knowledge and memory, the nature of perception, and an evaluation of skepticism.
4 units, Win (Dretske) MWF 10

185. Philosophy of Mind — The mind-body problem, including behaviorism, functionalism, and other forms of materialism; intentionality and the nature of mental representation; the explanation of action in terms of the agent’s reasons.
4 units, Spr (Taylor) MWF 1:15

194. Undergraduate Seminars in Philosophy — Preference given to undergraduate majors. A series for advanced undergraduates. Enrollment limited to 14 in each seminar. For those in the Philosophy honors program, seminars serve as preparation for writing an honors thesis.

194A. Free Will — Recent and historically important discussions of the problem of freedom of the will. Readings: Hume, Locke, Reid, Frankfurt, O’Connor, Strawson, Valleman, Wolf, etc.
4 units, Aut (Yaffe) Th 2:15-5:05

194B. Philosophy and Literature of Existentialism and Postmodernism — The emergence of existentialism and postmodernism as philosophical movements in the 20th century from the perspective of the failure of the Enlightenment. The relationships between works of literature and philosophical ideas, and the development of new literary forms and philosophical approaches within these traditions. Traditional themes from these movements (despair, death, fragmentation, local meaning, etc.) and such issues as questioning the modernism/postmodernism split, continuity, and the role of love. Readings from Heidegger, Sartre, Camus, Baudrillard, Lyotard, Gibson, DeLillo, and others.
4 units, Spr (Kaplan, Käufer) Th 2:15-5:05

195. Undergraduate Reading Groups in Philosophy — Preference given to undergraduate majors. Advanced, intensive reading groups. Enrollment limited to 5.

195A. Nature and Necessity — The idea that it was the task of science to tell us the true, fundamental essence of things (abandoned by Locke and considered bankrupt in modern
philosophy) has experienced a resurgence recently. New Essentialism and reactions to it. Readings from Locke, Hacking, Quine, Putnam, Kripke, Du-pé, and others. Prerequisite: one philosophy course.

3 units, Win (Faderman) Th 2:15-4:05

196. Tutorial — Senior Year
5 units, any quarter (Staff) by arrangement

197. Individual Work for Undergraduates
any quarter (Staff) by arrangement

198. The Dualist — Dedicated to the publication and promotion of The Dualist, a national journal of undergraduate work in philosophy. Requires neither papers nor presentations; students take the initiative in an informal atmosphere. May be taken one to three quarters
1 unit, any quarter (Staff) M 12:15-1:05

PRIMARILY FOR GRADUATE STUDENTS

Graduate students should also consult previous entries in the catalog for courses with graduate student numbers.

211. Philosophical Texts of the Ming Dynasty — (Same as 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 (Ivannoe) not given 1995-96

212. Interpreting Confucian Texts — (Same as 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 (Ivannoe) not given 1995-96

219. Graduate Seminar on Greek Philosophy: Aristotle — Aristotle's use of homonymy, emphasizing his treatments of being and goodness. The nature of homonymy from uncontroversial examples of the phenomenon provided by Aristotle. Some philosophically rich applications.
3 units, Aut (Shields) M 3:15-5:05

226. Kant on Self-Consciousness — Theories about the nature of human self-consciousness in the Critique of Pure Reason (the Transcendental Deduction of the Categories, the Refutation of Idealism, and the Paralogisms). Duisburg Nachlass and some of Kant's writings on logic and anthropology.
3 units, Aut (Smith) Th 3:15-5:05

239. Teaching Methods in Philosophy — For Ph.D. students in their second or third year who are teaching assistants for the department. Discussion of issues about the teaching of philosophy.
1-4 units, any quarter (Staff) by arrangement

240. Individual Work for Graduates
any quarter (Staff) by arrangement

242A. Philosophy of Science Seminar: Foundations of Quantum Mechanics
3 units, Aut (Guttmam, Suppes) M 3:15-5:05

242B. Philosophy of Science Seminar: Causality
3 units (Suppes) not given 1995-96

242C. Philosophy of Science Seminar: Kant and Foundations of Science
3 units, Spr (Suppes, Guttmann) M 3:15-5:05

244. Evolutionary Perspectives on Cognitive Science — Examination of the relevance of key evolutionary concepts for cognitive science, focusing on the concept of adaptation. Recent work on complexity and evolution. Recommended: basic understanding of philosophy of mind.
3 units (Godfrey-Smith) not given 1995-96

260. Core Seminar in Philosophy of Science — For first- and second-year students in the Philosophy Ph.D. program.
4 units (Godfrey-Smith) not given 1995-96

263. Freedom and Responsibility — What is it to be a free agent? To act of one's own free will? To be an agent who is responsible for what she/he does? Can there be free, responsible agents in a world of physical causes? Readings from recent work in philosophy.
3 units, Aut (Bratman) W 3:15-5:05

270. Core Seminar in Moral Philosophy — For first- and second-year students in Philosophy Ph.D. program.
4 units, Spr (Bratman, Cohon) MW 3:15-5:05

273. Topics in the Philosophy of Economics
4 units (Dupré, Satz) not given 1995-96

275. Marx and Weber — Marx and Weber aspired to grasp the fundamental political problems of the human predicament (unfreedom, inequality, oppression, and bureaucratization). Both developed theories to account for these problems and investigated the extent that such problems could be mitigated or resolved and believed that social science could contribute to our understanding of the modern world, and to our efforts to change it. Their works are evaluated with regard to our own convictions about politics, human agency, social change, and the role of knowledge.
3 units, Win (Satz) F 10-12

276. Rorty and the 'End' of Philosophy — Rorty argues that the work of influential recent figures (Quine, Davidson, Dewey, and Wittgenstein) in analytic philosophy heralds the end of philosophy as a distinct discipline. Are his interpretations accurate? If so, is the end of philosophy...
Elster, Freud, and Amos Tversky. 

287. Theory of Action — Alternative approaches in contemporary philosophy of action to intention and intentional action, and their relations to broader issues about agency and practical reason. 

3 units, Win (Bratman) T 10-12

278. Graduate Seminar in Social Ethics — Interdisciplinary. Faculty and students present issues of public and personal morality, topics chosen with the advice of instructor. Student-prepared reading list is available a week prior to presentation. Group discussion follows. 

3 units, Aut (Moravcsik) T 1:15-3:05

279. Virtue Ethics — Ethical philosophy as found in the writings of Aristotle, Philippa Foot, Elizabeth Anscombe, and John McDowell; its relation to Kantianism and utilitarianism. 

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

280. Core Seminar in Metaphysics and Epistemology — For first- and second-year students in the Philosophy Ph.D. program. 

4 units, Win (Dupré, Godfrey-Smith) MW 3:15-5:05

281. Core Seminar in Philosophy of Language — For first- and second-year students in the Philosophy Ph.D. program. 

4 units (Perry) not given 1995-96


3 units, Win (Rozemond) T3:15-5:05

283. Rationality — Perspectives on rationality: psychology, rational choice, philosophy. Guest presentations. 

3 units, Win (Guttman, Lazar, Suppes) M 3:15-5:05

285. The Self — Considers the basic structure of self-knowledge, readings in Castaneda, Shoemaker, Evans, etc. Analytical approach in the context of a general account of the acquisition and use of information. 

3 units, Win (Perry)

286. Philosophy of Mind: Qualia — Qualia, the properties by means of which we distinguish conscious experiences from one another, present the toughest problem to modern materialistic theories of mind. Representative samples of recent work on qualia (e.g., Dennett, Tye, Lycan, Strawson, Block, McGinn, Dretske, et al.) 

3 units, Aut (Dretske)

287. The Multiple Self — Philosophical attempts to deal with different phenomena that exhibit irrationality of belief. Works of D. Pears, R. de Sousa, Jon Elster, Freud, and Amos Tversky. 

3 units, Spr (Lazar)

288. The Concept of Objectivity — Objectivity plays an essential role in a variety of philosophical and non-philosophical disputes. Literary theorists dispute the objectivity of interpretation and textual meaning; psychophysicists dispute the objective reality of color; philosophers dispute the existence of moral facts; music theorists dispute the existence of a unique correct interpretation of a performance; feminists and social constructivists dispute the objectivity of science and history. Focusing on these and related areas, seminar develops a theory of what objectivity is and why it matters, to better understand or dismiss ongoing controversies. 

3 units, Spr (Kraut) T 3:15-5:05


3 units (Etchemendy) not given 1995-96

298. Topics in Logic, Language, and Information — Logical analysis of common concerns on the interface of linguistics, computer science, and philosophy. Topics: dynamic semantics of texts and programs (variable binding, updating, process algebra), categorical structures (quantification, polymorphism). 

3 units, Spr (van Benthem) F 10-12

314. Advanced Classical Chinese Texts — (Same as Religious Studies 314.) 

4 units (Ivanhoe) not given 1995-96

322. Leibniz — Analysis of Leibniz’ philosophical system with an emphasis on his metaphysics. 

3 units (Rozemond) not given 1995-96

373. Mind, Action, and Rationality — (Same as Political Science 350.) Research in philosophy and the social sciences on basic issues about agency and practical reason. Prerequisite: graduate standing or consent of instructors. 

3 units, Spr (Bratman, Ferejohn) T 3:15-5:05

380. Graduate Seminar on Mind and Action: Animal Awareness — Recent psychological and philosophical literature on the question of animal thought, awareness, and intentionality. 

3 units (Dretske) not given 1995-96

382A. Philosophy of Language: Brandom’s Making It Explicit — Discussion of Robert Brandom’s Making It Explicit: Reasoning, Representing, and Discursive Commitment, a potentially important book in the philosophy of language, with significant material on the philosophy of the mind and of logic. 

3 units, Aut (Kremer) Th 3:15-5:05

382B. Seminar in Philosophy of Language: Syntax 

3 units, Spr (Moravcsik) Th 3:15-5:05

383. Epistemology — Examination and comparison of Hume and Goodman on induction, and Wittgenstein on following a rule. 

3 units (Dupré, Godfrey-Smith) not given 1995-96

3 units, Aut (Smith) W 3:15-5:05

395B. Philosophy of Cognitive Science — A foundation analysis of modern cognitive science, emphasizing the role of computation. Topics: traditional symbol manipulation (Fodor, Haugeland, Newell, Pylyshyn, Simon); full-scale critiques (Dreyfus, Searle, Taylor, Winograd); the role of connectionism (Cussins, Fodor, Smolensky); and anti-representationalism (Brooks, Chapman, Dretske, Rosenschein).

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

450. Thesis
any quarter (Staff) by arrangement

AFFILIATED DEPARTMENT OFFERINGS

CLASSICS
258B. Hellenistic Philosophy
4 units, Aut (Wigodsky)

FRENCH AND ITALIAN
258B. Literature and Philosophy: Perspectives on Self-Deception
3-5 units, Win (Dupuy)

HISTORY
133. The Darwinian Revolution — DR:9(4)
4 units, Aut (Lenoir)

HISTORY AND PHILOSOPHY OF SCIENCE

145/245. Scientific Revolution — (Same as History 139.)
4 units, Spr (Rider)

MATHEMATICS

161. Set Theory — (Enroll in Math. 161.)
3 units, Win (Liebman) TTh 3:15-4:30

290A,B. Model Theory
3 units, Aut, Win (Mints) MW 3:15-4:30

291A,B. Recursion Theory
3 units (Feferman) not given 1995-96

292A,B. Set Theory
not given 1995-96

293A,B. Proof Theory
3 units (Mints) not given 1995-96

294. Topics in Logic
3 units, Spr (Mints)

RELIGIOUS STUDIES

1E. Eastern and Western Conceptions of Self — DR:2(*) or 8(3*)
5 units, Aut (Yearley)

42. Philosophy of Religion
5 units, Win (Gelber)

167. Medieval and Renaissance Religious Philosophy
4 units, Win (Gelber)

273. Aquinas' Ethics
5 units (Yearley) not given 1995-96

PHYSICS

Chair: Douglas D. Osheroff
Director of Graduate Study: Robert V. Wagoner
Director of Undergraduate Study: Mason R. Yearian
Associate Professors: Patricia Burchat, Georgio Gratta, Peter F. Michelson, Shoucheng Zhang
Assistant Professors: Mark A. Kasevich, Charles M. Marcus, Roger W. Romani, Jeffrey Willick
Professors (Research): John A. Lipa, Phillip H. Scherrer, Todd I. Smith, John P. Turneaure
Courtesy Professors: Peter A. Sturrock, Richard Taylor, Richard N. Zare
Lecturer: Richard Pam
Consulting Professor: Theodor W. Hänsch

OFFERINGS AND FACILITIES

The Russell H. Varian Laboratory of Physics, the adjacent Physics Lecture Hall, the nearby W. W. Hansen Experimental Physics Laboratory (HEPL) and the E. L. Ginzton Laboratory form a closely related complex which houses a range of physics activities from general courses through advanced research. At the Stanford Free Electron Laser Center, located in HEPL, tunable picosecond optical beams are available for materials and biomedical research at wavelengths that extend from the visible to the far infrared. Separate from this group is the Stanford Linear Accelerator Center (SLAC), a high energy physics lab which has as its principal tools a two-mile-
long 50-GeV electron accelerator and a 6-GeV
electron-positron storage ring. Also at SLAC are
a 30 GeV electron-positron storage ring (PEP)
and the Stanford Synchrotron Radiation Labora-
try (SSRL). A high-energy facility, the Stan-
ford Linear Collider (SLC), provides electron-
positron collisions at about 100 GeV in the cen-
ter of mass.

Professor Yeanian is director of HEPL, and
Professors Cabrera, Lipa, Michelson, Schwett-
man, Smith, and Turnearue are members of the
laboratory. The staffs of Ginzton Laboratory,
SLAC, and SSRL are listed in the "Independent
Research Laboratories, Centers, and Institutes"
section of this bulletin.

Stanford is a member of the Hobby-Eberly
Telescope Consortium. This 10.4 meter telescope
should begin operation in 1996 at McDonald
Observatory in Texas. There will be opportuni-
ties for graduate and undergraduate students do-
ing research projects to use this telescope start-
ing in late 1996.

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, schol-
arily 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 special-
ize in astronomy, astrophysics, or space science
should consult the "Astronomy Course Program"
section of this bulletin.

Three introductory series of courses include
labs in which undergraduates carry out individual
experiments. The Intermediate and Advanced
Physics Laboratories offer facilities for increas-
ingly complex individual work. Undergraduates
are also encouraged to participate in research;
most can do this through the honors program.

Graduate students find opportunities for re-
search in the fields of astrophysics, atomic physics/
laser science, coherent optical radiation, con-
densed matter physics, high energy physics, in-
termediate energy physics, low temperature phys-
ics, and theoretical physics. Opportunities for
research are also available with the faculty at
SLAC in the areas of theoretical and experi-
mental particle physics and accelerator design, and
with the faculty in Physics and Applied Physics
in the areas of astrophysics, materials research,
uclear imaging technology, photon science, quan-
tum electronics, and theoretical and experimen-
tal condensed matter physics.

The number of graduate students admitted to
the Department of Physics is strictly limited. Stu-
dents should complete application by January 1
for the following Autumn Quarter. Graduate stu-
dents 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 includ-
ing physics as part of a general education; those
preparing for careers in professional fields that
require a knowledge of physics, such as medi-
cine or engineering; and those preparing for teach-
ning or research careers in physics or related fields.
Physics courses numbered below 200 are planned
to serve all three of these groups. The courses
numbered above 200 meet the needs mainly of
the third group, but also of some students major-
ing in other branches of science and in engineer-
ing.

BACHELOR OF SCIENCE

Requirements for the degree of Bachelor of
Science in Physics are: Physics 61, 63, 64, 65,
66, 70, 105, 107, 110, 111, 120, 121, 122, 130,
131, 132, 170, 171, 201, 202; and Math. 41, 42,
43, 44, 130, and any one additional math
course numbered 100 or higher. Physics 41, 43,
45, 46, 47, and 48 can replace the Physics 60 se-
ries requirements. One additional physics course
at the senior level is required and may be selected
from Physics 135, 160, 161, 172, 181, 192, 204
or 262. Math. 43H, 44H, and 45H may be substi-
tuted for Math. 43, 44, and 130. The department
advises the study of some Chemistry, for example,
31 or 32, 33, and 35; some Computer Science,
for example, 106; and also the study of a modern
language. Mathematics and physics courses taken
to satisfy the department's major requirements
cannot be taken on a Credit/No Credit basis.

Students may follow either of the two course
sequences. Sequence I (based on Physics 61, 63,
and 65) is preferable for students who have had
physics and some calculus in high school. In this
sequence, Math. 41 is not required. Sequence II
(based on Physics 41, 43, 45, and 47) 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 pos-
sible date to see which sequence is the most suit-
able. Students who enter the physics program after
the freshman year are normally advised to take
the Physics 61, 63, 65 sequence, provided they
have previously taken Math. 41.

Sample programs in physics and mathematics
under the two sequences are shown below.

Students should consult their advisers about the
course distribution requirements in other areas.
Students should work out, in consultation with
their advisers, a program which best fulfills in-
dividual aims. The Undergraduate Office of the
Department of Physics has more detailed information on how to obtain a B.S. degree in physics. This should be carefully studied by prospective majors, especially if they intend to make use of Stanford’s programs abroad. Under some circumstances the department permits, by petition, flexibility in the requirements so that the student may fit a period abroad into the program. Those students who enter the program through the 40s series and who have completed Math. 44 or 130 should consider including the intermediate labs (Physics 105 and 107) or intermediate electricity and magnetism (120 series) in their program in their sophomore year.

**SEQUENCE I**

**FIRST YEAR**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>A</th>
<th>W</th>
<th>S</th>
</tr>
</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 59. Overview of Physics</td>
<td>1†</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 61, 63, 65. Advanced Freshman Physics</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Physics 64, 66. Advanced Freshman Laboratory</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**SECOND YEAR**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>A</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 130, 131, 132. Ordinary Differential Equations, Partial Differential Equations I and II</td>
<td>3</td>
<td>3</td>
<td>3†</td>
</tr>
<tr>
<td>Physics 70. Modern Physics</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 105, 107. Intermediate Physics Laboratories</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physics 110, 111. Intermediate Mechanics</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Physics 120, 121, 122. Intermediate Electricity and Magnetism</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

**THIRD YEAR**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>A</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 103, 106 or 109. Linear Algebra and Matrix Theory, Complex Variables or Modern Algebra</td>
<td>3†</td>
<td>3†</td>
<td></td>
</tr>
<tr>
<td>Physics 130, 131, 132. Quantum Mechanics</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Physics 160, 161. Introduction to Galactic Astrophysics, Extragalactic Astrophysics</td>
<td>3**</td>
<td>3**</td>
<td></td>
</tr>
<tr>
<td>Physics 170, 171, 172. Thermodynamics, Kinetic Theory and Introduction to Statistical Mechanics, Physics of Solids</td>
<td>4</td>
<td>4</td>
<td>3**</td>
</tr>
<tr>
<td>Physics 181. Optics</td>
<td>3**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 192. Introductory Biophysics</td>
<td>3**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 201/202. Advanced Physics Laboratories</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physics 262. Gravitation and Astrophysics</td>
<td>3**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FOURTH YEAR**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>A</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 135. Computational Physics</td>
<td>3**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 203. Advanced Physics Laboratory</td>
<td>3†</td>
<td>3†</td>
<td></td>
</tr>
<tr>
<td>Physics 204. Senior Seminar in Theoretical Physics</td>
<td>3**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 205. Honors Program</td>
<td>3†</td>
<td>3†</td>
<td></td>
</tr>
<tr>
<td>Physics 210, 211, 212. Advanced Mechanics (Partial and Continuum, Nonlinear Statistical)</td>
<td>3†</td>
<td>3†</td>
<td></td>
</tr>
<tr>
<td>Physics 220, 221. Classical Electrodynamics</td>
<td>3†</td>
<td>3†</td>
<td></td>
</tr>
</tbody>
</table>

**SEQUENCE II**

**FIRST YEAR**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>A</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 41, 42, 43. Analytic Geometry and Calculus</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Physics 41, 43, 45. Mechanics, Electricity, Magnetism</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physics 46. Electricity, Magnetism, Laboratory</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 59. Overview of Physics</td>
<td>1†</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SECOND YEAR**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>A</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 44, any additional math course numbered 100 or higher</td>
<td>3</td>
<td>3†</td>
<td></td>
</tr>
<tr>
<td>Math. 130, 131, 132. Ordinary Differential Equations, Partial Differential Equations I and II</td>
<td>3</td>
<td>3</td>
<td>3†</td>
</tr>
<tr>
<td>Physics 47. Light and Heat</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 48. Light and Heat Laboratory</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 70. Modern Physics</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 105, 107, 201. Intermediate Labs</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physics 110, 111. Intermediate Mechanics</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

**THIRD YEAR**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>A</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 103, 106 or 109. Linear Algebra, Matrix Theory, Complex Variables, or Modern Algebra</td>
<td>3†</td>
<td>3†</td>
<td></td>
</tr>
<tr>
<td>Physics 120, 121, 122. Intermediate Electricity and Magnetism</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Physics 130, 131, 132. Quantum Mechanics</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Physics 202. Advanced Physics Laboratory</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FOURTH YEAR**

<table>
<thead>
<tr>
<th>Course No. and Subject</th>
<th>A</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 135. Computational Physics</td>
<td>3**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 160, 161. Introduction to Galactic Astrophysics, Extragalactic Astrophysics</td>
<td>3**</td>
<td>3**</td>
<td></td>
</tr>
<tr>
<td>Physics 170, 171, 172. Thermodynamics, Kinetic Theory and Introduction to Statistical Mechanics, Physics of Solids</td>
<td>4</td>
<td>4</td>
<td>3**</td>
</tr>
<tr>
<td>Physics 181. Optics</td>
<td>3**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 192. Introductory Biophysics</td>
<td>3**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 201, 204. Optics, Senior Seminar in Theoretical Physics</td>
<td>3**</td>
<td>3**</td>
<td></td>
</tr>
<tr>
<td>Physics 192. Introductory Biophysics</td>
<td>3**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 201, 203. Advanced Physics Laboratory</td>
<td>3</td>
<td>3†</td>
<td></td>
</tr>
<tr>
<td>Physics 210, 211. Advanced Mechanics (Particle and Continuum, Nonlinear)</td>
<td>3†</td>
<td>3†</td>
<td></td>
</tr>
</tbody>
</table>
PHYSICS 615

Gravitation and Astrophysics 3**

* Additional elective units must be added to bring the total number of units to 180 as required by the University.
† Not required for the degree in physics.
** Majors are required to take one of these courses.

Undergraduates are offered help with physics problems in the department counseling and tutoring center, the Reference Frame. The center is staffed Monday through Thursday, 9 a.m. to 5 p.m. and 7 to 9 p.m., and Fridays 9 a.m. to 3:15 p.m.

HONORS PROGRAM

The department offers a program leading to the degree of Bachelor of Science in Physics with Honors:

1. Students should find a physics project, either theoretical or experimental, in consultation with individual faculty members.
2. The student submits a proposal to the honors subcommittee, which decides on its suitability as an honors project.
3. Course credit for the project is assigned by the adviser within the framework of Physics 205.
4. A written report of the work at its completion is required for honors.
5. Before the end of the year, each candidate gives a seminar on his or her work. This seminar is announced publicly and is open to the general audience. The expectation is that the student’s adviser, along with all the other honors candidates, will attend the seminar.
6. The decision as to whether a given independent study project does or does not merit award of honors is made jointly by the honors subcommittee and the student’s adviser. This decision is based on the quality of both the honors work and the other work in physics.
7. The work done in the honors program may not be used as a substitute for regularly required courses.

GRADUATE PROGRAMS

MASTER OF SCIENCE

The department does not offer a separate program for the M.S. degree, but this degree may be awarded for a portion of the Ph.D. degree work.

University requirements for the master’s degree, discussed in the “Graduate Degrees” section of this bulletin, include registration for at least three quarters at full tuition as a graduate student and completion of 36 units of course work after the bachelor’s degree. Among the department requirements are an average letter grade indicator (LGI) of at least ‘B’ in courses 201, 203, 210, 211, 212, 220, 221, 230, 231, or their equivalent. Up to 6 of these required units may be waived on petition if a thesis is submitted.

DOCTOR OF PHILOSOPHY

The University’s basic requirements for the Ph.D. (residence, dissertation, examination, etc.) are discussed in the “Graduate Degrees” section of this bulletin. The minimum department requirements for the Ph.D. degree in Physics consist of completing all courses listed below, and at least one quarter from each of two subject areas (among condensed matter, quantum optics and atomic physics, astrophysics and gravitation, and nuclear and particle physics) chosen from courses with numbers above 232, except 290 and 294. The requirements in this list may be fulfilled by passing the course at Stanford or passing an equivalent course elsewhere: 201, 203, 210, 211, 212, 220, 221, 230, 231, 232, 290, 294. An average LGI of at least ‘B’ is required in all the courses taken toward the degree.

All Ph.D. candidates must have math proficiency equivalent to the following courses: 106, 113, 114, 130, 131, 132.

Prior to making an application for candidacy, each student is required to pass a written examination on undergraduate physics. This comprehensive undergraduate exam is given annually at the beginning of Autumn Quarter. Graduate physics is tested by the exams in the first-year courses (210-232). A thesis proposal must be submitted during the third year. In order to assess the direction and progress toward a thesis, an oral report and evaluation is required during the fourth year. After completion of the dissertation, each student must take the University oral examination (defense of dissertation). The Physics faculty also believes that a scientist should have facility with a foreign language for cultural reasons as well as to establish better contact at meetings in foreign countries.

Three quarters of teaching (including a demonstrated ability to teach) are a requirement for obtaining the Ph.D. in Physics.

Students interested in applied physics and biophysics research should also take note of the Ph.D. granted independently by the Department of Applied Physics and by the Biophysics Program administered through the Department of Chemistry. Students interested in astronomy, astrophysics, or space science should also consult the “Astronomy Course Program” section of this bulletin.

The department office has more detailed information on how to obtain an advanced degree in physics and should be consulted by prospective candidates.

Ph.D MINOR

Minors in Physics must take at least six courses numbered 210 to 232 among the 20 required units.
All prospective minors must obtain approval of their physics course program from the Physics Graduate Study Committee at least one year before award of the Ph.D.

FELLOWSHIPS AND ASSISTANTSHIPS

The Department of Physics makes an effort to support all its graduate students through fellowships, teaching assistantships, research assistantships, or a combination of sources. Information on application procedures is mailed with the admission information.

TEACHING CREDENTIALS

For information on teaching credentials, consult the "School of Education" section of this bulletin or address an inquiry to the Credential Administrator, School of Education.

The degree of Master of Arts in Teaching is offered jointly by this department and the School of Education. The degree is intended for those who have a teaching credential and wish to strengthen their academic preparation. The program consists of a minimum of 25 units in the teaching field and 12 units in the School of Education. A suggested minimum would be Physics 57, 64, 66, 105, 110, 111, 120, 121, and Math. 130, 131. Detailed requirements for the degree are outlined in the "School of Education" section of this bulletin.

COURSES

There are four series of beginning courses. The Ten Series (11, 14, 15A, B, 19, 27) is recommended for the humanities or social science student who wishes to become familiar with the methodology and content of modern physics. The Twenty Series (21, 22, 23, 24, 25, 26) is recommended for general students and for students preparing for medicine or biology. The Forty Series (41, 43, 45, 46, 47, 48) is for students of engineering chemistry, geology, mathematics, and some physics majors. The Advanced Freshman Series (61, 63, 64, 65, 66) is for the well-prepared student and is the preferred introductory series for those physics majors who have the appropriate background.

Both the Twenty and Forty Series consist of demonstration lectures on fundamental principles of physics, problem work on application of these principles to actual cases, and lab experiments closely correlated with the lectures. Their objectives are not only to give information on particular subjects, but also to provide training in the use of the scientific method. The primary difference between the two series of courses is that topics are discussed more thoroughly and treated with greater mathematical rigor in the Forty Series.

Courses beyond 99 are numbered in accordance with a three-digit code. The first digit indicates the approximate level of the course: undergraduate courses (1); first-year graduate courses (2); more advanced courses (3); research, special, or current topics (4). The second digit indicates the general subject matter: laboratory (0); general courses (1), (2), (3); nuclear physics (4); elementary particle physics (5); astrophysics, cosmology, gravitation (6); condensed matter physics (7); optics and atomic physics (8); miscellaneous courses (9).

11. Symmetries of Nature — For humanities and social science students. Concepts of atomic and subatomic physics; how physicists have used symmetry principles to discover the laws of nature on a subatomic scale, and how symmetries determine the behavior of atoms, nuclei, and elementary particles. Offered occasionally. DR:5(7)
3 units

12. Science, Society, and Politics — Scientific research has a profound impact on society, and society has come to expect solutions to important social issues. The public debates on proposed, ongoing, or recently abandoned major scientific projects and programs, including: global warming and ozone depletion, the danger posed by earth-asteroid collisions, the cancellation of the Super-conducting Supercollider, the U.S. decision to build the Space Station jointly with Russia, “clean” nuclear power from fusion, and cosmology and the Hubble telescope.
4 units, Spr (Walker) TTh 2:30-3:45

3 units, Aut (Yearian) TTh 1:15-2:30

15. Topics in Modern Astronomy — 15 A and B are for students not majoring in the physical sciences and are taught in different quarters by different instructors, but are related in topic. Students should take either 15A or 15B.

15A. The Nature of the Universe — (Enroll in Astronomy 15A.)
3 units, Win (Linde) MW 2:15-3:30

15B. Cosmic Horizons — 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 (Willick) MW 1:15-2:30
19. An Introduction to Physics (Physics for Poets) — Non-technical survey of the methodology of physics and some of the achievements in understanding the physical world. Topics: classical conservation laws, relativity, nuclear, and particle physics, the Standard Model and where we are today. High school algebra and trigonometry are used. DR:5(7) 3 units, Aut (Susskind) MWF 1:15

21. Mechanics and Heat — For biology, social science, premedical students. Introduction to Newtonian mechanics, fluid mechanics, theory of heat. Calculus is used as a language and developed as needed. Prerequisites: working knowledge of elementary algebra and trigonometry. DR:5(7) 3 units, Aut (Cabrera) MWF 10 or 11 one-hour discussion by arrangement

22. Mechanics and Heat Laboratory — Pre- or corequisite: 21. 1 unit, Aut (Cabrera) by arrangement

23. Electricity and Optics — Electric charges and currents, magnetism, induced currents; wave motion, interference, diffraction, geometrical optics. Prerequisite: 21. DR:5(7) 3 units, Win (Susskind) MWF 10 or 11 one-hour discussion by arrangement

24. Electricity and Optics Laboratory — Pre- or corequisite: 23. 1 unit, Win (Susskind) by arrangement

25. Modern Physics — Introduction to modern physics. Relativity, quantum mechanics, atomic theory, radioactivity, nuclear reactions, nuclear structure, high energy physics, elementary particles, astrophysics, stellar evolution, and the big bang. Prerequisite: 23 or consent of instructor. DR:5(7) 3 units, Spr (Romani) MWF 10 or 11 one-hour discussion by arrangement

26. Modern Physics Laboratory — Pre- or corequisite: 25. 1 unit, Spr (Romani) by arrangement

27. Evolution of the Cosmos — Similar to 15A or 15B but at a more quantitative level. 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. Offered occasionally. DR:5(7) 3 units, Aut (Petrosian) TTh 11-12:15 discussion by arrangement

28. Mechanics, Heat, Electricity, and Magnetism I — For biology, social science, premedical students. The sequence 28 and 29 fulfills, in ten weeks, the one-year college physics requirement (with lab) of most medical schools. Topics: Newtonian mechanics, fluid mechanics, theory of heat, electric charges and currents. Calculus is used as a language and developed as needed. Prerequisite: working knowledge of elementary algebra and trigonometry. DR:5(7) 6 units, Sum (Staff) MTWHF 10-12 plus two hours discussion by arrangement

29. Electricity and Magnetism II, Optics, Modern Physics — Magnetism, induced currents; wave motion, optics; relativity, quantum mechanics, atomic theory, radioactivity, nuclear structure and reactions, elementary particles, astrophysics and cosmology. Prerequisite: 28. DR:5(7) 6 units, Sum (Staff) MTWHF 10-12 plus two hours discussion by arrangement

41. Mechanics — Vectors, particle kinematics and dynamics, work, energy, momentum, angular momentum; conservation laws; rigid bodies. Discussions based on use of calculus. Corequisite: Math. 20 or 41, or consent of instructor. DR:5(7) 3 units, Aut (Dimopoulos) lee MWF 9 or 10 discussions by arrangement

43. Electricity — Oscillations. Electric charges and fields, capacitance, resistance; steady currents and magnetic fields. Prerequisites: 41 and Math. 20 or 41. Corequisite: Math. 21 or 42, or consent of instructor. DR:5(7) 3 units, Aut (Dimopoulos) lee MWF 9 or 10 discussions by arrangement

44. Magnetism — Time varying currents and fields, inductance, Maxwell’s equations, electromagnetic oscillations and waves. Special relativity. DR:5(7) 3 units, Spr (Osheroff)

46. Electricity and Magnetism Laboratory — Pre- or corequisite: 45. 1 unit, Spr (Osheroff)

47. Light and Heat — (Formerly 55.) Reflection and refraction of light, lens systems; light and electromagnetic waves; temperature, properties of matter, introduction to kinetic theory of matter. Prerequisites: 53 and Math. 43, or consent of instructor. DR:5(7) 4 units, Aut (Wojcicki) lec TTh 9-10:30 discussion by arrangement

48. Light and Heat Laboratory — (Formerly 56.) Pre- or corequisite: 47. 1 unit, Aut (Wojcicki) by arrangement

50. Astronomy Laboratory and Observational Astronomy — Theory and use of an optical telescope and the interpretation of basic observational data of planets, stars, and galactic systems. Individual observations with a 14-inch Cassegrain telescope are supplemented by lectures/discussion of basic observational techniques, astronomical cata-
logs 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

59. Overview of Physics—Recommended for all prospective physics majors. Major areas of current research. Topics: fundamental particles, solid state physics, low temperature physics, biophysics, and astrophysics. Lectures by faculty and physicists with research interests in these fields.
1 unit, Aut (Burchat) M 3:30-5

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 (Marcus) TTh 9-10:50
63. 4 units, Win (Marcus) TTh 9-10:50
65. 4 units, Spr (Marcus) TTh 9-10:50

64. 1 unit, Win (Marcus) by arrangement
66. 1 unit, Spr (Marcus) by arrangement

70. Modern Physics—Relativity, experimental basis of quantum theory, Schrödinger equation, atomic structure, nuclear structure, high energy physics, elementary particles. Prerequisite: 53. Recommended: prior or concurrent registration in Math. 42.
DR:5(7)
3 units, Win (Yearian) TTh 11-12:15

72. Modern Physics Laboratory—Prerequisite: 25 or 70.
1 unit, Win (Yearian)

81. Quantitative Observation—For sophomores only. Basic techniques for quantitative measurement in observational science, including collection of astronomical data with electronic instruments and examination of high-energy x-ray observations from satellite data. Possible goals: measurement of the age of a star cluster, the temperature of a collapsed stellar core, or the orbit of a neutron star or black hole binary.
1 unit, Win (Romani)

100. Introduction to Observational and Laboratory Astronomy—Introduction to observational techniques in astronomy for physical science or engineering students. Emphasis on measurement of fundamental astronomical parameters such as distance, temperature, mass, and composition of stars. One two-hour lecture and one night of observation using the 14-inch telescope at the Stanford Student Observatory. Limited enrollment. Prerequisites: one year of physics, prior or concurrent registration in 25, 65, or 70; and consent of instructor. DR:5(7)
4 units, Spr (Walker) M 3:15-5
lab by arrangement

105,107. Intermediate Physics Laboratory Seminars—Sequence in experimental techniques required of all Physics majors. Topics: electronics, detectors and radioactive sources, optics and lasers, statistics and data handling. One-hour weekly lecture, usually Friday noon and one to two afternoons a week in lab. Prerequisites: 54 or 64 and 66; prior or concurrent registration in 56 and the 120 series.

105. Laboratory Seminar I: Electronics
3 units, Aut (Pam) F 12

107. Laboratory Seminar II
3 units, Spr (Kasevich) by arrangement

110,111. Intermediate Mechanics—Mechanics of systems of particles and rigid bodies. Coordinate transformation and vectors; Newtonian mechanics; linear and nonlinear oscillations; Hamilton's principle, Lagrangian and Hamiltonian dynamics; central forces, planetary motion; collisions; non-inertial reference systems; rigid body dynamics; coupled oscillations; and introductory fluid mechanics. Prerequisites: 51 or 61, and Math. 130.
110. 4 units, Win (Kasevich) MWF 9
111. 4 units, Spr (Michelson) MWF 9

120,121,122. Intermediate Electricity and Magnetism—Vector analysis, electrostatic fields, including multipole expansion; dielectrics. Special relativity and transformation between electric and magnetic fields. Maxwell's equations. Static magnetic fields, magnetic materials. Electromagnetic radiation, plane wave problems (free space, conductors and dielectric materials, boundaries). Dipole and quadrupole radiation. Wave guides and cavities. Prerequisites: 53 or 63; prior or concurrent registration in Math. 130 or 131 with Physics 120 and 121, respectively. Recommended: concurrent or prior registration in Math. 103.
120. 4 units, Aut (Michelson) MWF 11
121. 4 units, Win (Burchat) MWF 11
122. 4 units, Spr (Wojcicki) MWF 11

130,131,132. Quantum Mechanics—The origins of quantum mechanics, wave mechanics, and the Schrödinger equation. Heisenberg's matrix formulation of quantum mechanics, solutions to one-dimensional systems, separation of variables and the solution to three-dimensional systems, the central field problem and angular momentum eigenstates, spin and the coupling of angular momentum, Fermi and Bose statistics, perturbation theory and other approximation techniques. Scattering theory; partial wave expansion. Born approximation. Green's functions. Reference to problems in atomic and nuclear physics explaining the basic phenom-
enology of these disciplines. Invariance principles and conservation laws in the context of quantum theory. Prerequisites: 70 or equivalent and 110, 111; concurrent or prior registration in 120, 121, 122, and Math. 130, 131.

130. 4 units, Aut (Peskin) TTh 1:15-2:30
131. 4 units, Win (Peskin) TTh 1:15-2:30
132. 4 units, Spr (Peskin) TTh 1:15-2:30

135. Computational Physics — Development of computational methods with application to problems in classical dynamics, electrodynamics, quantum mechanics, and statistical mechanics. Numerical integration; solution of ordinary differential equations including the Runge-Kutta method; solutions of the heat equation and Poisson’s equation with relaxation methods, etc.; Monte Carlo methods; matrix methods and eigenvalue problems. Short introduction to Basic programming; class projects may be programmed in Basic, Fortran Pascal, or C. Prerequisites: 110, 111, 121; Math. 130. Offered occasionally.

3 units, Spr (Cabrera)

160. Introduction to Stellar and Galactic Astrophysics — Physics of the sun. Evolution and death of stars. White dwarfs, novae, planetary nebulae, supernovae, neutron stars, pulsars, binary stars, x-ray stars, and black holes. Galactic structure: interstellar medium, molecular clouds, HI and HII regions, star formation and element abundances. Prerequisites: calculus and one year of college physics at the level of the Physics 50 series or equivalent.

3 units, Aut (Romani) MW 1:15-2:30

161. Introduction to Extragalactic Astrophysics and Cosmology — Basic observational data on distances and the distribution of matter in the universe: galaxies, clusters, and superclusters of galaxies. Electromagnetic radiation from galaxies and quasars and the background radiation at radio, infrared, and x-ray frequencies. Introduction to cosmology, models of the universe, and their evolution. The Big Bang and the physical processes in the first three minutes. Prerequisites: calculus and one year of college physics at the level of the Physics 50 series or equivalent.

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

170,171. Thermodynamics, Kinetic Theory, and Statistical Mechanics — Derivation of laws of thermodynamics from basic postulates; determination of relationship between atomic substructure and macroscopic behavior of matter. Temperature, equations of state, heat, internal energy, entropy, reversibility, applications to various properties of matter, absolute zero and low-temperature phenomena. Distribution functions, transport phenomena, fluctuations, equilibrium between phases, phase changes, the partition function for classical and quantum systems, Bose-Einstein condensation, and the electron gas. Cooperative phenomena including ferromagnetism, the Ising model, and lattice gas. Irreversible processes. Prerequisites: 55 or admission to Advanced Sequence, and Math. 130.

170. 4 units, Aut (Fetter) MWF 10
171. 4 units, Win (Fetter) 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 (Byer) MWF 11


1 unit (Byer) by arrangement

190. Independent Study — Experimental or theoretical physics under supervision of a faculty member. Prerequisites: superior work as an undergraduate physics major; approval of the instructor and of the Undergraduate Study Committee of the department.

any quarter (Staff) by arrangement

192. Introductory Biophysics — (Enroll in Applied Physics 192.)

3 units, Win (Doniach)

198. History of Physics — (Enroll in History and Philosophy of Science 168; History 139A.)

3-5 units (Staff) not given 1995-96

201,202,203. Advanced Physics Laboratory — Experiments in atomic, nuclear, solid state, and low-temperature physics; optics; and particle physics. 201 has individually prepared lab experiments. 202 consists of student prepared low-temperature experiments. 203 consists of continued experiments at the Advanced Physics Lab level or preparation of a new experiment. (Optional for Physics majors.) Prerequisites: 105, 107. Recommended: prior or concurrent registration in 171.

201. 3 units, Aut (Kapitulnik) Spr (Walker)
202. 3 units, Win (Osheroff)
203. 3 units, Aut (Kapitulnik) Spr (Walker)

204. Senior Seminar in Theoretical Physics — Topics of recent interest in theoretical physics: string theory, supersymmetry, inflationary cosmology, chaos, and others. Work in the seminar may provide a basis for an honors project in theoretical physics. Prerequisite: 132 or consent of instructor. Offered occasionally.

3 units, Aut (Linde)
by arrangement
205. Honors Undergraduate Research — Experimental or theoretical project and thesis in physics under supervision of a faculty member. Planning of the thesis project should begin no later than middle of the junior year. Successful completion of an honors thesis leads to graduation "with departmental honors." Prerequisites: superior work in physics as an undergraduate major and approval of the honors committee.

1-8 units, Aut, Win, Spr (Yearian) Sum (Staff)

207, 208. Laboratory Electronics — (Enroll in Applied Physics 207, 208.)
207. 3 units, Win (Fox)
208. 3 units, Spr (Fox)


3 units, Aut (Kallosh) MW 9:30-10:50

211. Continuum Mechanics — Fluid mechanics: foundations, kinematics, and dynamics of incompressible and compressible flows. Surface waves, weather, sound and shock waves, and possibly elasticity (waves). Examples from fluid mechanics (instabilities, turbulence, etc.) and other fields are provided as physical background for the analysis of simple nonlinear systems. Emphasis on phase-plane analyses, attractors, and transition to chaos. Prerequisite: 210.

3 units, Win (Wagoner) MW 9:30-10:50


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, Lienard-Wiechert potentials, relativistic Larmor’s formula, frequency and angular distribution of radiation, synchrotron radiation. Energy losses in matter: Bohr’s formula, Cherenkov radiation, bremsstrahlung and screening effects, transition radiation. Prerequisites: 122 or equivalent; Math. 106 and 132, or concurrent registration in Physics 210 and 211.

220. 3 units, Aut (Zhang) MW 1:15-2:30
221. 3 units, Win (Zhang) MW 1:15-2:30


230. 3 units, Aut (Chu) MWF 11
231. 3 units, Win (Chu) MWF 11
232. 3 units, Spr (Kallosh) MWF 11


3 units (Staff) alternate years, given 1996-97

262. Introduction to Gravitation and Astrophysics — Tensor analysis: special relativity, the energy-momentum tensor, and curvature. Einstein’s equations: weak fields, tests, spherically-symmetric solutions, gravitational waves. Cosmology, black holes, stellar structure, and other topics in astrophysics, as time permits. Prerequisites: 111, 122. Recommended: concurrent enrollment in 211.

3 units, Spr (Michelson) 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...

3 units, Spr (Kasevich) alternate years, not given 1996-97

324. Introduction to Accelerator Physics — (Enroll in Applied Physics 324.)

3 units, Aut (Siemann) alternate years, not given 1996-97


330. 3 units, Aut (Laughlin) MW 11-12:30
331. 3 units, Win (Laughlin) MW 11-12:30
332. 3 units, Spr (Laughlin) MW 11-12:30

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 rr(LC) and e+e- annihilation to hadrons; radiative corrections in QED and QCD; running coupling constants; experimental measurements of the strong coupling; Monte Carlo techniques. Spring: Hadron spectroscopy in the static quark model; properties of heavy quarks and quarkonium systems. Weak interactions: muon, pion, and beta decay; weak mixing angles; the K_L - K_S system on CP violation; charged and neutral current neutrino scattering; the standard model of electroweak interactions; determinations of sin^2(θ_W); properties of W and Z bosons; gauge symmetries and the Higgs mechanism; properties of Higgs particles. Introduction to topics beyond the standard
model: grand unification, proton decay, super-symmetry. Prerequisite: 330.

351. 3 units (Marsiski)
352. 3 units (Marsiski, Staff)

360. Stellar Physics — Astronomical data on stars and star clusters; classification, Hertz-Spring-Russell diagram. Equations of hydrostatic equilibrium and energy transport, equation of state for normal and degenerate matter, opacity, nuclear, and neutrino processes. Stellar evolution from main sequence to white dwarfs, neutron stars, and black holes. Prerequisite: 220 or equivalent, or consent of instructor. Recommended: 132.

362. High Energy Astrophysics — Transport and radiation processes of high energy particles in relativistic magnetized plasmas. Accretion disk structures and stability. Application to acceleration of particles and their radiation in the interstellar medium and supernova remnant; in pulsars, binary x-ray sources, gamma ray bursts and active galactic nuclei or quasars. Prerequisites: 132 or 221, or equivalents.


365. Extragalactic Astrophysics and Cosmology — Basic observational data and theories of the structure and evolution of the universe, emphasizing the relevant physical processes. Cosmic background radiation, gravitational lensing. Observational properties and theoretical models of galaxies, quasars, and other galactic activity. Prerequisite: 221 or equivalent.


367. Literature of Condensed Matter Physics — (Enroll in Applied Physics 367.)

368. Group Theory and Symmetry — (Enroll in Applied Physics 368.)

370. Theory of Many-Particle Systems — Application of quantum field theory to the nonrelativistic, many-body problem, including methods of temperature-dependent Green’s functions and canonical transformations. Theory of finite-temperature, interacting Bose and Fermi systems with applications to superfluidity, superconductivity, and the electron gas. Prerequisite: 222.


373. Solid State Theory: Continuation — (Enroll in Applied Physics 373.)

374. Cooperative Phenomena — (Enroll in Applied Physics 374.)

375. Electronic Structure — (Enroll in Applied Physics 375.)


379. Introduction to Atomic Processes — (Enroll in Applied Physics 383.)

380. Quantum Optics and Measurements — (Enroll in Applied Physics 387.)

381. Mesoscopic Quantum Physics — (Enroll in Applied Physics 388.)

450.451,452. Special Topics in Particle Physics — Advanced topics in theoretical high-energy physics. Topics change quarterly and each year to survey the elements of formalism needed for theoretical research. Prerequisite: 332.

450. Grand Unified Theories

451. Topics in Particle Physics

452. Supergravity
453A. Beam Dynamics in Storage Rings — (Enroll in Applied Physics 453A.)
3 units, Win (Chao)
3 units, Spr (Whittum)

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 4-5

463. Special Topics in Astrophysics — Research level discussions of current topics in astrophysics. Content varies each quarter and year, depending on the interests of staff and students. Topics to be announced. Offered occasionally.
3 units, Spr (Wagoner) by arrangement

473A. Non-Equilibrium Phenomena in Condensed Matter
3 units, Aut (Doniach)
473B. Condensed Matter Physics
2 units, Aut (Beasley)
473C. Physics of Disordered Systems
2 units, Win (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

Chair: Lucius J. Barker
Associate Professors: Luis R. Fraga, Judith L. Goldstein, Terry L. Karl, Scott D. Sagan (on leave 1995-96)
Assistant Professors: Geoffrey Garrett, Kurt T. Gaubatz, Michael A. McFaul, Mark Tunick
Courtesy Professors: David P. Baron, Jonathan B. Bendor, Gerhard Casper, Steven H. Chaffee, Gerald Dorfman, Lawrence Friedman, Keith Krebel, Gail Lapidus, Roger Noll
Courtesy Associate Professor: Coit D. Blacker
Courtesy Assistant Professors: Daniel Diermeier, Debra Satz
Affiliated Professors: Adrienne Jamieson, Michael W. Kirst, Michael M. May
Senior Lecturer: Elisabeth Hansot
Visiting Professor: Gerhard Hafner
Visiting Assistant Professor: Ronald L. Jepperson

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

To receive an A.B. in Political Science, a student must:
1. Complete 45 units of Political Science courses.
2. Take an advanced course in three different areas chosen from:
   a) General or Political Organizations (100-109, 200-209)
   b) Comparative Politics (110-129, 210-229)
   c) International Relations (130-149, 230-249)
   d) Political Theory (150-169, 250-269)
   e) American Politics (170-198, 270-298)
   (Introductory courses numbered below 100 do not fulfill a field distribution requirement but do count toward the total political science units.)
3. Take at least one seminar (which could at the same time fulfill an area requirement).
4. Bridge the gap between 45 units and the 60 units required for a degree by taking courses either in Political Science or in other departments, provided that non-departmental courses relate in a direct way to the student's major focus in political science.

Directed reading units may not be used to fulfill a distribution requirement, and no more than 10 units of directed reading may be counted toward the 45 political science units.

Chair: Lucius J. Barker
Associate Professors: Luis R. Fraga, Judith L. Goldstein, Terry L. Karl, Scott D. Sagan (on leave 1995-96)
Assistant Professors: Geoffrey Garrett, Kurt T. Gaubatz, Michael A. McFaul, Mark Tunick
Courtesy Professors: David P. Baron, Jonathan B. Bendor, Gerhard Casper, Steven H. Chaffee, Gerald Dorfman, Lawrence Friedman, Keith Krebel, Gail Lapidus, Roger Noll
Courtesy Associate Professor: Coit D. Blacker
Courtesy Assistant Professors: Daniel Diermeier, Debra Satz
Affiliated Professors: Adrienne Jamieson, Michael W. Kirst, Michael M. May
Senior Lecturer: Elisabeth Hansot
Visiting Professor: Gerhard Hafner
Visiting Assistant Professor: Ronald L. Jepperson

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

To receive an A.B. in Political Science, a student must:
1. Complete 45 units of Political Science courses.
2. Take an advanced course in three different areas chosen from:
   a) General or Political Organizations (100-109, 200-209)
   b) Comparative Politics (110-129, 210-229)
   c) International Relations (130-149, 230-249)
   d) Political Theory (150-169, 250-269)
   e) American Politics (170-198, 270-298)
   (Introductory courses numbered below 100 do not fulfill a field distribution requirement but do count toward the total political science units.)
3. Take at least one seminar (which could at the same time fulfill an area requirement).
4. Bridge the gap between 45 units and the 60 units required for a degree by taking courses either in Political Science or in other departments, provided that non-departmental courses relate in a direct way to the student's major focus in political science.

Directed reading units may not be used to fulfill a distribution requirement, and no more than 10 units of directed reading may be counted toward the 45 political science units.
A maximum of 20 units of transfer work may be given political science credit toward the major.

All courses counting toward the 60-unit requirements must be taken for a letter grade, although units in excess of the required 60 may be taken on a Satisfactory/No Credit basis.

PUBLIC POLICY EMPHASIS

The student who wishes to receive an A.B. degree with a focus on public policy may choose the "public policy concentration" within the political science major. This program introduces the student to political and economic institutions and processes, analytical techniques, and substantive courses in public policy. For further information, consult with the department’s Director of Undergraduate Studies.

PRIZES

There are four annual prizes for undergraduate students: the Edwin A. Cottrell Memorial Prize for the best student in Political Science 1, the Arnaud B. Leavelle Memorial Prize for the best paper in the History of Political Thought sequence (Political Science 151A,B,C), a cash prize for the best thesis written in political theory, and the Lindsay Peters, Jr., Memorial Prize for the outstanding student each year in Political Science 10.

HONORS PROGRAM

This program offers qualified students an opportunity to conduct independent research and to write a thesis of superior quality summarizing the results of their research. It provides for close contact between students and their advisers, so that students can receive intensive guidance and assistance throughout their research and writing. The aim is to help students through the process of research, analysis, drafting, rethinking, and redrafting essential to excellence in writing.

Because the honors thesis program involves close student-faculty contact, the basic requirement for admission to the program is that students secure the agreement of a regular faculty member to be their thesis adviser. No faculty member can effectively supervise more than a few honors theses each year. Application to the program should therefore be made as early as possible, and well before the beginning of the quarter in which the student wishes to enter the program. Application forms can be obtained from the department office, should be countersigned by both the student and his or her thesis adviser, and then approved by the director of the honors program. Normally, the thesis adviser is a faculty member with whom the student has already worked. Normally, too, students enroll in the program by the Autumn Quarter of the senior year and have at least a letter grade indicator (LGI) of 3.5 in political science courses when they apply.

The program is based on the assumption that good writing takes time. Students should, therefore, strongly discourage from attempting to complete an honors thesis in less than three quarters. While details are always worked out on an individual basis between students and thesis advisers, the following patterns are typical: (1) If a student already has substantial background on the thesis topic, the honors thesis program can be completed in two or three quarters (for a total of 10-15 units); (2) if a student has done little or no previous work on the topic, but the thesis adviser believes the proposed project is viable, then the program should be spread over three quarters (for a maximum of 15 units).

Successful completion of honors in Political Science requires (1) completion of all requirements for the major, (2) enrollment in Political Science 199R, a 2-unit seminar in Autumn Quarter for honors candidates, and (3) successful completion of a thesis of honors quality (LGI of 'B+' or better). Honors work done for credit (Political Science 199) may not be counted toward the required 45 units in political science but may be counted as all or part of the additional 15 units which relate to the student’s interest in political science.

GRADUATE PROGRAMS

Admission — Prospective graduate students should write to Graduate Admissions, the Registrar’s Office for application materials. All applicants are required to submit a sample of their writing and to take the General Test of the Graduate Record Examination. Applicants whose native language is not English must take the Test of English as a Foreign Language (TOEFL) and the Test of Spoken English (TSE). The TOEFL and TSE requirements are waived for applicants who have recently completed two or more years of study in an English-speaking country. For details concerning these tests see Guide to Graduate Admission. The application deadline is January 1. Admission is offered for the Autumn Quarter only. The department expects all students to pursue a full-time program except for time devoted to teaching or research assistantships.

MASTER OF ARTS

Applicants for the A.M. program are selected on the basis of the same criteria as Ph.D. candidates. Financial aid is not available to applicants for the A.M. program. The department offers a terminal A.M., or the A.M. degree may be pursued as part of a joint degree program with one of the University’s professional schools. Students interested in a joint degree should apply for admission to the A.M. program in Political Science.
during Autumn Quarter of the first year in the Stanford professional school.

Terminal A.M. students, and doctoral candidates who wish to apply, are awarded the A.M. degree when they have met the following requirements: completion of at least three quarters of residency as a graduate student, with 45 units of credit, of which at least 25 units must be taken in political science graduate seminars of 200-level and above. Not more than 25 units of the 45-unit requirement may be taken in a single field. The student shall take at least two graduate seminars in each of two fields and at least one graduate seminar in a third field. Of the remaining 20 units, not more than 10 units of work from related departments may be accepted in lieu of a portion of the work in political science. Not more than 10 units can be taken as directed reading. Courses must be numbered above 100. A letter grade indicator (LGI) of 'B-' or better must be attained for directed reading and all course work.

The University's basic requirements for the master's degree are discussed in the "Graduate Degrees" section of this bulletin. Students receiving the A.M. degree from Stanford are not given preference for admission to the Ph.D. program. They must apply for admission in the regular manner and are subject to the same selection process as other applicants. The department does not offer a 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 of this bulletin.

DOCTOR OF PHILOSOPHY

The University's basic requirements for the Ph.D. degree are discussed in the "Graduate Degrees" section of this bulletin.

Programs of study leading to the Ph.D. degree are designed by the student, in consultation with advisers and the Director of Graduate Studies, to serve his or her particular interests as well as to achieve the general department requirements. A student is recommended to the University Committee on Graduate Studies to receive the Ph.D. degree in Political Science when the following program of study has been completed:

1. The candidate for the Ph.D. degree must offer three of the following concentrations in political science: American politics, comparative politics, international relations, political theory, and public organizations. Upon petition, a special field (for example, public law, urban politics, or methodology) may be offered as a third concentration. Students concentrate on two of these areas by fulfilling, depending on the concentration, combinations of the following: written qualifying examinations, research papers, research design, course work. The requirement for the third concentration may be satisfied by taking either a written examination in that area or by offering a minimum of 10 units with a letter grade indicator (LGI) of 'B' or better in the third concentration from among the formal graduate-level courses in the five divisions of the department. The third concentration cannot be satisfied by courses taken as a requirement for a first or second concentration. A third concentration in theory requires two courses in addition to the 5 units necessary to fulfill the program requirement. Completion of special concentrations may require more than 10 units of course work.

2. The Ph.D. candidate is required to demonstrate competence in a language and/or skill that is likely to be relevant to the dissertation research. The level of competence needed for successful completion of the research is determined by the student's adviser. All candidates must complete 5 units of statistical methods or its equivalent. Students who are in the concentration of International Relations, American Politics, or Public Organizations are required to take an additional 5 units of methods. Previous instruction can be counted towards this requirement only if approved by the Director of Graduate Studies.

3. If the candidate has not completed at least one year of previous undergraduate instruction in political theory, or at least 5 quarter units of graduate political theory, he or she must take 5 quarter units of graduate instruction in political theory.

4. By the start of the fourth quarter in residence, each first-year graduate student submits to the student's adviser a statement of purpose. This statement indicates the student's proposed major concentrations of study, the courses taken and those planned to be taken to cover those fields, the student's plan for meeting language and/or skill requirements, plans for scheduling of comprehensive examinations and/or research papers, and, where possible, dissertation ideas or plans. This statement is discussed with, and must be approved
by, the student's adviser. In the Autumn Quarter following completion of their first year, students are reviewed at a regular meeting of the department faculty. The main purposes of this procedure are, in order of importance: to advise and assist the student to realize his or her educational goals; to provide an incentive for clarifying goals and for identifying ways to achieve them; and to facilitate assessment of progress toward the degree.

5. When both the student and adviser feel that the student is ready, he or she takes comprehensive examinations in two concentrations and completes one research paper. Comprehensive examinations are offered at the discretion of the faculty. If scheduled, they are given in the third week of Autumn and Winter Quarters, and in the seventh week of Spring Quarter. Students should normally expect to complete these examinations and the research paper by the end of their second year.

6. Upon completion of one research paper and two comprehensive exams in his or her two major concentrations, the student files an Application for Admission to Candidacy for the Ph.D. which details program plans and records. This document, along with a student's examination performance, is reviewed by the faculty at a regular meeting. If it is approved, the student is advanced to candidacy. Students must be approved to candidacy by the completion of their sixth quarter as a full-time student.

7. During the third year, a formal dissertation proposal is submitted by the student to a thesis committee of three faculty members, including the principal adviser.

8. A candidate for the Ph.D. in Political Science is required to serve as a teaching assistant (TA) in the department for a minimum of two quarters.

9. Doctoral candidates who apply for the A.M. degree are awarded that degree on completion of the requirements outlined in the description of the A.M. program.

10. The candidate must pass the University oral examination on the area of the dissertation, at a time, after the passing of the written comprehensive examinations, suggested by the candidate's dissertation committee.

11. The candidate must complete a dissertation satisfactory to the Dissertation Reading Committee and the University Committee on Graduate Studies.

Ph.D. MINOR

Candidates in other departments offering a minor in Political Science select two concentrations in political science in consultation with the Director of Graduate Studies and submit to her or him a program of study for approval. Written approval for the program must be obtained from the Director of Graduate Studies before application for doctoral candidacy. Students are required to complete at least 20 units in political science courses, all of which must be at least 100 level and above. Two of these courses, in separate concentrations of political science, must be 200 level and above. All grades must be an LGI of 'B' or better. Candidates may be examined in their concentrations in the general oral examination by a member of the Department of Political Science, chosen in consultation with the Director of Graduate Studies.

WEST REFERENCE ROOM

The department maintains, for its faculty, guests, graduate students, and advanced undergraduates, a small reference room that holds political science journals, handbooks, books useful in preparing for Ph.D. examinations, and other materials. Access to West Reference Room is restricted to eligible key holders.

COURSES

Summer Quarter—During Summer Quarter, the Department of Political Science offers a variety of courses and seminars. The specific offerings depend on the faculty available during the Summer Quarter.

The department uses the following course numbering system:

- 1-99 Introductory Courses
- 100-199 Advanced Courses and Undergraduate Seminars (at the instructor's discretion, graduate students may enroll and be given graduate credit when additional work is assigned and the appropriate department Graduate Credit Authorization form is completed)
- 200-299 Graduate-Undergraduate Seminars (principally for graduate students; at the instructor's discretion, undergraduates may be admitted)
- 300-400 Graduate Seminars

Course information is accurate when the Stanford Bulletin goes to press; however, students should be aware that there may be changes and should check the quarterly Time Schedule for up-to-date information.

INTRODUCTORY

1. Major Issues of American Public Policy—Alternative public policies in selected areas, including control of monopoly, poverty, and foreign policy. The political process: the influence of cultural, economic, and political factors and the location of political power in determination of public policy. DR:9(S)

5 units, Aut (Heller)
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:3

5 units, Win (Ferejohn)

20. Issues in Comparative Politics: Power, Policy, and Industrial Development — How does industrialization affect a country’s political system regarding the extent and range of central government power? How do government policies influence patterns of industrial development? Hypotheses are tested by case studies of the political history of countries with different industrialization experiences (Britain, U.S., Germany, Soviet Union, China, Japan, S. Africa, and Algeria).

5 units, Win (Abernethy)

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) given 1996-97

35. International Politics — (Same as 135.) Approaches to the study of world politics including realism, liberalism, and decision-making theories. WW I, nuclear weapons debate, and contemporary international security and economic problems. The normative and policy implications of different theories. DR:9(5)

5 units, Aut (Risse-Kappen)

38. International Security in a Changing World — Introductory survey of international and regional security relations from the closing days of WW II to the collapse of the Soviet Union and the onset of the post-Cold War era. Interdisciplinary faculty lecture on arms control and the nuclear arms race; the military legacy of the Cold War; sources of conflict in the post-Cold War world; regional security issues; the proliferation of advanced weapons technologies; and peacekeeping, peacemaking, and the resolution of international conflict.

5 units, Win (Holloway)

50D. Introduction to Political Philosophy — (Enroll in Philosophy 30, Public Policy 103A.)

5 units, Aut (Satz)

60. The American Dream — Critical analysis of America’s dominant ideology, the American Dream, as experienced by women, minorities, labor, Indians, and immigrants. DR:3

5 units, Aut (Manley)

98. Dialogues Tutorial: Promises and Moral Obligation — Addresses abstract issues of moral philosophy by focusing on a familiar, concrete, and accessible topic, the moral obligation to keep promises.

2 units, Win (Tunick)

99C. Sophomore Seminar: Politics Through the Lens of the Contemporary Novel — How political activity is understood through political science texts and through the lens of the novel. Competing conservative, liberal, and Marxist understandings of politics. The strengths and weaknesses of the novel as a vehicle for portraying political activity. Pervasiveness and authoritativeness of the political within the societies the novels depict. Sorts of selves created through inclusions and exclusions from the political arena.

5 units, Win (Hansot)

ADVANCED UNDERGRADUATE

Advanced undergraduate courses are open to undergraduates who have the necessary prerequisites, and to graduates where advisable. Undergraduate seminars have limited enrollments and admission generally requires consent of instructor. They are intended for juniors and seniors, but may admit graduate students. Sign-up sheets for undergraduate seminars are posted in the department office at class list sign-up time. Undergraduates should also consider the graduate-undergraduate seminars, numbered 200-299, in the next general section.

GENERAL

100A. Introduction to Political Data Analysis — Applications of probability and statistical methods in political science.

5 units, Aut (Rivers)

100B. Statistical Modeling for Political Science — Specification and estimation of statistical models of political processes. Focuses on the multiple regression model and its extensions.

5 units, Win (Rivers)

100W. Politics, Economics, and Welfare — Develops a systematic and formal framework to the study of politics and political decision making and applies this approach to a range of questions. The determinants of public policy: why is one political decision made instead of another in the context of American politics. Applications: the rise of the new regulatory state, the Gulf War, and affirmative action. The design of electoral systems and their effects on political outcomes, bureau-pluralism in Japan and other Asian NICs, and economic reform in the developing and post-socialist countries. Important questions in international relations. Prerequisite: 1 or 10.

5 units (Weingast) not given 1995-96
POLITICAL ORGANIZATIONS

The courses and seminars listed below are open to all undergraduates in the University regardless of major. There are no prerequisites. There are no formal course sequences in public administration.

101P. Politics and Public Policy — (Same as Public Policy 101.) The domestic policy-making process, emphasizing how elected officials, bureaucrats, and interest groups shape government policies in various areas including tax, environmental, and social-welfare policy, given their goals and available tactics. How public policies are formulated and implemented. The results of this process using equity and efficiency criteria. Prerequisites: 1 or 10.
5 units, Spr (Heller)

104. Seminar: Urban Policy — Issues of public finance, housing, education, transportation, and crime in major metropolitan areas in the U.S. Students are placed in an internship in local government and contribute to a policy report being written by a local government agency.
5 units, Win (Fraga)

5 units (Moe) not given 1995-96

5 units (Bendor) given 1996-97

109. Directed Reading/Research in Political Organizations — Advanced individual study in public administration.
any quarter (Staff) by arrangement

COMPARATIVE POLITICS

Undergraduate courses and seminars in comparative politics generally fall into two groups: those dealing with a particular country or region, and those dealing with major political problems or processes. Students concentrating in comparative politics are encouraged to take courses from both groups, and are also urged to do course work in more than one country or region.

111D. British Politics — Britain has experienced a remarkable cycle of change in its politics during the last two decades. After a prolonged period of political and economic instability, Prime Minister Thatcher and her Conservative Party established in 1979 a one-party dominance that persists today.
Changes in British policy, and the revival of political competition in the years ahead.
5 units, Spr (Diamond)

112D. Readings in Political Science and International Relations — (Enroll in German Studies 52D.)
3-4 units, not given 1995-96

113A. Politics and Development in Latin America — Survey of the major political systems in Latin America (normally Argentina, Brazil, Cuba, and Mexico), the patterns of economic and social development associated with them, and their historical and international contexts. DR:9(3)
5 units, Spr (Packenham)

114K. The Political Economy of Development — (Same as 314K, Latin American Studies 250.) Introduction to major theories of political development, emphasizing interplay between economic and political processes, and national and international factors from Latin America, Africa, and Asia. Cases include Brazil, China, Cuba, El Salvador, India, Taiwan, Nigeria, and Venezuela DR:2(*) or 9(5*)
5 units, Aut (Karl)

115M. Chinese Politics: Enduring Problems in the Governance of China — Overview of modern Chinese history and the structure of the Chinese state. The major and enduring problems involved in the governance of China. The evolution of policy toward each problem since the 1700s, emphasizing the last 25 years. Choices Chinese leaders must make today in managing those problems. Population growth and migration, Han-ethnic minority relations, strategies for economic growth, national security policy, education, political participation and social control, environmental protection, and the organization of the political system.
5 units, Win (Oksenberg, Michel)

116. Politics and Society in Europe (I) — Europe is characterized by a mixture of unity and diversity; common beliefs, practices, and institutions (“European Civilizations”), a history of political division (“the European State System”), and armed conflict (“European Civil Wars,” ending in 1945). Consider whether historical diversity has diminished in recent decades and, if so, whether this convergence can be attributed to the process of regional integration.
5 units, Win (Schmitter)

116L. Social Foundations of Democracy — 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 the individual country’s experiences with democracy.
5 units (Diamond)
alternate years, given 1996-97
118A. Political Change in Tropical Africa — The colonial situation, growth of nationalism, achievement of political independence, ethnic patterns in new states, civilian and military leadership, role of party and bureaucracy, movements for electoral democracy, succession struggles and civil war, problems in stimulating economic development, and efforts at regional integration. DR:2(*)
5 units, Spr (Abernethy)

118B. The Politics of Race and Class in Southern Africa — The political history of the region’s 10 countries, emphasizing relations among racial and ethnic groups. Diplomatic, economic, and military interactions among these states. The impact of movements, corporations, and international organizations based outside the region. Domestic politics in South Africa, emphasizing struggles over the character of post-apartheid society. DR:2(*) or 9(5*)
5 units, Win (Hafner) given 1996-97

120. The European System Under New Circumstances — Factors and elements prompting changes in Central and Eastern Europe. The process of those changes combined with the reaction of other states. The impact of European integration resulting from those changes (tested by conflicts in Europe). Emphasis is on international (interstate) and domestic relations.
5 units, Win (Hafner)

121M. Russian Politics — The evolution of the present Russian political system. The Soviet system, tracing its collapse. Attempts at reform of the Soviet system, beginning with Khrushchev and ending with Gorbachev. The emergence of Russian post-communist political institutions, including the Russian federal system, executive-legislative relations, political parties, and lobbies. The relationship between political and economic reform in post-communist Russia.
5 units, Win (McFaul)

122G. The Political Economy of Contemporary Europe — Analysis of the decline of the Keynesian welfare state and interventionist government; the reinvigoration of the European Community (1992, EMU, political union, enlargement); and the integration of eastern and western Europe. The interactive effects of political pressures (e.g., for government interventions to ameliorate market outcomes) and economic constraints (e.g., the need to compete in global markets or to attract foreign capital) on the policies pursued by national governments, domestically and on the European stage. DR:9(5)
5 units (Garrett) given 1996-97

123M. Seminar: Postcommunist Politics — The sources of the collapse of the communist states in Eastern Europe and the former Soviet Union. Issues facing the formation and consolidation of post-communist states and societies, including democratization, privatization, nationalism, and foreign relations between newly independent states. Models and historical analogues for analyzing the emergence of post-communist polities. Prerequisite: 121M.
5 units, Spr (McFaul)

124. Seminar: Political Economy of Latin American Development — Theoretical readings, case studies, and comparative analyses explore patterns of state-market relations in Latin America and their consequences for economic, social, and political development.
5 units, Win (Packenham)

125. The Rise of Industrial Asia — (Same as Economics 130.) The political, economic, social, and cultural aspects of industrial development and change in Asia as a region. Prerequisite: consent of instructors.
5 units, Aut (Okimoto, Lau, Raphael, Rohlen)

126C. Seminar: Constitutionalism — Preference given to seniors in Political Science. The role of constitutions. What is a constitution? Why do we have written constitutions? What are the different functions performed by constitutions in different countries? How important is the institution of judicial review? Constitution-making in Eastern Europe in the present period.
5 units (Casper) not given 1995-96

126K. Seminar: The United States and Central America — (Same as Latin American Studies 182.) The crisis of development in Central America and the challenge it has posed for U.S. policy towards Latin America. Emphasis is on the historic roots of the crisis and the emergence of specific policy dilemmas in the issue areas of democratization, national security peace negotiations, and human rights.
5 units (Karl) not given 1995-96

129. Directed Reading/Research in Comparative Politics — Advanced individual study in comparative politics.
any quarter (Staff) by arrangement

INTERNATIONAL RELATIONS

Students interested in international relations are encouraged to take Political Science 35, International Politics. While not a formal prerequisite for many of the courses listed below, 35 provides a desirable background for more advanced work.

The courses in international relations offered by the Department of Political Science can be divided into two groups: those dealing with global political, military, and economic problems; and those dealing with the foreign relations of specific nations or geographic regions. Students concentrating in international relations are encouraged to select their courses from both these groups.

Students with interests in international relations are encouraged to refer to the "International
Relations" section of this bulletin, which lists international relations courses in other departments.

130. How Nations Trade — Economic theory predicts that free trade is in the interests of all countries and their citizens. The historical record shows protection endemic to all of them. The relationship between economic forces that push countries in the direction of free trade and the political pressures that lead countries in the opposite. Topics: GATT, bilateral, and regional trade blocs in Europe, N. America, and E. Asia. The future of global trade and its effects on international and domestic politics.

5 units (Garrett) given 1996-97

132D. Seminar: Controversies Over Foreign Aid — Overview of debates involving official development assistance: ethical basis for aid; relative efficacy of aid, trade, private investment, and work of non-governmental organizations; economic conditionality in structural adjustment programs; role of humanitarian relief under conditions of natural disaster, civil war, and anarchy. Group discussion and critique of students' research projects.

5 units (Abernethy)

133. Peace Studies — (Same as Education 173X, Psychology 142, History 154.) Interdisciplinary, dealing with the challenges of pursuing peace in a world where the sources of conflict are many and regional, ethnic, and religious antagonisms are rising. The art of creating and maintaining peace is analyzed from historical, social, psychological, and moral perspectives. Goals: to illustrate the current and potential contributions of various academic disciplines and critical analyses to the study of peace; and to prepare students to think critically and to act responsibly and effectively on behalf of peace. Eight sections: challenges, enemies, theoretical understandings, justice, security, non-violence, public peace processes, peace and you.

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

134A. Strategy, War, and Politics — Traditional and modern theories on the causes of war and sources of peace. Contrasting explanations for the origins of WW I and II; alternative theories of deterrence in the nuclear age; the causes of war in the Persian Gulf, and ethnic conflicts in the post-Cold War era. DR:9(5)

5 units, Spr (Sagan)

134B. America and the World Economy — Developmental approach analyzes American foreign economic policy, centering on a historical analysis of the basic issues involved in the formation of American foreign policy. Issues: evolution of American tariff and trade policy, development of mechanisms for international monetary management, and American foreign investment policy reflected in changing political goals pursued by American central decision-makers. Prerequisite: 35 or equivalent.

5 units, Win (Goldstein)

134C. Seminar: America and the World Economy — For students writing a research paper on an aspect of American foreign policy. Prerequisites: 134B, consent of instructor.

5 units, Spr (Goldstein)

135. Seminar: International Politics — See 35. Limited to students with graduate standing.

5 units, Aut (Staff)

138A. Seminar: Advanced Study in International Security — States in the international system have different domestic structures, cultures, and norms. Do such differences significantly influence state behavior during crises and wars, or do states behave similarly under grave international pressures? Theories of deterrence, crisis bargaining, and norms concerning the use of force; case studies. Research paper. Prerequisite: 38 or consent of instructor.

5 units, Spr (Sagan)

138B. Seminar: Security and Diplomacy

5 units, Spr (Lewis)

139A. Japanese Foreign Policy — Analysis of the origins of WW II in the Pacific; Japan's role in international security; and the U.S.-Japan trade conflict.

5 units, Win (Okimoto)

140A,B,C. Ethics of Development in a Global Environment (EDGE) — (Same as Engineering 297A,B,C, Anthropology 133A,B,C.) Wednesday evening seminars on world affairs mostly on issues affecting poor nations. Autumn Quarter treats war and peace: the background of current wars and peace negotiations, the UN peacekeeping efforts, war and religion, arms trade. Winter Quarter treats international resources and commerce: the debt crisis, environmental protection, resource depletion, Japan in the world economy, aid and monetary institutions. Spring Quarter treats "poverty and prejudice": development models, comparative national health, AIDS, control of wealth, India-China-Africa-S. America today. Speakers from Stanford and other institutions are experts who directly deal with world policy makers through research and advisory activities.

1-4 units, Aut, Win, Spr (Gupta, Lusignan, Packenham) lecture W 7:30-9:30 p.m., workshops by arrangement

141K. Ethics and International Relations — How moral claims function in the foreign policy process and in relations between states. Arguments for and against normative approaches to making and studying policy. The moral dimensions of selected foreign policy issues. Prerequisite: 35, or consent of instructor.

5 units (Gaubatz) not given 1995-96
142K. International Law — The nature and role of international law in the interaction of states. The basic principles of international law. Problems of interpretation and enforcement. The relationship between law and power. Treaties and the legal basis of diplomacy and international organizations. Law and the problem of war. Human rights under international law. Prerequisite: 35 or consent of instructor.
5 units, Win (Gaubatz)

142S. Seminar: Managing Hazardous Technologies — The political and organizational dimensions of efforts to manage hazardous technologies. Problems of international cooperation, risk perception, and organizational learning. Nuclear power, space shuttles, oil tanker accidents, commercial airlines, and nuclear weapons. Research paper required.
5 units (Sagan) not given 1995-96

143G. Seminar: Public Opinion in International Relations — The role of public opinion in the formation and conduct of foreign policy. The relationship between domestic opinion and international pressures on decision makers. The influence of democracy and democratization on international relations. Prerequisite: 35 or consent of instructor.
5 units (Gaubatz) given 1995-96

5 units (Sagan) given 1996-97

143K. Seminar: Democratic States and International Relations — The influence of democracy and democratization on international relations. Role of public opinion in the formation and conduct of foreign policy. Relationship between domestic and international constraints on democratic decision-makers. Prerequisite: 35 or consent of instructor.
5 units, Aut (Gaubatz)

143L. Seminar: War, Peace, and Organization Theory — Drawing on concepts from organization theory, builds an understanding of military institutions (including technological and doctrinal innovation), the causes of war, and the nature of organizational change. Classic texts in organizational analysis (Simon, March, Cyert) and well-established works in security studies (Allison, Steinbruner, Posen). Recent organizational approaches (e.g., new institutionalism, cultural approaches) and recently published or forthcoming work on security issues.
5 units (Eden) not given 1995-96

145. Seminar: International Cooperation, Regimes, and Organizations — Introduces theoretical and practical problems of international cooperation. Why is international cooperation necessary? What are cooperation problems, and how can they be dealt with? Prevailing theories of international cooperation (e.g., realism, liberalism, institutionalism) applied to empirical issues-areas (e.g., international security, trade, and the global environment). Prerequisite: 35 or an equivalent introductory course in international relations.
5 units, Win (Risse-Kappen)

149. Directed Reading/Research in International Relations — Advanced individual study in international relations.
any quarter (Staff) by arrangement

POLITICAL THEORY

Note — 151A, B, C may be taken independently of one another.

151A. History of Political Thought I: Ancient, Classical, and Christian Worlds — The changing relationship between political rule and individual achievement in Greek, Roman, and early Christian thought. Readings: Plato, Aristotle, Sophocles, Cicero, the Bible, Augustine, and Aquinas. DR:8+(3)
5 units, Aut (Hansot)

151B. History of Political Thought II: Pre-Renaissance to Enlightenment — The secularization of political thought and the development of liberal and republican ideas between the 14th and the 18th centuries. Readings from Calvin, Hobbes, Locke, Luther, Machiavelli, Marsilius, Montesquieu, and Rousseau. DR:8(3)
5 units, Win (Okin)

151C. History of Political Thought III: French Revolution to the Present — The intellectual struggles since the French Revolution regarding the possibility and desirability of founding a new, rational political authority which respects individual freedom and rights, an authority not bound by tradition. Readings: Burke, Bentham, Dostoyevsky, Kant, Hegel, Marx, Melville, Mill, Nietzsche.
DR:8(3)
5 units, Spr (Tunick)

152. Seminar: Expression and Censorship — What, if any, restrictions on pornography can be justified? Is societal resilience being strained by the "lyrics" of rap? What can the new, and viable, morality look like?
5 units, Win (Drekmeier) M 4:15-6:05

153. Utopian Political Thought — How utopias function as blueprints for social change or as thought experiments. Classical and modern utopias (Plato, More, Bellamy, Gilman, Piercy) and anti-utopias (Orwell, Le Guin, Borges). Limited enrollment. Prerequisite: consent of instructor. DR:8t(3)
5 units, Win (Hansot)

154. Feminist Political Theory; Gender, Power, and Justice — (Same as Feminist Studies 138.) 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:87(3)

5 units (Okin) given 1997-98

156. Seminar: Punishment — Central concepts of political theory (authority, freedom, justice, obligation) considered by focusing on problems raised by legal punishment, including: By what right does the state punish? For what actions is it legitimate to punish? Can punishment be just in an unjust society? Why punish at all? Classic political theories of punishment, literature and empirical studies, and current political debates.

5 units (Tunick) not given 1995-96

157. Seminar: On Privacy — U.S. constitutional and tort law regarding government and private invasions of privacy. The role of technology in shaping societal expectations of privacy, and how we weigh competing interests of privacy, publicity, exposure, and law enforcement. Topics: random drug tests; aerial and electronic surveillance; searches of autos, open fields, prisoners, the homeless. Readings include case law, social history of privacy, anthropology, and political philosophy. Prerequisite: 170, 171, or consent of instructor.

5 units, Aut (Tunick)

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 (Manley) not given 1995-96

163M. Seminar: On Thatcherism and Reaganism — The resurgence of conservatism in the U.S. and Britain from the late 1970s to the present. The policies of Reagan and Thatcher in the context of competing theories of the state. Long-term consequences of Thatcherism and Reaganism.

5 units, Aut (Manley) W 1:15-3:05

166. Seminar: Problems in Political Theory — Obligation — (Same as 263.)

5 units (Tunick) not given 1995-96

169. Directed Reading/Research in Political Theory — Advanced individual study in political theory.

any quarter (Staff) by arrangement

AMERICAN POLITICS

170. Judicial Politics and Constitutional Law: Interpreting the Constitution — Interaction of law and politics, and the role of the U.S. Supreme Court in the political system generally. Theories of constitutional interpretation, focusing on major court cases dealing with the proper role of the court, economic and substantive due process, federalism, property takings, and criminal due process. DR:9(5)

5 units, Aut (Tunick)

171. Judicial Politics and Constitutional Law: Civil Liberties — Role and participation of courts, primarily the U.S. Supreme Court, in public policy making and the political system. Judicial activity in civil liberty areas (religious liberty, free expression, race and sex discrimination, political participation, and rights of persons accused of crime). Prerequisites: 10 or equivalent, and sophomore standing.

5 units, Win (Barker)

176. Seminar: The Supreme Court — Intensive study of the U.S. Supreme Court and its role in the governing system. Topics: the court as a political-legal institution, judicial recruitment and selection, nature and dynamics of judicial decision-making in individual and collegial contexts, and the differential role and responsiveness of the court as compared to other governing institutions. Prerequisites: 170 or 171 and junior standing, or consent of instructor.

5 units (Barker) given 1996-97

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 (Barker) given 1996-97

181. African Americans and the Political System — African Americans as political actors and the development and use of political resources as the means to achieve policy objectives. Emphasis on the role and differential responsiveness of governing institutions to concerns of African Americans.

DR:3 or 9(5)

5 units, Spr (Staff)

182F. Introduction to American Law — (Same as American Studies 179, Law 106.) American law for undergraduates. The structure of the American legal system, including the courts; American legal culture; the legal profession and its social role; the scope and reach of the legal system; the background and impact of legal regulation; the relationship between the American legal system and American society in general. DR:9(5)

5 units, Aut (Friedman)

186. Urban Politics — Introduces the major actors, institutions, processes, and policies of sub-state government in the U.S., focusing primarily on city general-purpose governments through a comparative examination of historical and contemporary politics. Issues are related to federalism, representa-
tion, voting, race, poverty, housing, and finances. 5 units (Fraga) given 1996-97

189. Seminar: Congress and Congressional Policy-Making — Survey of institutions and practices of the House and Senate in the post-war period. Topics: the internal institutional structures of Congress — the rules, the committee, leadership, party systems, the seniority system, and the structure of congressional careers; the relation of Congress to other political structures — Congressional elections, interest groups, the President, the media, the bureaucracy, and the courts. Enrollment limited to 20. 5 units (Ferejohn) alternate years, given 1996-97

192F. Seminar: Politics of Race and Ethnicity in the United States — Examines the historical and contemporary politics of selected communities of color to comprehensively understand American political development and the important issues in current American politics. Issues common to communities of color (educational opportunity, vote dilution, and immigration). Participation in a class debate on affirmative action required. 5 units (Fraga) given 1996-97

194C. Political Communication — (Enroll in Communication 160/260.) 4 units, Aut (Chaffee)

194R. Seminar: Law of Politics and Elections — Current issues in reapportionment, voting rights, campaign finance, and other areas of election law. 5 units (Rivers) given 1996-97

196. Seminar: Issues of Race in American Politics — Surveys the forms that racism takes in contemporary American political thinking emphasizing the connections, if any, between central values in the American political tradition such as self-reliance and individualism, attitudes toward Blacks, and ideas about racial policies. Recent, large scale surveys of the opinions and attitudes of Americans. 5 units, Spr (Sniderman)

197. Seminar: Prejudice, Politics, and Group Conflict in Italy — Original survey materials. The new force of prejudice and racism shaping politics in contemporary Europe. 5 units, Win (Sniderman)

198. Directed Reading/Research in American Politics — Advanced individual study in politics. Prerequisite: 10 or equivalent. any quarter (Staff) by arrangement

199A,B,C. Senior Project — Students conduct independent research work towards a senior honors thesis. Reference “Honors Program” above.

199R. Seminar: Senior Research Project — Required for students writing honors theses. Focuses on acquisition of research skills and development of an appropriate research design. 2 units, Aut (Staff)

GRADUATE-UNDERGRADUATE SEMINARS

Conducted as seminars or colloquia, and open to advanced undergraduates and graduates. Non-majors and majors are usually welcome, but enrollments are limited. Sign-up sheets for these courses are posted in the department office on class list sign-up days. Sheets should be checked for specific enrollment information.

GENERAL

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 (Diermier) given 1996-97

201B. Seminar: Economic Analysis of Political Institutions — (Same as Business 681P.) Addresses an expanded set of issues using the methods of information economics, games with incomplete information, repeated games, sequential bargaining, and rational expectations. 5 units, Win (Baron)

201C. Seminar: Applied Formal Models — Congressional Decision-Making — (Same as Business 682.) Focuses on empirical applications of formal models to the study of legislatures. Presumes students have acquired basic technical skills from 201A,B, or their equivalents. Objective: to learn how such skills can be applied to obtain a more comprehensive and systematic understanding of collective decision-making. 5 units, Spr (Krehbiel)

203. Seminar: Advanced Topics in Statistical Modeling — Possible subjects: measurement models, multidimensional scaling, multivariate analysis, causality testing, Bayesian methods, semiparametric and robust methods. 5 units, Spr (Rivers)

POLITICAL ORGANIZATIONS

206. Seminar: Politics and Organization — Provides an analytical foundation for understanding organized activity as it reflects the organization of political life. Coverage of theories is eclectic and interdisciplinary. Emphasis is on political institutions and formal organizations generally,
and the norms, expectation, and routines characteristic of informal political structure.

5 units, Win (Moe)

206W. Seminar: The Political Economy of Institutions — Survey of economic approaches to organization, emphasizing theory and application, with attention to politics.

5 units (Moe) given 1996-97

209. Directed Reading in Public Administration

any quarter (Staff) by arrangement

COMPARATIVE POLITICS

212P. The Politics of International Cooperation and Regional Integration — Open to advanced undergraduates (by consent of instructor) and graduate students. Theory and practice of "regionalism," multilateral conflict resolution, functionalism and international organizations, the politics of free trade areas and common markets, the emergence of international regimes and supranational institutions. Emphasizes the European Community, the North American Free Trade Area, and various experiences in Latin America.

5 units (Schmitter) not given 1995-96

214. Seminar: Comparative Interest Politics — For advanced undergraduates and graduates. A theoretical and empirical inquiry into the role played by interest association in modern politics. Emphasis is on the contrast between pluralist and corporatist systems in advanced capitalist countries, with some Latin American and other Third World cases attempting a transition to democracy. Enrollment limited. Prerequisite: consent of instructor.

5 units (Schmitter) not given 1995-96

216. Seminar: Business and Labor in Politics — Open to upper-level undergraduates and graduates wishing to write research papers. Explores comparatively the ways in which capitalists and workers defend their interests in modern democracies, emphasizing the role of interest association, arrangements for sectoral governance and differences in public policy in Europe, N. America, and Japan.

5 units (Schmitter) not given 1995-96

219. Seminar: Comparative Institutional Analysis — The effects of political institutions on the translation of societal preferences into public policy outcomes. Socio-economic institutions, c.g., trade unions and the organization of business; and the formal attributes of political systems, c.g., electoral systems (first past the post, alternative vote, STV, list PR, etc.), party systems, the division of authority (federalism, bicameralism, presidentialism) and administrative structures (central banks, bureaucratic agencies, ministerial structure). Empirical examples supplement the theoretical arguments.

5 units (Garrett) given 1996-97

221M. Revolutions — While "revolutions" mark important turning points in the modern world, the causes and consequences of revolutions are poorly understood. Given the limited number of cases, theorizing about revolutions is underdeveloped, underspecified, and outdated. Seminar seeks a study of revolutions as a legitimate focus for theoretical inquiry by reviewing structural, institutional, cultural, and rational choice approaches. Case studies of revolutions, focusing on testing and applying recent theories of political change to classic revolutionary cases.

5 units, Win (McFaul)

222K. Seminar: Research on Latin America — (Same as Latin American Studies 200.) Restricted to graduate students and undergraduates preparing senior honors theses after research in Latin America. Develop and present research and prepare a field paper. Prerequisite: consent of instructor.

5 units (Karl) not given 1995-96

223. Seminar: Japanese Politics — The primary institutions in Japanese politics (the bureaucracy, legislature, political parties, and interest groups) through the lens of the major theories that have been used to explain their structure and behavior (statism, pluralism, elitism, and network theory).

5 units (Okimoto) given 1996-97

224. Seminar: States and Markets in Development — Research-oriented seminar for advanced undergraduates and graduate students focusing on recent trends toward economic liberalization in policies and models of national development. Includes, but is not limited to, Latin America. Prerequisite: consent of instructor.

5 units, Spr (Packenham)

224K. Seminar: Contemporary Issues in Latin America — (Same as Latin American Studies 251.) Restricted to A.M. and Ph.D. students. Oriented toward defining individual research on contemporary Latin America.

5 units, Win (Karl, Morrison)

225A. Seminar: Principles of Political Economy — Introduces the basic theoretical tools used to analyze the interrelationships between political systems and the economy (spatial models, the logic of collective action, the evolution of cooperation, bargaining theory, and social choice). Empirical applications to cross-national comparisons and political development.

5 units (Garrett) given 1996-97

226A,B. Workshop on Brazil — (Same as Latin American Studies 197A,B.) Inquiry into the present relationship between economy, society, and politics in Brazil. Social trends, economic performance and cultural issues. Problems surrounding the consolidation of democracy as they are to affect and are affected by the current government of Fernando Henrique Cardoso. Stanford faculty and visiting scholars from Brazil participate. Meets once a week
both quarters, but can be taken either (or both). Prerequisite: consent of instructor.

5 units, Aut, Win (Schmitter)

227. Seminar: Democratization — East, West, and South — For graduate students; advanced undergraduates by consent of instructor. Comparison of political changes possibly leading to more democratic institutions in Latin America, with reference to Southern and Eastern Europe and perhaps Asia: differences in previous regimes and economic systems; levels of development and international context; modes of demise and efforts at reform; eventual institutions and practices.

5 units, Win (Schmitter)

227D. Seminar: Consolidating Democracy — Problems and processes of consolidating new or recently restored democracies. Examples and illustrations from Europe, Asia, Africa, and Latin America, with emphasis on the new democracies of the post-1974, “third wave” period. The nature of consolidation and its relationship to legitimation; legacies of authoritarian rule and the transition; design of political institutions; (re)building political parties; crafting agendas and constructing coalitions; problems of democratic governance (delivering accountability, a rule of law, electoral integrity); the relationship between consolidation and structural economic reform, managing ethnic and regional conflict; establishing civilian control over the military; developing a democratic civil society and political culture; and the role of international actors. Each student writes a major research paper on an individual country.

5 units, Spr (Diamond) T 2:15-5:05

229. Directed Reading in Comparative Politics — any quarter (Staff) by arrangement

INTERNATIONAL RELATIONS

234B. International Institutions — The origins and function of security and economic international institutions in the contemporary world. Regional trade organizations, multilateral organizations such as the IMF, GATT, and EC.

5 units, Win (Goldstein)

234P. The Role of Technology in National Security — (Same as 134P, Engineering-Economic Systems 170.)

5 units, Aut (May) MW 4:15-5:30

240. Seminar: Security in an Insecure World — The revolution in international and regional security relations occasioned by the collapse of Soviet power, German unification, and the rise of globalism of Japan and China. Emphasis on the problem of nuclear weapons proliferation, regional conflicts and arms races, the rising incidence of intra-state and transnational violence, and the prospects for limitations of collective military action and cooperative security. Regional foci include Russia and newly independent states, the New Europe, and the Asia-Pacific region.

5 units (Blacker) not given 1995-96

243A. Graduate Seminar: International Relations Theory — Introduction to contemporary theories of international politics. Micro and macro approaches to the study of conflict and cooperation in world politics, including the work of Carr, Waltz, Gilpin, Keohane, and Bueno de Mesquita. Format emphasizes student oral and written presentation of assigned readings.

5 units, Aut (Gaubatz)

243B. Seminar: Theoretical Issues in International Security — Critical examination of the major theories concerned with international security. Theories at a variety of levels of analysis (systemic, domestic politics, organizational, and psychological). Short research design papers.

5 units, Win (Sagan)

243C. Seminar: Theoretical Issues in International Political Economy — Major contemporary theories affecting global economic relations and related national policies.

5 units, Win (Goldstein)

243G. Seminar: Political Theory and International Relations — The foundations of modern international relations theory. The development of ideas about power, legitimacy, and the conduct of international relations. Readings from Thucydides, Machiavelli, Hobbes, Rousseau, Kant, Grotius, Niebuhr, Arendt, and others.

5 units (Gaubatz) given 1996-97

243J. The Organization of the Contemporary World System: Political Economy and Culture — The transformation of the world system in the contemporary period, and its current economic, political, and cultural organization. Emphasis on economic globalization and the emergence of a global political structure.

5 units, Spr (Jepperson)

244D. Theories of European Imperialism — Alternative explanations for the dominant position Western European countries held in world politics and in the global economy from the 15th to the 20th centuries.

5 units, Win (Abernethy)

245. Graduate Seminar: Norms, Ideas, and Other “Fuzzy Variables” in International Relations — The recent “constructivist” (or “reflectivist” or “interpretivist”) turn in international relations theory and its ontological and epistemological implications. Purpose is to evaluate empirical work inspired by these approaches and possible research designs in a constructivist mode.

5 units (Risse-Kappen)

246. Colloquium: Nuclear Weapons — Theories and History — (Same as History 261/361.) Theo-
ries of arms races, deterrence, nuclear diplomacy; evaluating these in light of the emerging field of nuclear history. Based on the experience of the main nuclear weapon states.

5 units (Holloway, Bernstein)
not given 1995-96


5 units, Win (Risse-Kappen)


5 units (Gaubatz) not given 1995-96

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.


not given 1995-96

258B. Literature and Philosophy: Perspectives on Self-Deception — (Enroll in French and Italian 297E.)

3-5 units, Win (Dupuy)

258F. French Democracy vs. British Liberalism — (Enroll in French and Italian 292.)

3-5 units (Dupuy) not given 1995-96

262. Seminar: Thought and Action — The relation between knowing and doing, and making and doing: the ranges from ideological presuppositions of psychological theories, the nature of revolutionary consciousness, various types of knowing and types of ideology, and the responsibilities of science and the role of knowledge as a factor of production.

5 units (Drekmeier) given 1996-97

263. Seminar: Problems in Political Theory — Obligation — (Same as 166.)

5 units (Tunick) not given 1995-96

266. Seminar: Gender and Political Theory — (Same as Feminist Studies 103F.) Reads/analyzes major works and parts of works from the Western tradition of political thought, viewing them through the prism of gender. The ideological roots of inequality between the sexes. Ways in which assumptions about sexual difference have shaped the essential concepts of our tradition, including reason, nature, politics, justice, and the separation of public from private life. Compares different and sometimes contrasting interpretations of the primary works read. Enrollment limited. Prerequisite: a course in political theory.

5 units, Aut (Okin)

268. Seminar: Contemporary Theories of Justice — Social and political justice. Facilitates understanding of major contemporary debates in political theory. Major recent works that develop principles of justice and the political arrangements that best satisfy their requirements.

5 units, Aut (Okin)

269. Directed Reading in Political Theory
any quarter (Staff) by arrangement

AMERICAN POLITICS

275. Courts as Policy Institutions — The relative nature, capacity, and limitations of courts and judges, as compared to other governing institutions and actors, in the formulation of public policy. Review of basic readings. Students are expected to develop and report on research projects dealing with topics related to particular policy areas.

5 units (Barker) not given 1995-96

289. Seminar: Congress and Congressional Policy-Making — Survey of institutions and practices of the House and Senate in the postwar period. Topics: the internal institutional structures of Congress (rules, committees, leadership, party systems, the seniority system, and the structure of congressional careers); the relation of Congress to other political structures (congressional elections, interest groups, the President, the media, the bureaucracy, and the courts). Enrollment limited to 20.

5 units, Win (Ferejohn)

291F. Seminar: Urban Politics and Policy — Graduate and undergraduate seminar examines the major theoretical approaches used in the analysis of urban politics and policy. Assesses fundamental conclusions about American politics reached by urban scholars as to how subsequent interpretations continue to set the context for scholarly debate and understanding about American political development generally.

5 units (Fraga) not given 1995-96

292A. Graduate Seminar: American Political Institutions — Theories of American politics, interest groups, political parties, Federalism.

5 units, Aut (Moe)

292B. Seminar: Introduction to Political Behavior — Analysis of public opinion, ideology, political tolerance and political values, racism, and voting.

5 units, Win (Sniderman)

292C. Research Seminar in American Politics — Students undertake supervised research in Ameri-
can politics and political behavior, producing a research proposal, and conducting research leading to the completion of a significant scholarly paper. Corequisites: 292A,B.
5 units, Spr (Rivers, Ferejohn)

292D. Research Seminar In American Politics — Students undertake supervised research in American politics and political behavior, producing a research proposal and conducting research leading to the completion of a significant scholarly paper. Prerequisites: 292A,B,C.
5 units (Brady, Rivers) given 1996-97

296. Seminar: Racial and Ethnic Politics in the U.S. — Focuses on the evolution of racial and ethnic politics in the U.S., examining the political development of the American polity generally. Goal: the construction of a comprehensive theory of American political development which can incorporate race and ethnicity.
5 units, Spr (Fraga)

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, Comparative Methodology, and Theory Development — For Ph.D. students who are involved in, or are considering writing dissertations utilizing comparative and case study methodology. Examination of the advantages and disadvantages of using comparative and case study methodology in political science and related fields. How can case studies be used in inductive research efforts to create or develop theory? How can case studies be used to test theories derived by more deductive methods? How does one choose the appropriate types and numbers of cases of theory development and testing? How does one assess causation in historical case studies?
5 units (Sagan) given 1996-97

310. Seminar: Selected Topics in Theory and Comparative Politics — Intended primarily to prepare graduate students for teaching in Political Science 1S, but open to all who are interested in generic political themes (power, violence, legitimate authority, interest, democracy, autocracy, etc.), with material from political theory, novels, films, and documents. Prerequisite: consent of instructor.
5 units (Schmitter) not given 1995-96

311. Seminar: Classics of Comparative Analysis — For political science Ph.D. candidates. Required for all students with comparative politics as a first or second concentration. Qualified Ph.D. candidates in other departments and A.M. candidates in political science may be admitted with consent of the instructors. Enrollment limited to 12.
5 units, Aut (Schmitter)

312. Proseminar in Comparative Politics — Follow-up of 311 intended primarily for graduate students writing grant applications and dissertation proposals. Workshop in practical aspects of designing and conducting political research abroad.
5 units (Schmitter) not given 1995-96

314K. Seminar: Political Economy of Development — Addresses major development theories in the area of comparative politics, emphasizing the interplay between global and domestic factors and economics and politics in the developing world.
5 units, Aut (Karl)

315. Workshop on Democratic Theory — Graduate students only. Selected topics in the theory and practice of modern political democracy: its antecedents, causes, processes, types, consequences, and future.
5 units (Schmitter) not given 1995-96

322. Seminar: Theories of Development — Literature-review for graduate students in the social sciences and area studies. Analysis of major theoretical approaches and empirical studies regarding political, economic, and social development in national units.
5 units (Packenham) given 1996-97

324. Seminar: Neoliberalism and Development — Recent trends toward economic liberalization in policies and models of national development; causes of such trends; effects on economic, social, and political development; normative models for assessing such phenomena; implications for development theory.
5 units, Win (Packenham)

340. Seminar: New Approaches to International Security — Innovative interdisciplinary approaches to security from the political science, sociology, anthropology, history, and engineering perspectives. Issues relating to war, nationalism, ethnic conflict, conflict resolution, democratization, and sustainable development. Approaches and issues are related to changing understandings of international security and conflicting disciplinary assumptions and methodologies.
5 units, Aut (Eden, Holloway)

350. Mind, Action, and Rationality — (Same as Philosophy 373.) Topics: the intersection of research in philosophy and the social sciences on basic issues about agency and practical reason. Prerequisite: graduate standing on consent of instructor.
3 units, Spr (Bratman, Ferejohn)

351. Research Seminar on New Political History — For advanced graduate students studying analytical approaches to political history and devel-
development. Focus is on American politics and some topics from other national contexts. The development of political institutions (elections, legislatures, courts, etc.) and the development of policies. Recent contributions.

5 units (Ferejohn) not given 1995-96

371. Research Seminar: Judicial Politics and Constitutional Law
5 units (Barker) not given 1995-96

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 (Staff)

AFFILIATED DEPARTMENTS

Note — The courses listed below count toward the 45-unit requirement for an A.B. degree in Political Science in the area indicated.

EDUCATION

AMERICAN POLITICS

105/215. American Education and Public Policy — (Formerly Political Science 186K.)
3 units, Aut (Kirst, Tyack)

220B. Introduction to the Politics of Education Analysis — (Formerly Political Science 187.)
4 units, Aut (Kirst)

ENGINEERING-ECONOMIC SYSTEMS

INTERNATIONAL RELATIONS

170. The Role of Technology in National Security — (Formerly Political Science 134P/234P.)
3 units, Aut (May)

171. The Role of Technology in Policy Decisions — (Formerly Political Science 136P.)
3 units, Spr (North, May)

OVERSEAS STUDIES

Courses approved for the Political Science major and taught overseas can be found in the "Overseas Studies" section of this bulletin, or in the Overseas Studies office, 126 Sweet Hall.

MORRISON INSTITUTE FOR POPULATION AND RESOURCE STUDIES

Faculty: (Director) Marcus W. Feldman, (Biological Sciences); Carl Djerassi (Chemistry), William Durham (Anthropology), Paul R. Ehrlich (Biological Sciences), Lawrence H. Goulder (Economics and Institute for International Studies), Mary Lake Polan (Gynecology and Obstetrics), Scott Rozelle (Food Research), Shripad Tuljapurkar (Biological Sciences)

Although Stanford University does not have a formal degree program in population studies, it does have scholars of international reputation in such specialties as demographic history, demographic methods, economic demography, epidemiology, population biology, population genetics, and the sociology and anthropology of populations.

The Morrison Institute for Population and Resource Studies is an interdisciplinary group serving three major functions: (1) encouraging graduate work in population studies through fellowship grants and supervision, (2) instituting courses and seminars in population studies, and (3) bringing visiting faculty to Stanford to strengthen existing course offerings. The institute also organizes an interdisciplinary Colloquium on Population Studies to introduce upper-division undergraduates 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

60. Environmental Problems and Development
3-5 units, Spr (Gupta)

5 units, Aut (Gibbs)

133A,B,C. The Ethics of Development in a Global Environment (EDGE) — (Same as Political Science 140A,B,C, Engineering 297A,B,C.)
1-4 units, Aut, Win, Spr (Lusignan, Packenham, Gupta)

161A. Conservation and Community Development in Latin America — (Same as Human Biology 139, Latin American Studies 196.)
3-5 units (Durham, Irvine) not given 1995-96

164. Ecological Anthropology — (Same as Human Biology 134.)
3-5 units (Durham, Staff) not given 1995-96

168. Medical Anthropology
5 units, Aut (Barnett)

169. Indigenous Peoples and Environmental Problems — (Same as Human Biology 149, Latin American Studies 129.)
3-5 units (Durham, Staff) not given 1995-96

181/281. Evolutionary Anthropology — (Same as Human Biology 181.)
5 units, Aut (Durham)

263. Political Ecology
5 units (Durham) not given 1995-96

264. Advanced Ecological Anthropology
5 units (Durham) not given 1995-96
BIOLOGICAL SCIENCES

117. Biology and Global Change — (Same as Earth Systems 111.)
   3 units, Win (Vitousek, Mooney)

140. Population Biology of Butterflies
   2-5 units (Ehrlich)
   alternate years, given 1996-97

142. Principles of Ecology — (Same as Geophysics 142.)
   3 units (Roughgarden) given 1996-97

146. Colloquium on Population Studies
   1 unit, Win (Feldman)

175H. Problems in Marine Biology
   12 units, Spr (Block, Denny, Epel, Gilly, Levine, Powers, S. Thompson, Watanabe)

216. Ecosystem Ecology and Global Biogeochemistry
   3 units, Spr (Vitousek)
   alternate years, not given 1995-96

349. Seminar in Population Ecology
   1-3 units, Aut, Win, Spr (Ehrlich)

383. Seminar in Population Genetics
   1-3 units, Spr (Feldman)

384. Seminar in Theoretical Ecology
   1-3 units, Spr (Roughgarden)

EARTH SYSTEMS

112. Anthrosphere: Human Interactions with Earth and the Environment — (Same as Civil Engineering 175, Economics 155.)
   5 units, Spr (Goulder)

FOOD RESEARCH INSTITUTE

103. The World Food Economy — (Same as Economics 106.)
   4 units, Spr (Falcon, Naylor)

   5 units, Win (Yotopoulos)

136/236. Population Perspectives in the Third World
   5 units (Arthur)

148/248. The Economies of Development in Greater China and the World
   5 units, Spr (Rozelle)

149/249. Development Theory at Work: Can Africa Succeed?
   5 units, Aut (Fafchamps)

323. Economic Development Theory — Survey
   5 units, Aut (Fafchamps, Rozelle)

327. Renewable Resource Economics and Developing Countries
   3-5 units, Win (Albers)

HEALTH RESEARCH AND POLICY

270. International Health
   2-4 units, Spr (Basch)

HUMAN BIOLOGY

105. Ethnogerontology
   4 units, Spr (Gallagher-Thompson, Yeo)

118. Human Diversity: A Linguistic Perspective
   3 units, Spr (Ruhlen)

120. Human Nutrition
   4 units, Aut (Butterfield)

145. Third World Development
   5 units, Aut (Crow)

148. Environmental Policy
   3 units (A. Ehrlich) not given 1995-96

150. Seminar: Gender-Specific Perspectives on Birth Control
   6 units, Spr (Djerassi)

182. Peasant Society: Economy and Environment — (Same as Anthropology 149A.)
   4 units (Crow) not given 1995-96

LATIN AMERICAN STUDIES

87. Urbanization, Poverty, and Children in Latin America
   5 units, Spr (Morrison)

138/270. Politics and Labor in Latin America
   5 units, Win (Tavares da Almeida)

195. Perspectives on Sustainable Development in Latin America
   5 units, Win (Rosset)

OVERSEAS STUDIES

106H. Man-Environment Interactions: Case Studies from Central Chile — Santiago.
   5 units, Aut (Hajek)

1111. Lecture Series on Immigration and Race in Italy — (Same as Anthropology 1111.) Florence.
   2 units, Aut (Yanagisako)

   5 units, Win (Hajek)

PSYCHOLOGY

Emeriti: (Professors) Leo Ganz, Albert H. Hastorf, Ernest R. Hilgard, Douglas H. Lawrence, Eleanor E. Maccoby
Chair: Ellen M. Markman
Professors: Albert Bandura, Gordon Bower, Herbert H. Clark, John H. Flavell, Leonard M. Horowitz (on leave Winter), John D. Krumboltz, Mark R. Lepper, Ellen Markman, Ha-

Associate Professors: Laura L. Carstensen (on leave Autumn), Anne Fernald

Assistant Professors: John D. E. Gabrieli, James J. Gross, David J. Heeger, Felicia Pratto

Professor (Teaching): Russell D. Fernald


Affiliated Faculty: Albert Ahumada, Jr., Douglas Daher, Vincent D'Andrea, Sam Edwards, Marilyn Hoskins, Karen Huang, Edward Leland, Elise Lenox, Alejandro Martinez, Robert Matano, Donald Norman, Carol Pertofsky, Barbaranne Shepard, Andrew B. Watson

Senior Lecturer: Lyn Carlsmith

Director, Bing Nursery School: Jeanne Lepper

Visiting Lecturer: Diann W. McCants

The Department of Psychology, housed in Jordan Hall, maintains shop facilities and extensive laboratories; the latter are equipped with computers and some are linked directly to the University's computer center. Bing Nursery School, located on campus at 850 Escondido Road, provides a laboratory for child observation, training in nursery school teaching, and research. It was constructed with funding from the National Science Foundation and a special grant from Mrs. Anna Bing Arnold and Dr. Peter Bing.

The department provides (1) courses designed for the general student, (2) a major program leading to the degree of Bachelor of Arts which includes honors and a specialization in one of five content area tracks, and (3) programs of graduate study and research leading to the degree of Doctor of Philosophy. Applications are not accepted for the master's degree except as noted below.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

For the A.B. degree, a total of 65 units in psychology and supporting fields are required; of these, a minimum of 45 units must be completed in psychology. A maximum of 20 units in non-introductory courses in supporting fields (that is, biological sciences, computer sciences, mathematics, physical sciences, and social sciences) may also be counted toward the 65-unit requirement.

Beyond these overall requirements, the 45 units in psychology must include Psychology 1 and 60, and at least two courses from each of the two groups listed below. Group A consists of broad content courses in cognition, perception, physiological psychology, and psycholinguistics. Group B consists of courses in social, developmental, abnormal, and personality.

Group A: 70, 102, 106, 120, 141, 146, 148, 156

Group B: 108, 111, 113, 115, 116, 121, 130, 136

The course lists for the two groups may change from year to year. Students should check with the Academic Assistant.

At least 35 of the 45 units of Psychology must be taken in courses other than independent study and practica. Independent study and practica courses (104, 167, 168, 184, 185, 188) are graded on a mandatory Satisfactory/No Credit basis.

A transfer student must take at least 23 units of course work in the department in order to receive the department's recommendation for graduation. Such students may receive transfer units for courses completed in psychology at any accredited university or college provided that the courses were taught by a regular faculty member and were approved by the Transfer Credit Office. All students must satisfy Group A and Group B requirements through courses completed at Stanford.

Beyond the Minimal Requirement—Many students want a "stronger" program than the minimal requirements listed above. This may be achieved in any or all of these ways:

1. Within the general major, the student may take advanced undergraduate or graduate courses in the department and in supporting disciplines, such as anthropology, biology, statistics, and computer science. The student may also take advantage of widespread opportunities for directed research, working closely with individual faculty and graduate students.

2. The student may apply to the senior honors program, described below.

3. The student may elect to pursue one of four specialization tracks: Health and Development, Computational Neurosciences, Decision Sciences, or Cognitive Sciences.

The training obtained from the pursuit of any of these options is valuable not only for students considering graduate work in psychology, but also those thinking of professional careers outside of psychology.

SPECIALIZATION TRACKS

Students in the major program, including those in the honors program, may elect to specialize in one of four tracks, namely, Health and Development, Computational Neurosciences, Decision Sciences, and Cognitive Sciences. Specialization consists of a coherent sequence of courses leading to advanced undergraduate or even graduate-level courses in an area. Typically, the se-
Quarter. During Winter and Spring Quarters, the proposal is turned in at the end of Autumn Quarter of the senior year. Information is also available at the Undergraduate Research Opportunities office in Sweet Hall.

Two or three faculty members serve as academic advisers for each track. After declaring a major, a student who wants to specialize should discuss the chosen track with an appropriate adviser. Information about the advisers and about the required and recommended courses for each track is available from the Student Services officer in the department.

For information concerning the coterminal bachelor’s and master’s degree program, see below.

HONORS PROGRAM

The senior honors program is designed for exceptionally able students who wish to pursue a year of intensive supervised independent research. Admission to the program is made at the end of the student’s junior year on the basis of (1) excellent academic performance, (2) previous research experience, and (3) recommendations by faculty and/or graduate students. An information meeting about the program is held in Winter Quarter.

Students interested in the program should involve themselves in research as early as possible and acquire a broad general background in a chosen area. The program is particularly appropriate for students planning to go to graduate school in psychology and in other social sciences, as well as computer science, business, counseling, or medical personnel. 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 Student Services officer in the department.

For information concerning the coterminal bachelor’s and master’s degree program, see below.

GRADUATE PROGRAMS

There are no specific course requirements for admission to the doctoral program. However, an applicant should have research experience as an undergraduate, as well as the equivalent of an undergraduate major in psychology. The major focus of the doctoral program is on research training, and admission is highly selective.

Applicants for admission must submit their scores on the Graduate Record Examination (both general and psychology subject tests) as part of the application. This examination may be taken at most universities and colleges.

MASTER OF ARTS

The Department of Psychology normally offers an A.M. degree only to students concurrently enrolled in its Ph.D. program or students concurrently pursuing coterminal A.B. and A.M. degrees. All applicants must satisfy University residency requirements for the degree and are responsible for consulting with their primary departments or the Financial Aid Office about the effects of the proposed program on their current funding.

Stanford undergraduate students who would like advanced training in psychology may apply for a coterminal A.M. degree in psychology. To do so, students should consult with the student services officer in the department. Along with a coterminal program application, applicants must submit (1) a statement of purpose, (2) a program plan specifying the courses in which they intend to enroll to fulfill degree requirements, (3) at least two letters of recommendation from Stanford faculty members familiar with their academic work, (4) a current Stanford undergraduate transcript, (5) SAT scores (which may be requested from the Registrar’s Office), and (6) a written agreement by a member of the psychology faculty to serve as the student’s adviser. This program is limited in size and admissions are highly selective. Students should apply to this program between their eighth and eleventh quarters of undergraduate study.

In exceptional cases, students concurrently enrolled in another doctoral or professional program at Stanford may also apply for the A.M. degree. Such applicants should also consult with the department’s student services officer, and need to submit (1) a statement of purpose, (2) a program plan specifying the courses in which they intend to enroll to fulfill degree requirements, (3) at least two letters of recommendation from Stanford faculty members familiar with their teaching and research.
academic work, (4) complete undergraduate transcript(s), (5) a current Stanford transcript, (6) GRE (or professional school test) scores, and (7) a written agreement by a member of the psychology faculty to serve as the student's adviser.

Students must complete at least 36 units of psychology courses for the degree. (For coterminal degree students, course work for the master's degree may not duplicate courses taken for the undergraduate degree.) Of these 36 units, at least 18 must be in psychology courses numbered 200 or above. Units from Psychology 275 (Graduate Research) may not be counted toward these 18 units; service as a teaching assistant for Psychology 1 or 60, through registration in 257 or 281 (Practicum in Teaching), may only be counted for up to 3 of these 18 units. Two of the graduate courses must be selected from the courses listed as "core course" requirements for the Ph.D. in psychology, one from the 'A' list and one from the 'B' list. In addition, at least one statistics course beyond the introductory level is required. The course must be approved by the student's adviser. All courses to be counted toward the master's degree must be passed with a letter grade indicator (LGI) of 'B-' or better (unless the course is offered only on a Satisfactory/No Credit basis). Demonstration of competence in the design and execution of psychological research is also required for receipt of the master's degree. Normally, this demonstration entails completion of a master's thesis. However, other evidence of substantial experience in the design and conduct of psychological research may, with the approval of the department's Committee on Graduate Studies, be substituted for a formal master's thesis. Students enrolled in the coterminal program must meet the University's residency requirement of 15 full tuition quarters or three tuition quarters beyond the quarter in which 180 units were completed.

DOCTOR OF PHILOSOPHY

In addition to fulfilling the residence requirement for the degree, the following requirements are stipulated.

First-Year Course Requirements—During the first year of graduate study, the student must take 207 (Pro-Seminar for First-Year Graduate Students), at least one approved graduate statistics course, and at least one core course selected from Group A and one core course selected from Group B (listed below).

Group A:
200. Foundations of Cognitive Science
203. Perception
206. Behavioral Neuroscience
210. Human Memory and Learning
214. Psycholinguistics
256. Decision and Judgment

Group B:
211. Advanced Developmental Psychology
212. Social Psychology
213. Personality
216. Abnormal Psychology

The student is expected to spend at least half of the time in research from the beginning of the first year of graduate study to the completion of the Ph.D., normally taking no more than 9 units of course work each quarter. At the end of the first year of graduate study, the student must file with the department a written report of the first-year research activities.

Second-Year Course Requirements—During the second year of graduate study (or as additional courses during the first year), the student must show competence in three additional areas selected from the core group and in a second approved graduate course in statistics. Of the five core courses selected during the first and second years of graduate study, at least two must be selected from Group A and at least two from Group B. The student may meet these requirements either by taking the courses listed above, or by special examination. Further course work prior to admission to doctoral candidacy should be arranged under guidance of the student's adviser.

Third-Year Major Area Paper—During the first week of Autumn Quarter of the fourth year, the student turns in a Conceptual Analysis of the Dissertation Area (CADA). This paper provides a general framework for the research topic of the dissertation, addresses the central issues within the specialty area, and reviews the pertinent literature(s). Typically, the analysis has the kind of scope found in the opening chapters of the more traditional dissertations, but the exact format and scope of the paper is a joint decision made by student and adviser.

At this same time, the student selects two faculty members to read the paper and give feedback and commentary on it. These should be two faculty members most likely to serve on the later orals committee of the dissertation.

A portion of the paper, revised as appropriate, can then become the first section of the actual dissertation proposal. Thus, the student receives additional feedback on CADA at the oral examination itself.

If the student should radically change the area of the dissertation research after CADA has been written, the procedure does not need to be repeated for the second dissertation topic. The student is still expected to be knowledgeable about the literature and problems of any research topics being pursued for the dissertation, but the formal CADA procedure need not be repeated.

Minor Requirements—The candidate must complete either a University minor satisfactory to the minor department, or elect to have the mi-
nor waived by selecting 12 approved units outside the department. A student designing a program of 12 units outside the Department of Psychology is expected to do so in consultation with the adviser.

Dissertation Reading Committee—The candidate must select a dissertation reading committee satisfactory to the department. The minimum membership of this committee must be (1) the principal dissertation adviser, (2) a second member from within the department, and (3) a third member chosen from Psychology or another department.

Orals—The candidate must pass the University oral examination, which is based on the dissertation proposal, not on the defense of the dissertation itself. The reason for this policy is to permit the oral to serve the function of guiding and improving the proposed research. This function can best be served if the oral is scheduled early in the year in which the dissertation research is conducted. It is therefore expected that the oral will be taken by the end of the Autumn Quarter of the fourth year.

Dissertation Requirements—The candidate must complete a dissertation satisfactory to the dissertation reading committee.

Ph.D. candidacy expires five years after admission to candidacy by the University Committee on Graduate Studies. Reapplication requires department reexamination.

STUDENT EVALUATIONS

First-Year Evaluation—It is the department's policy to evaluate the progress of each graduate student at the end of the first year of graduate study. As part of the procedure, each student is required to file with the department a report of the first-year research activities.

Students should discuss this report and the evaluation procedures with their adviser as early as possible in their first year. The report is due on June 1.

If the student fulfills the academic promise displayed upon entrance, he or she is invited to continue to the doctorate.

The first-year evaluation is primarily based on three factors:
1. The quality of research carried out in the first year.
2. Performances in courses (especially required courses).
3. Recommendations of the adviser (including a commitment on the part of that adviser to continue in that role).

Second-Year Evaluation—A similar evaluation is conducted at the end of the second year of graduate training involving the same criteria as the first year; however, the student is not required to submit a paper. Students who do not make satisfactory progress during the second year may be dropped from the program.

THE DOCTORAL TRAINING PROGRAM

As indicated by the requirements described above, a student may concentrate in any one of several areas within psychology. Regardless of area, however, the training program places emphasis on the development of research competence, and students are encouraged to develop those skills and attitudes that are appropriate to a career of continuing research productivity.

Two kinds of experience are necessary for this purpose. One is the learning of substantial amounts of technical information. A number of courses and seminars are provided to assist in this learning, and a student is expected to work out a program, with his or her adviser, that attains such knowledge in the most stimulating and economical fashion.

A second aspect of training is one that cannot be gained from the courses or seminars. This is firsthand knowledge of, and practical experience with, the methods of psychological investigation and study. These methods do not exist in the abstract; they are ways of behaving with the people or animals who are being studied. They are skills and require guided practice for their perfection.

Students are provided with whatever opportunities they need to reach those levels of competence representative of doctoral standing. Continuing research programs, sponsored by members of the faculty, offer direct opportunities for experience in fields represented by the faculty's many research interests.

Each student achieves competence in unique ways and rates. Each student and adviser share in planning a program leading to the objectives discussed. The student is expected to spend half of his or her time on research and normally takes no more than 9 units of course work per quarter.

FELLOWSHIPS, SCHOLARSHIPS, AND ASSISTANTSHIPS

Research and teaching assistantships, United States Public Health Service traineeships, and some University fellowships are available. The type of support offered may vary from year to year. The department depends on the fact that a number of its students receive outside awards. Qualified applicants are asked to take initiative in applying for predoctoral fellowships from the National Science Foundation, the Danforth Foundation, Ford Foundation, and the United States Public Health Service, among others. Applications may be made by college seniors planning to work for a higher degree. Students should apply early in Autumn Quarter of the senior year. For information concerning application forms and procedures, consult representatives from the financial awards office of your home institution.
TEACHING REQUIREMENT

The department views experience in supervised teaching as an integral part of its graduate program. Regardless of the source of financial support, all students serve as teaching assistants for four Psychology courses during their graduate study. Of the four courses, one of them should be Psychology 1, General Psychology, and another should be Psychology 60, Statistical Methods. Students are discouraged from participating in teaching the first year of graduate study. Students typically progress from closely supervised teaching to more independent work. They usually begin by teaching sections of General Psychology and Statistics and then progress to more advanced courses in their area of specialization. They may offer a supervised, but essentially independent, seminar during their final year of graduate study.

Ph.D. MINOR

Candidates for the Ph.D. degree in other departments may elect a minor in psychology. To obtain a minor, the student must complete 20 units of course work at the graduate level in the Department of Psychology, excluding Psychology 275 (graduate-level research). Cross-listed graduate courses can be used to satisfy this requirement.

COGNITIVE SCIENCE PROGRAM

Psychology is participating, along with the Departments of Computer Science, Linguistics, Philosophy, and the School of Education, in an interdisciplinary program of cognitive science. The program is intended to provide students with an interdisciplinary education as well as a deeper concentration in psychology. Doctoral students are eligible to participate in the Cognitive Science program. Students who complete the requirements receive a special designation in cognitive science along with the Ph.D. in Psychology. To receive this field designation, students must complete 30 units of approved courses, 18 of which must be taken in two disciplines outside of psychology.

PSYCHOLOGY COLLOQUIUM

The Psychology Colloquium meets on most Wednesday afternoons at 3:45. Topics of current interest are presented by speakers from Stanford and other institutions. Graduate students are expected to attend.

COURSES

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 '96 issued annually in January.

OPEN TO ALL STUDENTS

Additional courses not listed here are frequently offered in the areas of their special research competence by selected postdoctoral or terminal Ph.D. personnel. These are listed in the quarterly Time Schedules, and the course descriptions are circulated in advance.

1. Introduction to Psychology — The scientific study of behavior focusing on psychological research and theory. Topics: the biological bases of behavior, sensation and perception, emotion, learning, memory, cognition, child development, psychopathology, and social psychology. DR:9(4) 4 units, Aut, Win (Mann, Wandell) MWF 11-12:15 Spr (Zimbardo) MWF 11-12:15

1A. Introduction to Psychology Discussion Section — Optional supplement to 1. Corequisite: concurrent enrollment in 1.

2 units, Aut, Win (Staff)

by arrangement

1 unit, Spr (Staff)

by arrangement

60. Statistical Methods — The elements of statistical description (measures of average variation, correlation, etc.). Develops an understanding of statistical inference, emphasizing 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 (Thompson-Schill) MTWThF 9 Spr (Thomas)

70. Brain and Behavior — Introduction to how the brain regulates behavior and in turn is influenced by behavioral interactions. Behavior is described in physiological terms, organized with respect to evolutionary principles. Topics: neurons, transmission of neural information, anatomy and physiology of sensory and motor systems, regulation of body states and the biology of learning, memory, and psychopathology. DR:5(7)

3 units, Aut (R. Fernald) TTh 11-12:15

102. Perception — A review of the basic processes of vision and hearing. Topics: basic anatomy of the eye and ear, speech perception, color vision, depth perception, etc. DR:9(4)

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

104. Special Laboratory Projects — Independent study. Can be repeated for credit. Prerequisites: 1, 60, and consent of instructor.

1-6 units, any quarter (Staff)

by arrangement
106. Introduction to Cognitive Psychology — Survey and analysis of major topics in cognitive psychology, including perception, memory, problem solving, and reasoning. Emphasis on contemporary research and theory. Prerequisites: 1 and 60, or consent of instructor. DR:9(4)
4 units, Win (B. Tversky) TTh 1:15-2:30

107. Cellular Neuroscience: Cell Signaling and Behavior — Survey of neural interactions underlying behavior. Prerequisites: 1 or equivalent, and elementary biology.
4 units (Wine) not given 1995-96

108. Cultural Psychology — The cultural sources of diversity in thinking, emotion, motivation, self, personality, morality, development, and psychopathology. Prerequisite: 1 or equivalent.
3-4 units (Markus) not given 1995-96

110. Culture and Human Development — Child development and child rearing in diverse cultures, integrating perspectives and research from developmental psychology, anthropology, and population studies. Emphasis on Japan, Kenya, India, and the U.S., examining how cultural traditions and social practices shape the environments of infancy and childhood, and influence human cognitions, emotions, moral judgments, and social behavior across the lifespan.
3 units, Spr (A. Fernald) MW 11-12:15

111. Developmental Psychology — Psychological development from birth to adulthood, emphasizing the infancy, early childhood, and middle childhood years. The nature of change during childhood and theories of development. Supervised experience with children at Bing School, Stanford's Child Development Laboratory School, is available if taken for 5 units. Prerequisite: 1 or equivalent. DR:9†(4)
3 or 5 units, Aut (Flavell) MW 11-12:15

113. Personality — A balanced introduction to the study of personality. Key concepts and research methods; major theoretical approaches and related empirical findings including psychodynamic, trait, biological, humanistic, behavioral, social-learning, and cognitive perspectives. Personality disorders and psychopathology. Prerequisite: 1 or equivalent.
3 units, Spr (Gross) MW 9:30-10:50

113A. Section for Psychology 113 — Corequisite: enrollment in 113.
1 unit, Spr (Gross) by arrangement

114. Ion Transport and Intracellular Messengers — (Graduate students register for 228.) Ion channels, carriers, ion pumps, and their regulation by intracellular messengers in a variety of cell types. Lab demonstrations and brief hands-on introduction to some techniques (e.g., patch clamping). Recommended: introductory course in biology or human biology, or 107.
3 units, Spr (Wine) M 7-9:30 p.m.

115. Social Development — Socialization and the development of social behaviors. Review of research concerning conscience and conduct, altruism and aggression, cooperation and competition, achievement, motivation, and self-control.
3-4 units, Win (M. Lepper) TTh 9-10:50

116. The Psychology of Gender — Research and theory on the socialization and psychological development of women and men. The biological, cultural, and social factors that influence gendered behavior. DR:9†(4)
3 units, Win (Carstensen) MW 9:30-10:50

117. Observation of Children — Seminar on learning about children through guided observations at Bing School, Stanford's Child Development Laboratory School. Physical, emotional, social, cognitive, and language development. Recommended: 111.
3-5 units, Win, Spr (J. Lepper) Th 4-5:30 and by arrangement

118. Development in Early Childhood — Supervised experience with young children at Bing School, Stanford's Child Development Laboratory School. Three units require four hours per week in Bing classrooms throughout the quarter; 4 units require seven hours per week; 5 units require 10.5 hours per week. Weekly seminar on developmental issues in the teaching–learning environment at Bing School. Prerequisite: 111 or 117, or consent of instructor.
3-5 units, Aut, Win, Spr (J. Lepper) T 4-5:30 and by arrangement

119. Human Behavioral Biology — (Enroll in Biology 150.)
5 units, Spr (Sapolsky)

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)
3-4 units, Aut (Markman) MW 11

121. Social Psychology — Interpersonal behavior. Survey of relevant research concerning attitudes, groups, person perception, and selected topics in social psychology. Prerequisite: 1 or equivalent. DR:9†(4)
4 units, Aut (Steele, Pratto, Zimbardo) TTh 1:15-2:45, section by arrangement

of historical periods. Prerequisites: 1, 60, 121.
3 units, Spr (Steinle) MW 1:15-2:30
alternate years, not given 1996-97

124. Research on Aging — Two-quarter seminar on aging, with practicum. Review of current research and participation in ongoing data collection, analysis, and interpretation. Prerequisite: consent of instructor.
4 units, Win, Spr (Carstensen) W 2:15-3:45

125. Psychology and Law — Legal, psychological, and popular views of morality, responsibility, equity, intention, insanity, evidence, crime and punishment; the police; psychological processes in jury deliberation; homicide and aggression; treatment of accused persons. Prerequisite: 1 or 121.
4 units (Rosenhan) not given 1995-96

126. Culture and Self — (See 226.) Prerequisites: 1, 60, 121.
3 units (Markus) alternate years, given 1996-97

127. African American Psychology — Introduction to ethnic psychology, specifically, the psychological dimensions of the Black experience in America. Lectures and readings. Black psychology from its evolution as a concentration area in the social sciences to present concerns that impact Black Americans’ mental health. Students are encouraged to expand on the methodological constructs employed in the study of Black Americans.
3 units, Spr (McCants) MWF 10

128. Research Methods and Experimental Design — Experimental research methods and principles in psychology. Structured research exercises and the design of an individual research project are required. Prerequisite: consent of instructor.
5 units, Spr (M. Lepper) TTh 1:15-3:05

130. Development in Infancy — Development in the first two years of life. Topics: prenatal development and childbirth, perceptual development, cognitive development in infancy, parent-infant interaction, infant social cognition, the development of emotion, and preverbal communication. Prerequisite: 1, 111, or Human Biology core.
3-4 units (A. Fernald) not given 1995-96

132. Laboratory Course in Developmental Psychology — For students interested in acquiring research skills. Focus is on conceptual and methodological issues related to research on early development; training in experimental design, lab and observational procedures, and the collection, analysis, and interpretation of data. Students conduct a series of supervised experiments, with infants and preschoolers, at the Center for Infant Studies in the Department of Psychology and at the Bing School. Limited enrollment. Prerequisites: 111 or 120 or 130, and consent of instructors.
4 units, Win (A. Fernald, Flavell, Markman) MW 11-12:15

132A. Laboratory Section for Psychology 132 — Corequisite: enrollment in 132.
2 units, Win (A. Fernald, Flavell, Markman) F 11-12:15

136. Abnormal Psychology — The characteristics, possible causes, and best treatments for many types of psychological disturbance. Emphasis is on how one builds and tests theories of psychological disturbances. Prerequisite: 1 or equivalent. DR:9(4)
3 units, Spr (Rosenhan) TTh 10-11:15

136A. Section for Psychology 136 — Corequisite: enrollment in 136.
1 unit, Spr (Rosenhan) by arrangement

137. The Interpersonal Basis of Abnormal Behavior — The role of interpersonal problems and processes in producing different forms of psychopathology, from neurotic reactions to schizophrenia. Combines clinical (case study) approach with conventional empirical approaches to clarify the origin, nature, and treatment of emotional disorders. Prerequisite: 136.
3 units, Spr (Horowitz) TTh 9:30-10:50

138. Carl Jung and Analytical Psychology — Introduction focusing on the person of Jung, his seminal philosophical perspectives and their impact on modern thought and life. The formation of analytical psychology with regards to Jung’s past relationship with Freud and later emergence as a prominent 20th-century thinker. Extended discussions of archetypal themes of the shadow, animas/animus (feminine/masculine) and puer/senex (youth/elder). Function of dreams and the interplay between the Jungian paradigm and spirituality.
4 units, Aut (Daher) TTh 1:15-3:05

140. Sleep and Dreams — (Enroll in Human Biology 11.)
3 units (Demet) not given 1995-96

141. Human Neuropsychology — Topics in human neuropsychology. Review of functional organization of human nervous system and of brain imaging techniques (MRI, PET, etc.). Hemispheric specialization and the brain basis of perception, memory, language, emotion, spatial cognition, and problem solving. Neuropsychological deficits in neurological disorders and their implications in understanding normal function. Prerequisite: 1 or equivalent.
3 units, Spr (Gabrieli) TTh 10-11:15

142. Peace Studies — (Same as Education 173X, History 154, Political Science 133.) Interdisciplinary, dealing with the challenges of pursuing peace in a world where the sources of conflict are many and regional, ethnic, and religious antagonisms are rising. The art of creating and maintaining peace is analyzed from historical, social, psychological, and moral perspectives. Goals: illustrate the current and potential contributions of various academic disciplines and critical analyses to the study of peace; and to prepare students to think critically and to act
responsibly and effectively on behalf of peace.
Eight sections: challenges, enemies, theoretical
understandings, justice, security, non-violence, pub-
lic peace processes, peace and you.
5 units, Spr (Bland, Drekmeier,
Holloway, Moses, Noddings, Ross)
MTW 1:15 and by arrangement

143. Conceptual Organization and Development — See 242. Prerequisite: 120 or consent of instructor.

alternate years, given 1996-97

146. Language and Thought — The psychology of language, including production and understanding in utterances; from speech sounds to speaker’s mean-
ing; children’s acquisition of the first language; and psychological bases for language systems. Lan-
guage functions in natural contexts and their rela-
tion to the processes by which language is produced, understood, and acquired. Prerequisite: 1 or Lin-
guistics 1. DR:9(4)

4 units, Aut (H. Clark) MWF 1:15

148. Biological Basis of Behavior — (Same as Hu-
man Biology 157.) The neural and hormonal basis
of animal behavior studied to understand the basis
of behavioral patterns. Multidisciplinary analysis of
the ecological and physiological constraints which
have governed specific adaptions in animal sys-
tems.

3 units (R. Fernald) not given 1995-96

152. Statistical Methods for Behavioral and So-
cial Sciences — For undergraduates; see 252.

153. Statistical Theory, Models, and Methodol-
dy — For undergraduates; see 253.

155. Human Abilities — (Same as Education 255.)
Introductory survey of psychological theory and
research on human cognitive abilities; their nature,
development, and measurement; and their impor-
tance in society. Relation of education and intel-
lectual abilities. Cognitive analysis of verbal reasoning
and spatial abilities. Individual differences in rela-
tion to motivation, personality, gender, and ethnic
differences. Prerequisite: 1 or equivalent. DR:9(4)

1-2 units, Win (Snow) MWF 10

156. Decision and Judgment — (Graduate students
register for 256.) Theory and experiments about
decision making and judgment under uncertainty.
Focuses on the contrast between the rational theory
of judgment and choice, and the psychological
principles that produce judgment biases and cogni-
tive illusions. Prerequisite: elementary concepts of
probability or statistics.

3 units, Win (A. Tversky) MWF 1:15-2:30

159. Emotions: History, Theories, and Re-
search — See 259. Prerequisite: consent of instruc-
tor.

3 units, Win (Zajonc) TTh 3:15-4:30

160. Experimental Methods in Cognitive Science — Examination of experimental research meth-
ods and principles in cognitive psychology, with
some application to neuroscience. Structured re-
search exercises are required. Prerequisite: consent
of instructor.

5 units (Gabrieli)
alternate years, given 1996-97

166. Topics in Perception — Current research top-
ics in perceptual psychology, neurophysiology of
perception, computational models, and computer
vision. Topics: color vision, visual motion percep-
tion, binocular vision, shape perception, visual
search, psychoacoustics, attention, eye movements.
Prerequisite: 102.

1-2 units (Heeger) not given 1995-96

167A. Peer Counseling: Bridge Community —
Instruction in peer counseling. Topics: verbal and
nonverbal skills, the use of open and closed ques-
tions, paraphrasing, working with feelings, summar-
ization, and integration. Instruction through lec-
tures, individual training, group exercises, roleplay
practice with optional video feedback. Sections
discuss topics of relevance to crisis counseling and
student life. Guest speakers from University and
community agencies. Students develop and apply
skills in a variety of settings in the University.

2 units, Aut, Win, Spr (D’Andrea, Staff)
M 3:15-5:05 plus one evening section

167B. Peer Counseling: Chicano Community —
Instruction in basic counseling. Topics: verbal and
non-verbal attending and communication skills, the
use of open and closed questions, working with
feelings, and summarization and integration. Also,
counseling issues that may be salient when working
with Chicanos, including the significance and pro-
cess of Spanish-English code switching in commu-
nication, the role of ethnic identity in self-under-
standing, the relationship of culture to personal
development, and the experience of Chicano stu-
dents in university settings. Lectures, individual
training, group exercises, discussion, role play, and
videotape practice.

2 units, Aut, Spr (Martinez) M 3:15-5:05
section by arrangement

167C. Peer Counseling: The African-American
Community — Instruction in peer counseling with
Blacks. Topics: the concept of culture, Black cul-
tural attributes and their effect on Blacks’ reactions
to accepting counseling, verbal and nonverbal at-
tending, the use of open and closed questions, work-
ning with feelings, summarization, and integration.
Geared toward counseling with Blacks; methods of
instruction include reading assignments, lectures,
guest speakers, group discussion, role play, and
videotaped practice. Students develop and apply
skills in the Black community on campus or in other
settings that the student may choose.

2 units, Aut (Edwards, Hoskins) M 3-4 W 4-5
167D. Peer Counseling: Issues in Sexual Health and Contraception — Provides knowledge of methods of contraception, sexually transmitted diseases, and related issues about sexual health, presented by students and experienced health professionals. Discussion, role play, and peer education outreach projects focus on how cultural diversity, communication skills, and community resources influence personal choice and contraceptive behaviors. Required for Sexual Health Peer Resource Center (SHPRC) peer educators. Recommended: courses in human sexuality and peer education.

2 units, Aut, Win, Spr (Anderson) T 7-10 p.m.

167F. Peer Counseling: Introduction to Asian American Psychology — Companion to 167A. Peer counseling skills not covered. Topics: the Asian family structure, concepts of identity, ethnicity, culture, and racism in terms of their impact on individual development and the counseling process. Emphasizes the development of an appreciation and empathic understanding of Asians in America. Lectures, readings, discussion, and group exercises.

2 units (Huang)

167N. Peer Counseling in Native American Community — Instruction in basic counseling techniques. Topics: verbal and nonverbal communication, strategic use of questions, methods of dealing with strong feelings, and conflict resolution. How basic elements of counseling apply to Native American Indian ways of helping. Salient themes when working with Native Americans including client, counselor, and situational variables in counseling, the significance of nonverbal communication, the role of ethnic identity in self-understanding, the relationship of culture to personal development, the impact of family on personal development, gender roles and Native Americans, and the experience of Native American Indian students in university settings. Lectures, individual skill development, group exercises, and role practice.

2 units, Spr (La Framboise, Martinez) W 1-3

169. Statistics for Social Scientists — (Enroll in Economics 80, Statistics 190.)

3-5 units, Aut (Romano)
Win (Amemiya)
Spr (Creljin)

171. Psychological Aspects of Addiction — The medical, psychological, and social issues involved with alcohol and drug abuse and dependence. Students are presented with the etiological theories and psychological perspectives on addiction. Limited enrollment.

3 units, Spr (Matano) M 2:15-4


3 units, Aut (Gross) Th 1:15-3:45

173. Undergraduate Seminar: Infancy Research — For students involved in research on infant development. Prerequisites: 130, 132.

3 units (A. Fernald) not given 1995-96

174. The American Drinking and Drug Culture — The role of alcohol and other drugs in American society and in the university community. Social, political, and physiological factors which influence drinking and drug-taking practices.

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

175. Applications of Social Psychology — (Graduate students register for 271.) The application of social psychological theory and research to a variety of issues and problems: evaluating the impact of social interventions, strategies, and shortcomings in personal and social decision making, effects of 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) Th 1:15-3:05

176. Psychophysiology — See 236. Prerequisite: consent of instructor.

4 units, Win (Gross) Th 1:15-5:45

177. Social Psychology of Physical Deviance and Disability — (Enroll in Human Biology 177.)

3 units, Aut (Hastorf, Scott) TTh 11-12:15

179. Theoretical Approaches in Social Psychology — (Graduate students register for 279.) The field of social psychology organized by the theories and systems that tie together wide-ranging findings and phenomena. Possible topics: how attitudes, beliefs, even our self-concepts originate in our actions; the importance of construal and cognition in social-psychological phenomena; and the relationships between thought, emotion, and health. Emphasis is on developing a systematic understanding of the field of social psychology.

3 units (Steele) given 1996-97

180. Undergraduate Seminar: Selected Topics in Psychology — (Refer to quarterly Time Schedule for seminar listings.)

180A. HIV/AIDS Training Education (Project SAVE: Stanford AIDS/HIV Volunteer Educators) — Project SAVE is designed to increase students' knowledge about HIV disease, transmission, and prevention, and its psychosocial, legal, and ethical implications. Instructors and guest speakers provide a thorough overview of HIV/AIDS issues in our society. Students develop training and presentation skills which are applied to conducting HIV educational presentations and campus projects (Stanford AIDS/HIV Awareness Week, community workshops).

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

180B. Alcohol Responsibility Education — The Freshman Alcohol Responsibility and Management (FARM) course is designed to increase students' knowledge about risks associated with the use of alcohol, and risk reduction strategies (personal, social, and environmental), and to develop personal...
communication and training skills to be able to conduct "Alcohol Management" presentations and workshops for freshman and other students new to Stanford University.

2 units, Aut (Lenox) Th 7-9 and by arrangement

181B. Dynamics of Time Perspective — Analysis of the ways in which individual differences in time perspective influences emotions, motivation, cognitive functioning, and the range of behavioral choices. The origins, correlates, and consequences of biased time perspectives. Research teams design, execute, analyze, and write an original investigation on the topic.

3.4 units, Win (Zimbardo) MW 1:15 plus sessions by arrangement

181C. Studies of Animal Behavior — Animal behavior offers insights about evolutionary adaptations. Seminar on the origins of the study of animal behavior and its development to the present. Discussion of original research papers. The use and misuse of parallels between animal and human behavior. Possible field trip to observe animals in their natural habitat.

3 units, Aut (R. Fernald) W 3:30-5:30

181E. Biology and Culture in Language Development — Do humans have an "instinct" for language, or is language a complex cultural artifact acquired by means of general learning mechanisms? The debate by researchers in language development, neurobiology, psycholinguistics, and anthropology. Topics: language acquisition in children, linguistic abilities in apes, biology of language disorders, evolution of speech and language, and the role of culture in language development.

3 units, Spr (A. Fernald) M 3:15-5:30

181F. Social Psychology and Social Policy — Introduction to theory and research on contemporary social problems in psychology including racial and ethnic strife, environmental degradation, poverty, educational underachievement, homelessness, crime, and related questions of social policy. Debates about the rationale for, and wisdom of, "intervention" programs ("headstart," affirmative action, economic or legislative remedies) in light of the lessons provided by social psychology and its subdisciplines (judgment and decision making, negotiation, and dispute resolution). Emphasis on processes and biases relevant to self-perceptions and interpersonal and intergroup perceptions. The nature of "wise" social interventions and the role, and limitations, of empirical research in addressing contentious social issues.

3 units, Aut (Ross) W 1:15-3:45

182. Senior Honors Research — Limited to students in senior honors program. Work includes finishing the research and data analysis, written dissertation, and presentation at the Senior Honors Convention.

0-4 units, Spr (B. Tversky) by arrangement

183. Advanced Research — Limited to students in senior honors program. May be taken for up to 4 units Autumn Quarter; up to 8 units total Autumn and Winter Quarters. Autumn Quarter: weekly research seminar, independent research project under the supervision of an appropriate faculty member. A detailed proposal is submitted at the end of Autumn Quarter. The research continues during Winter and Spring Quarters. A progress report demonstrating sufficient progress is required at the end of Winter Quarter.

0-4 units, Aut (B. Tversky) T 3:15-5:05
0-8 units, Win (B. Tversky) by arrangement

184A,B,C. Paraprofessional Internship Program — Primarily for students interested in counseling, clinical, educational, and community psychology through field experience. Opportunities for working with emotionally and behaviorally disturbed children; with adolescents in high school peer-counseling programs or through Juvenile Probation; with adults at the V.A. hospitals, mental health clinics, or centers for the elderly. On-site training and supervision. No previous experience required, but internships demand a commitment of time and energy of 8-12 hours per week for two consecutive quarters. Weekly seminar explores diversity of clinical opportunities and specific therapeutic techniques.

1-5 units, Aut, Win, Spr (Carlsmith) T 1:15-2:30 and by arrangement

185A,B,C. Experience-Based Study on the Meaning of Being Disabled — Comprehensive look at a number of disabilities; the life experience of the individual affected and his or her family. The roles of doctor, therapist, special education teacher, counselor, and other professionals involved in the life of the disabled person. Weekly seminars; students also teach swimming and/or other skills to children and adults with different disabilities (mental, physical, emotional, learning, etc.) for at least three hours weekly, keep an ongoing journal, and participate in a final group or individual action project.

3 units, Win, Spr (Carlsmith, Wright) Th 7:30-9:30p.m. and by arrangement

188. Reading and Special Work — Independent study. Can be repeated for credit. Prerequisite: consent of instructor.

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

191. Undergraduate Seminar: Personal and Social Change — Analysis of social cognitive approaches to personal and social change. Applications of sociocognitive theory to the modification of psychological dysfunctions in familial, educational, medical, and organizational settings. Ethical and value issues in behavior change.

3 units, Spr (Bandura) M 1:15-3:05
192. Undergraduate Seminar: Aggression — Analysis of the causes and modification of individual and collective aggression. Major issues in aggression: social labeling of injurious conduct, social determinants of aggression, effects of the mass media, institutionally sanctioned violence, terrorism, psychological mechanisms of moral disengagement, and legal sanctions and deterrence doctrines.

3 units, Win (Bandura) T 1:15-3:05


3 units (Pratto)

alternate years, given 1996-97

194. Undergraduate Seminar: Development of Children’s Knowledge about the Mind — (Graduate students register for 294.) Prerequisite: consent of instructor.

3 units (Flavell) not given 1995-96

195. Language and Deception — Seminar on deceptive, exploitative, and other noncooperative uses of language. How is language used to deceive or exploit? Where are these techniques practiced and why? What are the personal, ethical, and social consequences of these practices? Prerequisite: 146 or Linguistics 1 or Philosophy 181.

3 units, Win (H. Clark) TTh 3:15-4:30

198. Undergraduate Topical Seminar on the Psychology of Gender — (Graduate students register for 238.) In-depth coverage of a specified topic related to psychology of gender. Prerequisite: 116.

3 units (Carstensen) not given 1995-96

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, 121.

4-5 units (Zimbardo)

alternate years, given 1996-97

PRIMARILY FOR GRADUATE STUDENTS

Undergraduate students admitted only by consent of instructor.


1-3 units, Aut (Rumelhart) MW 9:10-11:15

201. Cognitive Neuropsychology — Survey of major topics in human cognitive neuropsychology. Current research about the brain basis of attention, memory, language, perception, spatial cognition, and problem solving. Implications for theories of normal cognition. Prerequisite: 140 or consent of instructor.

1-3 units, Win (Gabrieli) WF 1:15-2:15

alternate years, not given 1996-97

203. Foundations of Vision — Quantitative and physiological aspects of human vision. Image formation by the eye, retinal sampling and wavelength encoding, neural encoding within the retina and cortex; performance measures including spatial contrast sensitivity, localization, color sensitivity, multiresolution representations of image data; color, motion, and depth perception.

1-3 units, Win (Wandell) MW 11:12-1:15

alternate years, not given 1996-97

206. Behavioral Neuroscience — The biological substrates of behavior, emphasizing topics currently being investigated by resident and visiting neuroscientists at Stanford. Possible topics: neuroanatomical and neurophysiological aspects of vision, audition, motor control and learning and memory, and hormonal and neurochemical aspects of stress and motivation.

1-3 units (Wandell, Wine)

alternate years, given 1996-97

207. Proseminar for First-Year Graduate Students — Required of and limited to first-year graduate students in psychology. Survey of major issues in contemporary psychology with their historical backgrounds.

2-3 units, Aut (Markman) TThF 9-10:30

210. Memory and Learning — Survey of major topics in human memory, emphasizing information-processing approaches to short-term memory, organization and long-term memory, forgetting, retrieval processes, prose memory, imagery, emotional memory, autobiographical memory, and skills. Prerequisite: graduate standing in psychology or consent of instructor.

1-3 units, Aut (Bower) MW 10:30-12

211. Developmental Psychology — Prerequisite: graduate standing in psychology or consent of instructor.

1-3 units, Win (A. Fernald, Flavell, Markman) TTh 3:5

212. Social Psychology — Prerequisite: 121 or graduate standing in Psychology.

1-3 units, Aut (M. Lepper, Ross)

TTh 1:15-3:05
213. **Personality** — Survey of theory and research in personality. Prerequisite: graduate standing in psychology.

3-4 units, Spr (Cartensen) Th 1:30-4 alternate years, not given 1996-97

214. **Psycholinguistics** — Prerequisite: graduate standing in Psychology or consent of instructor.

1-3 units, Spr (H. Clark) WF 1:15-2:30

216. **Abnormal Psychology** — Literature in abnormal psychology approached from a cognitive and interpersonal perspective. Attempts to integrate psychoanalytic, cognitive, and behavioral views of the nature, origin, and treatment of abnormal behavior. Prerequisite: graduate standing in psychology.

1-3 units, Win (Horowitz) TTh 9-10:20

219. **Graduate Seminar on Selected Topics in Cognition** — Prerequisite: consent of instructor.

1-3 units, Aut (B. Tversky, S. Peters) Th 1:15-3:05

220. **Graduate Seminar: Special Topics in Cognitive Development** — Prerequisite: graduate standing in psychology or consent of instructor.

1-3 units (Markman) alternate years, given 1996-97

221. **Applied Vision and Image Systems** — Lectures/demonstrations illustrate the design and control of color imaging devices (display, printers, cameras, and scanners). Aspects of human vision relevant to software and hardware design. Topics: digital halftoning, color calibration, color metrics, flicker sensitivity, motion compensation, human spatial resolution, visual masking, JPEG principles, printer design, scanner design, color software architecture.

1-3 units, Spr (Wandell) TTh 9:30-10:45

223. **Psychological Perspectives on the Self** — See 123.

1-3 units, Spr (Steele) MW 1:15-2:30

225. **Psychology and Law** — See description 125.

1-4 units (Rosenhan) not given 1995-96

226. **Culture and Self** — (Undergraduates register for 126.) Recent perspectives on the nature and functioning of self; anthropological and psychological literature on Japanese, Chinese, Korean, Indian, African, and Arab selves; and the consequences of variation in selfhood for cognition, learning, emotion, motivation, and psychopathology.

1-3 units (Markus) alternate years, given 1996-97

227. **Graduate Seminar: Psychobiology** — Behavior in the biological context of a particular species. Behavioral patterns at each level of analysis from the molecular through societal. Discussion of original research papers on questions about the physiological bases of behavior. The rationale and experiments which underlie current concepts about how the brain controls behavior.

1-3 units, Spr (R. Fennald) T 3:15-5:15 alternate years, not given 1996-97

228. **Ion Transport and Intracellular Messengers** — See 114.

1-3 units, Spr (Wine) M 7-9:30 p.m.

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

1-3 units (Staff) alternate years, given 1996-97

231. **Graduate Seminar: Self-Efficacy** — Origins, mediating mechanisms, and diverse effects of people's beliefs in their efficacy to exercise control over events in their lives. Alternative theories of perceived control; nature and structure of self-efficacy belief systems; major sources of efficacy beliefs; processes through which they affect human functioning; developmental analysis of efficacy beliefs over life course; application of self-efficacy theory to cognitive development, health functioning, clinical dysfunctions, organizational functioning, and athletic performance; exercise of collective efficacy to accomplish social change.

1-3 units (Bandura) not given 1995-96

235. **Counseling Theories and Intervention from a Multicultural Perspective** — (Enroll in Education 233.)

3 units, Spr (LaFromboise)

236. **Social Psychological Perspectives on Stereotyping and Prejudice** — Advanced seminar: overview of psychophysiology, a rigorous empirical study of mind-body relations. Focus: two response systems (electrodermal and cardiovascular) and applications to lie detection, emotions, and health. Critical thinking skills are emphasized.

4 units, Win (Gross) Th 1:15-3:45

237. **Career and Personal Counseling in Culturally Diverse Settings** — (Same as Education 234.) Methods of integrating career and personal counseling with clients and counselors from differing backgrounds. Practice with selected assessment instruments. Case studies of biocultural role conflict. Informal supervised experience.

3 units, Aut (Krubolitz) M 3:15-5:05 and by arrangement

238. **Seminar on the Psychology of Gender** — See 198. Prerequisite: graduate standing in psychology.

1-3 units (Carstensen) not given 1995-96

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 so-
248. Introduction to Test Theory — (Enroll in Education 252.)
3-4 units, Spr (Haertel)

249A. Problems in Measurement: Item Response Theory — (Enroll in Education 353A.)
3 units, Win (Haertel)
alternate years, not given 1996-97

250. Individual Counseling Psychology Methods — (Same as Education 227.) Techniques for helping individual clients learn successful procedures for coping with problems, e.g., shyness, depression, anxiety, obesity, and aggression.
3 units (Staff) alternate years, given 1996-97

252. Statistical Methods for Behavioral and Social Sciences — (Undergraduates register for 152.) For students with experience and training in empirical research. Analysis of data from experimental through factorial designs, randomized blocks, repeated measures; regression methods through multiple regression, model building, analysis of covariance; categorical data analysis through two-way tables, logistic regression. Integrated with the use of statistical computing packages. Prerequisites: Psychology or Education student, Education 191; Statistics 190. (PSE)
1-6 units, Aut (Thomas) MWF 1:15-2:45
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 signal detection, profile, trend, factor, and discriminant analysis, and multivariate analysis of variance. Students analyze data and write a research report weekly. Lab required. Prerequisite: 252 or Education 257.
1-3 units, Win (Thomas, Pratto) Th 11-12:15

255. Graduate Seminar: Selected Topics in Personality and Abnormal Psychology — Prerequisite: consent of instructor.
1-3 units, Aut (Horowitz) by arrangement

256. Decision and Judgment — For graduate students. See 156.

257. Individually Supervised Practicum — Relevant teaching experience for graduate students as part of their program of study. Can be repeated for credit. Satisfies INS requirements for Curricula Practical Training. Prerequisites: graduate standing in psychology, consent of adviser.
3-5 units, Aut, Win, Spr (Wandell)
by arrangement

258. Graduate Seminar in Social Psychology Research — For students who are already or are planning to become involved in research on social construal and the role that it plays in a variety of phenomena, notably the origin and escalation of conflict.
1-3 units, Aut, Win, Spr (Ross) M 3:30-5

259. Emotions: History, Theories, Research — (Undergraduates register for 159 with consent of instructor.) Theoretical and empirical issues in the
domain of emotions. History of emotion theories, current approaches, and the interaction between emotion and cognition.

1-3 units, Win (Zajonc) TTh 3:15-4:30


1-3 units (Rumelhart) alternate years, given 1996-97

261. Psychology of Problem Solving and Reasoning — (Same as Education 295.) Introduction to results and methods of research on cognitive processes of solving problems and reasoning. Focus is on accomplishments and limitations of research conducted since 1970, including views of cognition as situated activity.

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

262. Memory Systems — Recent findings indicate different kinds of memory are mediated by separable neural networks. Different patterns of memory failures are seen in a variety of neurological disorders and in terms of functional consequences for normal memory, such as unconscious learning. Prerequisites: 141, 201, or consent of instructor.

1-3 units, Spr (Gabrieli) TTh 2:15-3:30 alternate years, not given 1996-97

264. Selected Topics in Human Learning — Recent empirical and theoretical analyses of verbal learning, learning from text, learning of concepts, and intellectual skills. Emphasis on information processing theories of memory and retrieval. Readings from recent research journals with topics determined partly by students’ interests. Discussion format. Prerequisite: 210 or consent of instructor.

1-3 units, 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.

1-3 units (Rumelhart) alternate years, given 1996-97

266. Topics in Perception — Current research topics in perceptual psychology, neurophysiology of perception, computational models, and computer vision. Topics: color vision, visual motion perception, binocular vision, shape perception, visual search, psychoacoustics, eye movements. Prerequisite: 203.

1-2 units (Heeger) not given 1995-96

267. Vision and Image Processing Laboratory — Through lectures and hands-on experience with a computer, explores image processing, human and computer vision, and computer graphics. Topics: image representation and image coding, sampling and filtering, motion analysis, color.

1-3 units (Heeger) alternate years, given 1996-97

268. Psychophysics and Cognitive Psychology for Musicians — (Same as Music 151.) Basic concepts and experiments relevant to the use of sound, especially synthesized, in music. Introduction to elementary concepts; no previous background assumed. Listening to sound examples important. Emphasis is on salience of various auditory phenomena in music. Prerequisite: some basic knowledge of music.

1-3 units, Win (Cook, Matthews, Pierce, R. Shepard) Th 9-10:50

269. Graduate Seminar in Personality Research — Can be repeated for credit. Prerequisite: graduate standing in psychology.

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

270. Applications of Social Psychology — See 175.

272. Special Topics in Psycholinguistics — May be repeated for credit. Prerequisite: consent of instructor.

1-3 units, Win (H. Clark)

274. Selected Topics in Judgment and Choice — Seminar addresses current research topics in the study of judgment and choice, including the determinant of confidence, the effect of context, the resolution of intrapersonal conflict, and the role of framing. Prerequisite: graduate standing in psychology or consent of instructor.

1-3 units, Aut (A. Tversky) T 4-5:30

275. Graduate Research — Research of intermediate nature; undertaken with members of departmental faculty. Prerequisite: consent of instructor.

1-15 units (Staff) by arrangement

276. Computational Neuroscience — Introduction to computational neuroscience: models of individual neurons, linear systems models, models of vision, audition, and learning.

1-3 units, Win (Heeger, Rumelhart) TTh 11-12:15 alternate years, not given 1996-97

277. Seminar on Emotion — Overview of emotion theory and research. Topics: What is an emotion? Biology and destiny. But we are not all the same! Feelings and faces. Reason and the passions. Focus is on interesting, experimentally tractable ideas. Prerequisites: 1, consent of instructor.

1-3 units, Aut (Gross) Th 1:15-3:45

279. Theoretical Approaches in Social Psychology — See 179.

1-3 units (Steele) alternate years, given 1996-97
280. Doctoral Research — For dissertation. Prerequisite: consent of instructor.
   1-15 units (Staff) by arrangement

281. Practicum in Teaching — Enrollment limited to students serving as teaching assistants in selected psychology courses. Can be repeated for credit.
   3-5 units, Aut, Win, Spr (Staff) by arrangement

283. Interdisciplinary Seminar on Conflict Resolution — (Same as Economics 386, Law 325, Operations Research 366.) Addresses problems of conflict resolution and negotiation from an interdisciplinary perspective. Presentations by faculty and by scholars from other universities.
   1-2 units, Win (Alexander, Arrow, Ross, Tversky, Wilson) T 4:10-5:30

288. Becoming a Professional Psychologist: A Practicum — Tactics and strategies for getting a job and keeping it. Enrollment limited to psychology graduate students beyond the first year.
   2-3 units (Zimbardo) alternate years, given 1996-97

290. Law and Social Science — (Same as Law 229.) Viewing social science as an analytic tool, examines its role in American legal process. The relevance of social science theory and empirical findings for such issues as copyright, deterrence, human responsibility, fair employment, and jury dynamics. The nature of expertise, and its relevance to these matters. Emphasis on scientific method and its relevance to legal analysis.
   2-3 units, Win (Rosenhan) MT 12:50-2:05

292. Social Cognition — The history of "cognitive" approaches in social psychology and recent findings in areas of "social cognition," including categorization and stereotyping, attention, impression formation, person memory, attitudes, automaticity, mood effects, and collective mental representations. Students read a text and two to three research articles weekly and write one-page summaries to facilitate class discussions, plus a review paper or research proposal for the class. Prerequisites: graduate student in psychology or undergraduate who has taken 121; consent of instructor.
   1-3 units (Pratto) not given 1995-96

293. The Psychology of Group Relations — Seminar on theories of intergroup relations concentrating on social psychological influences (stereotyping, group identity, self-esteem, prejudice, socio-political ideology, group cohesion, and status).
   1-3 units (Pratto) alternate years, given 1996-97

294. See 194.

296. Methods in Personality and Social Psychology — Focus is on developing and consolidating a set of methodological skills in personality and social psychology and in allied disciplines (sociology, education, and communication). Experimental methods, survey and multivariate methods. Topics: formulating the research problem, experimental and quasi-experimental design, going from abstract ideas to concrete instances, measuring and analyzing change data, observational techniques, handling research artifacts, professional and ethical issues, triangulation, archival and correlational studies, validity and reliability of measurement, organizing data. Practicum format; students develop a real research proposal over the course of the quarter.
   1-3 units, Win (Steele, Pratto) TTh 1:15-2:30

297. Seminar for Coterminal Masters' Students — Discussion of contemporary issues and student research. Student and faculty presentations.
   1-2 units, Spr (L. Ross) F 1-3

298. Contemporary Topics in Social Psychology — In-depth analysis of selected issues in contemporary life understood from various social psychological theories and perspectives.
   2-4 units, Spr (Zimbardo, Zajonc) MW 1:15-2:45

299. Effective Teaching — Seminar designed to enhance teaching effectiveness for graduate TAs within the department. Covers all major topics in undergraduate education in psychology; planned and developed in conjunction with advanced-level graduate students.
   1 unit (Zimbardo, Rosenhan) alternate years, given 1996-97

300. 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, Aut (Rosenhan) T 3:20-6:20

355. Jury Decision-Making — (Same as Law 327.) Limited to Law and graduate students who have consent of instructor. Seminar examines the psychological processes regulating jury decision-making. The cognitive aspects of a presentation (the amount of information that can be retained and processed), story, and construal processes. The social psychological aspects of group decision making. Preparation for trial, including trial simulation, voir dire, and juror selection.
   1-3 units (Rosenhan) not given 1995-96
Government plays an important, ubiquitous role in contemporary society. Moreover, the growing complexity of public policies, the political processes that give rise to them, and the organizations that implement them have created a need in government, business, and the nonprofit sector for people who understand how government operates. The Public Policy Program provides students the foundational skills and institutional knowledge necessary for understanding the policy process and provides an interdisciplinary course of study in the design, management, and evaluation of public sector programs and institutions. The major in Public Policy is useful as preparation for 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.
4. Seniors are required to participate in one quarter of the Senior Seminar (Public Policy 200). Majors also must submit at least one research paper during the senior year and present it before the Senior Seminar. The senior paper may be a term paper for either the Senior Seminar or another course or an honors thesis.

5. A maximum of 10 units may be taken on a Satisfactory/No Credit basis in the prerequisite courses for the Public Policy Core. All courses required for Public Policy majors must be taken for a letter grade.

6. Students must complete the Public Policy core and their concentration area courses with an average letter grade indicator (LGI) of 2.0 or higher.

7. To become a major in Public Policy and to be nominated for the A.B. degree, students must complete an application, available in Building 60, room 61B. For additional information, drop by or phone 415-723-3452.

The Public Policy Program offers courses to prepare students for making effective use of an internship (Public Policy 179, 182). Students may also participate in the Integrated Scholar Intern Program combining directed reading and research with an internship.

HONORS PROGRAM

The Public Policy Program offers students the opportunity to pursue honors work during the senior year. In order to graduate with honors in Public Policy, a student must:

1. Apply for admission to the honors program no later than the end of the second week of Autumn Quarter of the senior year.

2. Complete the requirements for the A.B. in Public Policy and achieve a letter grade indicator (LGI) of 3.3 in the following courses: the Public Policy core, the student’s concentration area courses, the Senior Seminar, and Public Policy 199 (senior research). Courses not taken at Stanford are not included in calculating the LGI.

3. Enroll in at least 10 but no more than 15 units of Public Policy 199 during the senior year and receive a final LGI on the senior thesis of at least a ‘B+.’

Students who intend to pursue honors work should plan their academic schedules so that most of the core courses are completed before the beginning of the senior year, and all of the core and concentration courses are completed by the end of Winter Quarter of senior year. This scheduling gives students the time and the necessary course background to complete a senior research project in Spring Quarter. In addition, juniors who may wish to pursue a senior thesis are encouraged to enroll in Public Policy 197 (Junior Honors Seminar) during Winter Quarter. This course focuses on developing a research plan and the research skills necessary to complete a thesis.

To apply, a student must submit a completed application to the Public Policy Program office with a brief description of the thesis. The student must obtain the sponsorship of a faculty member who approves of the thesis description and who agrees to serve as a thesis adviser. Students intending to write a thesis involving more than one discipline may wish to have two advisers. To be admitted to the honors program, students must:

1. Submit a completed application for honors work to the Public Policy Program office by the end of the second week of Autumn Quarter of the senior year.

2. Achieve an LGI of at least 3.3 in Public Policy courses by the end of the junior year.

The honors thesis must be submitted to both the thesis adviser and the Public Policy Program office. Graduation with honors requires that the thesis be approved by both the adviser and the director of the Public Policy Program. The role of the director is to assure that the thesis meets the standards of excellence of the program. The grade for the honors thesis is determined solely by the adviser. The thesis adviser sets the deadlines for receiving the final draft of the thesis; however, the director sets the deadline for theses to be considered for University and departmental awards. In order to graduate with honors at the spring commencement, a student must submit a final bound copy of the thesis to the Public Policy Program office no later than Friday, June 7. In order to be considered for awards given to outstanding senior theses, a student must submit a copy of the thesis to the Public Policy Program office no later than Wednesday, May 22.

Members of the core faculty in Public Policy are listed above and are available to provide assistance in selecting a senior thesis topic. For additional information, contact the Public Policy Program office.

COURSES

50. Current Trends in Policy Making — Guest speakers address current policy issues (the environment, health care, education, and the budget). Discussions about these policies, stressing interactive learning that puts students in the positions of the policy makers.

3 units, Spr (Buckley, Cogan)

101. Politics and Public Policy — (Same as Political Science 101P.) The domestic policy-making process, emphasizing how elected officials, bureaucrats, and interest groups shape government policies in various areas including tax, environmental, and social-welfare policy, given their goals and
available tactics. How public policies are formulated and implemented. The results of this process using equity and efficiency criteria. Prerequisite: Political Science 1 or 10.

102. Organizations and Public Policy — 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.

103A. Introduction to Political Philosophy — (Same as Philosophy 30.) Introduction to some fundamental issues of political life. Why do laws have authority? Can it be fair for some people to be wealthier than others? How free should society be? Do we need a government at all? These questions are explored through a careful reading of the classic texts in political philosophy, from the 4th century B.C. to the present. DR:8(3)

103B. Ethics and Public Policy — (Same as Science, Technology, and Society 110.) Ethical issues in science- and technology-related public policy conflicts. Develops the capacity for rigorous critical analysis of complex, value-laden policy disputes. Topics: the nature of ethics and morality; the nature of and rationales for liberty, justice, and human rights; and the use and abuse of these concepts in recent and current policy disputes. Cases from: biomedical, environmental affairs, the technical professions, communications, and international relations. A Writing Across the Curriculum course. DR:8(3)

104. Economics and Public Policy — 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. Writing Focus course. Prerequisites: Economics 51, 52 (52 may be taken concurrently).

105. Quantitative Methods and Their Application to Public Policy — Applications of statistical methods, rather than methodology per se. Risk assessment in the evaluation of biohazards and medical techniques and technologies; comparisons of such information-gathering techniques as surveys, experiments, or simulation studies; methods of expressing and evaluating uncertainty; and the interpretation of such quantitative techniques of data analysis as regression. Prerequisites: Economics 80, 102.

179. Preparation for Internship Learning — Provides students with the knowledge and skills necessary for effective learning through an internship. Focus is on identifying and negotiating internship assignments which yield effective service and substantive learning appropriate to students' academic interests. Introduction to the theory and practice of self-directed "field" learning (e.g., clarifying goals and objectives, critical reflection on experience, problem-solving, assessing experiential learning, and understanding the interplay between experience and analysis in field research). If appropriate, students are placed with faculty who serve as sponsors of internship-related directed study.

182. Policy Making and Problem-Solving at the Local and Regional Level — Public policy issues, processes, and organizations at the local and regional level. Focus: public and non-profit sector institutions and organizations; structure and context of community problem-solving and local policy formulation, implementation, and analysis. Case study investigation of public issues in the community, e.g., homelessness, toxic waste disposal, child care, land use planning. Opportunity to learn from local policy makers and community leaders.

195. Business and Public Policy — The multi-faceted relationships between business, government, and interest groups, with emphasis on companies and interest groups as strategic actors in the "nonmarket environment." Companies attempt to shape public policy through government processes and international politics; interest groups attempt to shape public policy through government processes and by exerting direct influence on businesses; politicians attempt to mediate conflicts of interest between and among businesses and interest groups. Each relationship transcends the conventional view of a business as an exclusively or predominantly market focused entity, that takes as given government actions and ignores interest groups and their collective actions. Modules: media and private collective action, business strategies in government arenas, international business and the nonmarket environment, and corporate responsibility and ethics.
196. The Political Economy of the Federal Budget — Applies the tools of economics and political science to study how the federal government makes its budgetary decisions. Factors that have contributed to the growth in federal spending, taxation, and the national debt; congressional and executive branch budget processes and their effects on government policymaking; spending programs (Social Security, Medicare, welfare, and infrastructure programs). Prerequisites: Economics 51, 52 (Economics 52 may be taken concurrently), Political Science 1. 
5 units (Cogan) not given 1995-96

197. Junior Honors Seminar — Primarily for students who expect to write an honors thesis. Weekly sessions discuss writing an honors thesis proposal (prospectus), submitting grant applications, and completing the honors thesis. Readings focus on writing skills and research design. Students select an adviser, outline a program of study for their senior year, and complete a prospectus by the end of the quarter. Seniors working on their theses also may enroll and present their research to the seminar participants. Seniors are required to make substantial progress on their thesis by the end of the quarter.  
3 units, Win (Rothwell)

198. Directed Readings in Public Policy  
1-5 units (Staff) by arrangement

199. Senior Research  
1-15 units (Staff) by arrangement

200A,B,C. Senior Seminar — Designed to give Public Policy students the opportunity to make oral presentations and to write a seminar-length paper on a topic in public policy. Topic and methods of analysis used are determined by student in consultation with instructor. A limited number of lectures and seminars deal with the question of how to conduct "good" research in public policy. Prerequisites: completion of core courses in Public Policy or consent of the instructor.  
200A. 3 units, Aut (Heller)  
200B. 3 units, Win (Heller)  
200C. 3 units, Spr (Heller)

201. Theories of International Cooperation and Conflict — Theories about conditions that promote cooperation or conflict between states. Objective: to identify strategies that promote cooperative solutions to international disputes and evaluate those strategies in terms of their historical effectiveness. The application of game theoretic models of rational action as tools for assessing relations between nations.  
4 units, Aut (Bueno de Mesquita)

202. Political Foundations of Transitional Economies — Cross national and regional comparisons of emerging market economies. What social arrangements might be important for structuring markets and the state's role in defining rules, with the state being a site of and arbiter of contestation. Coalition foundations of regime choice from a public choice perspective. How organized groups from business, labor, government agencies, and political parties affect the distribution of property rights. The East Asian experience and its relevance for other developing regions, especially Africa; the lessons of European economic development for the present; reforming the informal sector, institution building, the relationship of democracy and economic reform; the relationship of regimes to interest groups; and the social and political foundations of the policy-making process. How does the system of social stratification change as a result of reform? How do societal organizations change in response to new internal operations and a transformed external context? Reforms fail because the social and political consequences are ignored; social costs and the regime's political foundations are critical for sustained market-led growth. The theoretical elaboration to the conditions of emerging markets in the contemporary world.  
5 units, Aut (Root)

RELIGIOUS STUDIES

Emeriti: (Professors) René Girard, Edwin M. Good, David S. Nivison  
Chair: Lee Yearley  
Professors: Arnold M. Eisen, Bernard R. Faure, Van A. Harvey (on leave Autumn), Lee Yearley  
Associate Professors: Carl W. Bielefeldt, Hester G. Gelber  
Assistant Professors: Alice Bach (on leave), Rudy V. Busto, Howard Eilberg-Schwartz (on leave), Philip J. Ivanhoe (on leave)  
Professor (Teaching): Robert C. Gregg (Classics and Religious Studies)  
Acting Assistant Professors: Thomas Leininger, Shulamit Magnus, Robert Royalty  
Visiting Professor: William Spohn (Spring)  
Visiting Associate Professor: Yisrael Knohl (Spring)  
Acting Instructors: Mark Berkson, Kenneth Fromm

The purpose of Religious Studies is to understand and interpret the history, literature, thought, and social structures of various religious traditions and cultures. The department offers courses at several levels, described below.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The general requirements for an A.B. in Religious Studies are 60 units of course work in the department (no more than 10 units of which can be taken Satisfactory/No Credit), including 9 to
15 units in introductory courses (numbered 1-89). At least two introductory courses must be in diverse religious traditions (see below). At least 40 units are to be taken in courses numbered above 100, including no fewer than three seminars numbered above 200.

In meeting these requirements, a student is expected to structure a coherent program of study in consultation with his or her adviser. This may be done in a number of ways. The student may choose to concentrate in one of three areas: Religious Traditions; Ethics and Philosophy of Religion; or Religion, Culture, and Comparative Studies. (Religious Traditions consists of three subfields: East Asian Religions, Judaism, and Christianity.) Alternatively, the student may construct a self-designed concentration across these (or other) areas, again in consultation with the adviser.

The student is expected to take a minimum of 25 units in the area of concentration. Relevant courses listed in one area may, with the written consent of the undergraduate director, be counted in another. Approved courses offered by other departments may also be counted.

Each major is encouraged to write a senior essay in his or her concentration. The essay provides the opportunity for a sustained treatment of a specific topic central to the student’s interests. Research for and writing of the essay, if chosen, will count as a 5-unit course to be credited toward the required 60-unit department total, as well as toward the 25-unit concentration total.

HONORS PROGRAM

Majors in Religious Studies should consider the possibility of writing an honors essay in Religious Studies. This essay may be on any approved topic in Religious Studies or, in special cases, interdisciplinary. The honors essay is expected to be approximately 40 pages in length and can represent as much as 10 units of work in the senior year.

Students wishing to take honors in Religious Studies should consult with the undergraduate director by the beginning of the Winter Quarter of the junior year so as to take advantage of courses relevant to the proposed research. Prior to this consultation, the student should have explored possible topics with members of the faculty expert in the field of interest.

Upon approval by the undergraduate director, the student enrolls for 2 units of credit in Religious Studies 198 in Spring Quarter of the junior year to develop, under supervision of a department faculty member, a detailed honors essay proposal with a preliminary bibliography graded Satisfactory/No Credit. Grades of ‘S’ are counted towards the total required for the major (60) even if permission to pursue the honors program is not given.

By May 15 of the junior year, the student should have presented a statement of the proposed topic and the method of investigation to the undergraduate director. This statement should be no less than five double-spaced pages in length and in addition should contain a bibliography of works to be consulted together with an appended list of courses taken or to be taken that are germane to the topic. After approval of the undergraduate director, the proposal is submitted to the professorate for approval or disapproval. Upon approval, the chair of the department appoints a tutor and a second reader. In the case of an interdisciplinary topic, a second reader from another department is assigned.

No special seminars or courses are required as a prerequisite for honors other than the individual work necessary for writing the thesis. In addition to the 2 units of credit taken in the last quarter of the junior year, students may elect to take as many as 10 but no less than 5 credit units of 198 on writing the thesis. These units must be in addition to the total number of units required for the successful completion of the major.

The tutor supervises the development of the essay; a complete first draft is submitted no later than the first day of the quarter preceding graduation. This draft is revised in the light of the tutor’s criticisms. The tutor, with a second reader, assigns the final grade. Essays must receive a ‘B’ or better to receive honors.

The student is encouraged to make use of a foreign language relevant to his or her work.

MAJOR IN RELIGIOUS STUDIES AND PHILOSOPHY

The Departments of Religious Studies and Philosophy jointly nominate for the A.B. students who have completed a major in the two disciplines. See a description of this joint major under the “Philosophy” section of this bulletin, or in the guidelines available from the undergraduate director of either department.

GRADUATE PROGRAMS

MASTERS OF ARTS

University regulations pertaining to the A.M. are listed in the “Graduate Degrees” section of this bulletin. The following requirements are in addition to the University’s basic requirements.

The student completes at least 36 units of graduate work at Stanford beyond the A.B. degree, including a required graduate seminar (304A or B). Residence may be completed by three quarters of full-time work or the equivalent.

The student’s plan of courses is subject to approval by the graduate director. No field of specialization is expected, but students may focus work in particular areas. Advanced and graduate courses in other departments may be taken.
No thesis is required; a thesis, if elected, may count for as many as 9 units. Each student demonstrates reading knowledge of at least one foreign language.

DOCTOR OF PHILOSOPHY

University regulations regarding the Ph.D. are found in the “Graduate Degrees” section of this bulletin. The following requirements are in addition to the University’s basic requirements.

Residence — Each student completes three years (nine quarters) of full-time study, or the equivalent, in graduate work beyond the A.B. degree, and a minimum of 72 units of graduate course work (excluding the dissertation).

Field of Study — The Ph.D. signifies special knowledge of a field of study and potential mastery of an area of specialization within it. The faculty of the department has established certain fields of study in which its strengths and those of other Stanford departments cohere. They are: East Asian religions, Judaic studies, Western religions, and modern Western religious thought. Students who wish to specialize in other fields must obtain early approval by the faculty.

Stages of Advancement — The three stages through which the student advances to the degree are: (1) in the first two years, the student refines an area of specialization within the chosen field of study in preparation for candidacy; (2) after attaining candidacy, the student concentrates on the area of specialization in preparation for the qualifying examination; (3) the student writes a dissertation and defends it in the University oral examination.

Languages — Each student demonstrates a reading knowledge of two foreign languages, including French or German. Each student also demonstrates reading knowledge of other ancient or modern languages necessary for the field of study, the area of specialization, and dissertation topic.

Courses — Each student satisfactorily completes the two graduate seminars (304 A and B) before the candidacy decision. Other courses are taken with the approval of a faculty adviser in consideration of the student’s field of study.

Candidacy — At the end of each academic year, the department’s faculty recommend second-year students for candidacy on the basis of all relevant information, and especially on the student’s candidacy dossier which includes the approved declaration of an area of specialization, certification for one foreign language, and two substantial papers written for courses during the previous two years.

Teaching Internships — At least two teaching internships under the supervision of faculty members are undertaken at a time negotiated with the graduate director. Students receive academic credit for the required internships, which are projects of academic training and not of employment.

Qualifying Examination — To qualify for writing a dissertation, the student must successfully pass a comprehensive examination in the chosen field and the area of specialization.

Dissertation — The dissertation contributes to the humanistic study of religion and is written under the direction of the candidate’s dissertation adviser and at least two other members of the Academic Council. The University oral examination is a defense of the completed dissertation.

JOINT Ph.D. IN RELIGIOUS STUDIES AND HUMANITIES

Religious Studies participates in the Graduate Program in Humanities leading to the joint Ph.D. in Religious Studies and Humanities described in the “Humanities Special Programs” section of this bulletin.

COURSES

Course levels:
1-89 Introductory (4 or 5 units)
101-189 Topics in Religion (4 or 5 units)
197-199 Undergraduate Directed Reading (variable units)
201-289 Seminars for Undergraduates and Graduates (5 undergraduate units or 4 graduate units)
299 Graduate Directed Reading (variable units)
301-399 Graduate Seminars, Research, and Teaching (variable units)

RELIGIOUS TRADITIONS

ASIAN RELIGIONS

11. Religious Classics of Asia — S. Asian texts, contexts, and nontexts from the Vedas, Buddhism, Advaita Vedanta, and Tantrism. Limited enrollment. DR:2(*) or 8(3*) 4 units, not given 1995-96

14. Introduction to Buddhism — Introduction to Zen Buddhist religious thought, focusing on selected issues in several representative texts. DR:2(*) or 8(3*) 4 units, Spr (Bielefeldt)
20. Chinese Religious Thought and Practice — Introduction to the religious traditions of China, emphasizing Buddhism and Taoism. DR: 2(*)
   4 units, Aut (Faure)

55. Introduction to Chinese Thought — (Same as Philosophy 46) Religious and philosophical thought of early China, especially the “Classical” period, 550-200 B.C. Development of Chinese thought as an extended dialogue among thinkers who provided uncommon and often contradictory answers to a common set of problems. Limited enrollment. DR: 2(*) or 8(3*)
   4 units (Ivanhoe) not given 1995-96

116. Japanese Buddhism — History and teachings of Buddhism in Japan, emphasizing the early and medieval periods. DR: 2(*)
   5 units (Bielefeldt) not given 1995-96

117. Syncretism and Sectarianism in Chinese Buddhism — Dialectical relationships between sectarian and syncretic tendencies, conservative and subversive elements, and orthodoxy and heterodoxy in development of Chinese Buddhism. Prerequisite: consent of instructor.
   5 units (Faure) not given 1995-96

118. Ritual in East Asian Buddhism — Rituals and symbolic representations of the relationship between sacred and profane in E. Asian religious traditions.
   4 units (Faure) not given 1995-96

119A. Neo-Confucianism — (Same as Philosophy 114.) Introduction to later Confucian thought as represented in the Song through Qing dynasties. Introduction to Buddhist concepts which provided some of the theoretical foundations for reinterpretation of Confucian thought in later phase. The thought of Cheng Hao, Cheng Yi, Zhu Xi, Wang Yangming, Dai Zhen, and Zhang Xuecheng. Prerequisite: 55 or consent of instructor.
   4 units (Ivanhoe) not given 1995-96

   5 units, Win (Faure)

136. Buddhist Yoga — Introduction to Buddhist models of spiritual practice, with emphasis on issues in the interpretation of the contemplative path. Limited enrollment.
   4 units (Bielefeldt) not given 1995-96

150. Mahayana Buddhism — Introduction to the Lotus school of Mahayana; its Indian sources, Chinese formulation, and Japanese developments.
   5 units, Aut (Bielefeldt)

170. Sex and Gender in East Asian Religions — How Asian religions (Buddhism and Taoism) dealt in theory and practice with the questions of sex and gender. The normative views found in each tradition; the models transmitted through mythology, ritual, and hagiography; the monastic definition of sexual norms and transgression, and of legitimate and illegitimate sexuality; the various conceptions of the body, and of desire, monastic discipline, and renunciation; the ritualization of sex and gender and the construction of a gendered religious experience through the Buddhist and Taoist discourses on embryology; and the role of women in such predominantly male traditions.
   4 units, Aut (Faure)

210. Speech and Writing in the Buddhist Traditions — Using Western “literature” on writing and morality (Derrida, Ong, Goody), examines various conceptions of speech and writing found in E. Asian religions, specifically the way writing has transformed the Chan/Zen tradition, and our interpretation of it.
   4 units (Faure) not given 1995-96

211. Philosophical Texts of the Ming Dynasty — (Same as Philosophy 212.) Primary text: Huang Zongxi’s Mingruxuean, a history of Ming Dynasty philosophers. Focuses on structure and theory of organization and approach to text. Additional readings from Wang Yangming and Li Zhi. Prerequisite: reading knowledge of classical Chinese.
   5 units (Ivanhoe) not given 1995-96

212. Interpreting Confucian Texts — (Same as Philosophy 212.) Illustrates critical importance of historical and philosophical issues to the task of interpretation. Introduction to Chinese commentarial tradition. Seminar; pace and range determined by constituents. Prerequisite: consent of instructor.
   5 units (Ivanhoe) not given 1995-96

221. Ch’an/Zen and Local Religion — Relationships between Ch’ an/Zen tradition and Chinese or Japanese local religion, focusing on forms of symbolic mediation (ritual, meditative techniques, etc.) in both religious traditions. Prerequisite: consent of instructor.
   5 units (Ivanhoe) not given 1995-96

230A. Zen Buddhism Seminar — Selected topics in Ch’an and Zen; may be repeated for credit.
   5 units (Bielefeldt) not given 1995-96

256. Japanese Buddhism Seminar — Selected topics. May be repeated for credit. 1995-96 topic: recent studies of the medieval period.
   4 units, Aut (Bielefeldt)

   5 units, Spr (Bielefeldt)

CHRISTIANITY

24. Introduction to Christianity — Historical development of Christianity from its origins to the present, showing how Christians have understood themselves as members of Christian communities. Primary source texts are basic to un-
understanding the varieties of Christianity; e.g., excerpts from Paul’s epistles, the Benedictine Rule, Calvin’s Institutes, the Book of Mormon, and liberation theology. DR:8(3)

4 units (Gelber) not given 1995-96

25. Introduction to New Testament Literature — The more important writings in the New Testament (and several non-canonical early Christian works) and recent scholarly treatment of this body of literature. Emphasis is on the historical and social dynamics which influenced the New Testament’s leading ideas, including its differing portraits of Jesus and its several understandings of divine action.

5 units (Gregg) not given 1995-96

47. Modern Christian Thought — The origins and development of Protestant “Neo-orthodox” theology from Barth’s Romerbrief to Tillich’s Systematic Theology.

5 units, not given 1995-96

65. Introduction to Christian Ethics — Concepts, sources, and methods employed in the ethical reflections of major Christian thinkers from traditional to contemporary (e.g., Augustine, Aquinas, and Stanley Habermas). Their understandings of society, the meaning of our lives, the kind of people we ought to be, and how we make practical moral judgments. DR:(8)3

5 units, Spr (Leininger)

132. Two Gospels: Matthew and Thomas — Questions about the early collection and uses of the teachings of Jesus through reading of one canonical and one non-canonical Gospel. Attention to “Q” source of Jesus-sayings, and related topics.

5 units, Spr (Gregg)

145. Protestantism — Development of Protestantism from Reformation to the present.

5 units (Harvey) not given 1995-96

146. Christian Fundamentalisms — Considers the diversity of Evangelical traditions in the U.S. Readings in the history, theology, and cultures of Evangelical Christianities from diverse points of view.

4 units (Busto) not given 1995-96

234. The Virgin Mary and Images of Power — Studies through art and literature the emergence of the Virgin Mary as a symbol of religious and cultural values from earliest legends to the modern era. Emphasis on the Middle Ages.

5 units (Gelber) not given 1995-96

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, Aut (Gelber)

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 1995-96

JUDAISM

15. The Hebrew Bible: Issues of Power — Fundamental concepts and contradictions in the history of pre-exilic Israel, emphasizing the transition from tribal confederation to national kingdom found in the biblical books of Exodus, Judges, and Samuel. Interrelationship of power struggles between the human and the divine; historical clashes between Israel and its ancient neighbors. Moses as reluctant prophet, David as ambitious king. Emphasis on the nature of Israel’s political community and the relations between power and authority, political and sacred order. Four evening films. DR:7(2) or 8(3)

5 units (Bach) not given 1995-96

23. Introduction to Judaism — Historical development of Jewish religious thought and practice, from the biblical period to the present. Various kinds of texts reflecting that development: scriptural, liturgical, midrashic, legal, historical, and philosophical.

DR:8(3)

4 units, Win (Eisen)

53. Jews and Judaism in America — Examination of the interaction between the character of the American Jewish community and the forms of Judaism developed in this country, against the background of American ethnicity. Historical, literary, sociological, and theological materials are used. DR:3 or 8(3)

4 units, Win (Eisen) not given 1995-96


5 units (Staff) not given 1995-96

128. Women and Judaism — Role and image of women in classical Judaism; responses of modern Jewish women to traditional conceptions of women and femininity. Recent attempts to create a feminist Judaism. DR:†

5 units (Staff) not given 1995-96

161. Modern Jewish Thought: The Meaning of Life — Key texts and thinkers in 20th-century Jewish thought that focus on God, the self, love, death, and the quest for goodness. Thinkers include Buber, Heschel, Kook, Levinas, and Soloveitchik.

5 units, Win (Eisen)

162. Conception of the Self and Jewish Identity in Modern Jewish Thought — Jewish philosophical and theological constructions of Jewish identity from Maimonides through Joseph Soloveitchik. How modern Jewish thinkers understand the self in general and how Jewish identity that is built upon this conception of self in particular.

5 units, Win (Fromm)
166. Myth and Ritual in Judaism — Festivals in the Jewish tradition. DR:8(3)
5 units, Spr (Knohl)

5 units (Staff) not given 1995-96

214. The Book of Genesis and Beyond — Literary-critical investigation of the patterns and topics in the book of Genesis, including creation, motherhood, covenant, brothers. Postbiblical texts such as Jubilees, Genesis, Rabbah, and other expansions of Genesis narratives are studied as examples of early reader-response criticism of the Bible. Prerequisite: 15 or consent of instructor.
5 units (Bach) not given 1995-96

231. The Bible in Fiction, Fiction in the Bible
5 units, Aut (Bach)

260. Contemporary Jewish Thought: Jewish Feminism and Jewish Tradition — Jewish women’s relationship to Jewish tradition, and the theology and religious practices of contemporary Jewish feminism. Topics: gender in traditional Jewish society; traditional women’s spirituality, rituals, and liturgy; gender and Jewish modernity; the feminist critique of Jewish tradition and the creation of alternative traditions; the “feminization of Judaism.”
5 units, Spr (Magnus)

281. Encounters Between Modern Philosophy and Judaism
5 units, Eisen (Staff) not given 1995-96

ETHICS AND PHILOSOPHY OF RELIGION

42. Philosophy of Religion — Classic and modern questions in the philosophy of religion traced through Western and Eastern traditions: coherence of theism, relativism, verification and ethics of belief, implications of science. Readings include traditional and modern texts. DR:8(3)
5 units, Win (Gelber)

113. Zhuang Zi — (Same as Philosophy 113.) History of Western philosophical interpretations of the Daoist text, Zhuang Zi. Survey of interpretations, emphasizing works of A.C. Graham, Chad Hansen, Wu Kuang-ming, Lee Yearley, and David Wong. No knowledge of Chinese is required. Separate readings for those who know Classical Chinese. Prerequisite: 55 or consent of instructor.
5 units (Ivanhoe) not given 1995-96

164. Morality of Peace and War — Moral, political, and religious issues surrounding conflict and conflict-resolution, especially in a nuclear age. General nature of peace and war, their theory and practice; just war tradition and pacifism; women and war. DR:8(3)
5 units (Staff) not given 1995-96

4 units, Win (Gelber)

168. Divine Justice in Medieval Thought and Literature — Medieval ethical beliefs studied through legends, myths, saints’ lives, literature, and the ethical theories of Medieval scholars.
4 units (Gelber) not given 1995-96

174. From Kant to Kierkegaard — Survey of main currents of theology and religion in Germany, emphasizing themes of the knowledge of God and the problem of alienation.
5 units (Harvey) not given 1995-96

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 (Staff) not given 1995-96

5 units (Bach) not given 1995-96

245. Comparative Religious Ethics — Introduction to the theory and practice of comparative religious ethics, focusing on comparisons of Chinese thought (e.g., Confucianism, Daoism) with Western ethical traditions (e.g., classical Greek, continental). The theory, methodology, and problems of comparative ethics and comparative religious thought. Ethics in Chinese thought. Analysis of comparative works. Issues of relativism and pluralism, the importance of the comparative approach, the role of metaphysics in ethical thought, problems in hermeneutics and the possibility of a universal morality. Prerequisite: some familiarity with Western ethical traditions.
5 units, Win (Berkson)
247. **American Religious Ethics** — Is there a distinctive American approach to the relation of ethics and religion? Representative texts of American Puritans, Transcendentalists, Pragmatists, and Naturalists, with attention to experience, conversion, moral discernment, and social responsibility.

5 units, Spr (Spohn)

266. **Medical and Legal Ethics** — Investigates ethical problems and assumptions of medicine and law, adopting a "principles and cases" approach and interrelating the concerns of the two professions.

5 units (Staff) not given 1995-96

272. **Skepticism and Morality** — Metaethics. What is the nature and justification of moral truth claims?

5 units (Staff) not given 1995-96

274A. **Sigmund Freud**

5 units (Yearley) not given 1995-96

274D. **Nietzsche's Zarathustra**

5 units (Harvey) not given 1995-96

275. **Love and Justice** — Philosophical and theological accounts of love and justice, emphasizing how they relate to self-sacrifice, equality, violence, and human finitude/vulnerability. Is love ideally indiscriminate and therefore antithetical to justice? Is justice a single virtue equally binding on all human beings? How are we to conceive (and act on) related values like rationality, human rights, and civil liberties?

5 units (Staff) not given 1995-96

277. **Religious Existentialists** — The theology of Rudolf Bultmann.

5 units (Harvey) not given 1995-96


5 units (Harvey) not given 1995-96

279. **Wittgenstein on Religion** — The significance of the "late Wittgenstein" for religious belief. Prerequisite: consent of instructor.

5 units, Win (Harvey)

286. **Character and the Good Life** — Is it possible or desirable to revive classical notions of good character and the good life? Are such ideals irrelevant to modern pluralistic societies? These questions are pursued in modern works that analyze the issues and classical definitions, Western and Chinese, of human excellence. Limited enrollment.

5 units (Yearley) not given 1995-96

287. **The Nature of Self**

5 units, Spr (Harvey, Yearley)

**RELIGION, CULTURE, AND COMPARATIVE STUDIES**

**IE. 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:2(*) or 8(3*)

5 units, Aut (Yearley)


5 units (Staff)

7. **American Indian Religions** — Basic themes in the beliefs and traditions of Indian peoples. Reconsideration of how American Indians have been studied. Cultural conflict and exchange among Indian peoples, Mexicans, Europeans, and Africans.

4 units (Busto) not given 1995-96


DR:3† or 8†(3)

5 units (Busto) not given 1995-96

26. **Dead Sea Scrolls, Christianity, and other Ancient Judaisms** — Jewish practices and expression in the Second Temple period, between the Maccabean Revolt (167 BC) and the destruction of the Temple in 70 AD. Readings and discussion of ancient texts in translation including selections from the Dead Sea Scrolls, apocalypses, Philo, Josephus, the New Testament, and Rabbinic literature.

4 units, Win (Royalty)

112. **Sexual Politics in the Ancient World** — Study of biblical and classical texts that indicate sources of gender bias. Topics: construction of gender and social reality in ancient texts; the female divine in biblical religion; ways in which changing social attitudes, especially issues of gender and sexuality, challenge traditional values expressed in the Bible. Biblical stories of Sarah and Hagar, Ruth, Esther, Deborah, Judith; classical texts include Homer, Hesiod, Euripides' *The Bacchae*, Aristotle.

DR:7†(2) or 8†(3)

5 units (Bach) not given 1995-96

134. **Reading the Feminine in Ancient Near Eastern Texts** — The connections between religion and gender in the foundational Western texts of the Sumerian, Babylonian, Canaanite, and Israelite traditions, focusing on the divine realm and the secular world. Emphasis is on literary analysis of ancient religious myths and epic texts. Images of male and female deities in literary and visual images.

4 units (Bach) not given 1995-96

---

287. **The Nature of Self**

5 units, Spr (Harvey, Yearley)
143. Chicano/a Religious Traditions — The religious traditions that created and continue to influence the history, politics, and formation of Mexican American communities. Topics: ancient Mesoamerica, Mexican Catholicism, Movimiento “indigenismo,” Evangelicos, Latino theology, Chicana innovations.
4 units, Win (Busto)

148. Social Theory and Religion
5 units (Eisen) not given 1995-96

149. Theories of Religion — The origin and persistence of religious behavior and belief in the modern period. Philosophical, sociological, historical, and psychological theories, “classic” and contemporary.
5 units (Harvey) not given 1995-96

157. Readings in Greco-Roman Religion — Texts present philosophical and religious thought and point towards activities of discrete groups.
5 units (Gregg) not given 1995-96

163. Religion and Ethnicity — Religion and issues of race, class, and gender in the history and development of racially ethnic communities. Religion as promoting or resisting assimilation. Issues: revitalization, theologies of liberation, dissent and transformation within traditions. DR: 3f
5 units, Aut (Busto)

165. Religious Ritual — Classical and contemporary theories of religious ritual with case studies from a variety of traditions.
5 units (Eisen) not given 1995-96

171. Medieval Religious Thinkers
5 units, not given 1995-96

172. Sex, Body, and Gender in Medieval Religion — Anxiety about sex and the body increased markedly during the early years of Christianity, while the doctrine of the Incarnation put the human body at the center of religious concern. Ideals of virginity, chastity, aesthetic self-denial of necessities like food, sleep, and freedom from pain were central to lay and clerical piety. The religious theory and practice associated with questions about sex, body, and gender in the Middle Ages as constructed in literature, mythology, ritual, mystic, and monastic texts.
4 units, Spr (Gelber)

179. Religion in Science Fiction and Fantasy — What religion is to us can be discerned in the ways we imagine it to be. The place of religion in the modern literary imagination through science fiction texts and films. These are assessed in conjunction with theoretical texts that define religion in the academic imagination. Students construct a fictional religion or religious situation.
5 units (Gelber) not given 1995-96

5 units (Faure) not given 1995-96

213. Myth in the Ancient Near East—Myth as genre; connection between mythologies and religious systems. Myths of Sumer, Babylon, Egypt, Canaan, and Greece (Gilgamesh, Enuma elish, Baal and Anath, Hesiod’s Theogony) compared with Israel’s myths of creation, flood, divine realm. Myth in contemporary culture and social institutions.
5 units (Bach) not given 1995-96

225. Syncretism and Revitalization Movements — Reading and reevaluating “classic” models of religious change. Case studies in religious change under conquest, colonialism, and crisis.
4 units (Busto) not given 1995-96

240. Jew, Pagans, and Christians in Late Antiquity — Investigation of distinctive expressions of Judaism, Roman polytheism, and Christianity from 100-450, emphasizing interactions between the groups. Primary documents and new studies of late Roman religious-political competition and conflict.
4 units, Win (Gregg)

241. Asceticism in Pagan and Christian Antiquity
4-5 units (Gregg) not given 1993-96

5 units, Aut (Busto)

4 units, Win (Busto)

261. Modernization/Secularization — Reexamination of these two fundamental concepts in light of recent historical, sociological, anthropological, and philosophical developments.
5 units, Spr (Eisen)

262. Religion and Masculinity — The way in which masculinity is constituted as a cultural and religious symbol. The role that religious symbols and practices play in the shaping of manhood, moving be-
tween ethnographic and historical literature concerning the psychological and sociological factors shaping the image of manhood.

5 units (Staff) not given 1995-96

270. Science and Religion — From Galileo and Newton to Einstein, religion and science have been deeply intertwined, yet science now challenges traditional religious belief. The questions science raises through the reading of historical texts and modern debates.

5 units (Gelber) not given 1995-96

276. Topics in Race and Religion — Seminar on issues in the intersection of race and religion. Topic: religious strategies of liberation for racially ethnic communities in the U.S. Prerequisite: consent of instructor.

4 unit (Busto) not given 1995-96

UNDERGRADUATE DIRECTED READING

197. Senior Essay — Prerequisite: consent of instructor and of the department.

Aut, Win, Spr (Staff) by arrangement

198. Honors Essay — Prerequisite: consent of instructor and of the department.

Aut, Win, Spr (Staff) by arrangement

199. Individual Work — Prerequisite: consent of instructor and of the department.

Aut, Win, Spr (Staff) by arrangement

GRADUATE DIRECTED READING

299. Individual Work — Prerequisite: consent of instructor.

Aut, Win, Spr (Staff) by arrangement

GRADUATE SEMINARS, RESEARCH, AND TEACHING

Topics of directed research (numbers ending in 9) vary each year according to student initiative and faculty research interests.

304A. Theories and Methods in the Study of Religion — Required of all graduate students in Religious Studies. Various approaches to the study of religion. Prerequisite: consent of instructor.

4 units, Aut (Yearley)

304B. Theories and Methods in the Study of Religion — (See 304A.) Required of all graduate students in Religious Studies. Various approaches to the study of religion. Prerequisite: consent of instructor.

4 units, alternate years, given 1995-96

310. Buddhist Studies Proseminar

5 units (Bielefeldt) not given 1995-96

311. Buddhist Studies Seminar

5 units (Bielefeldt) not given 1995-96

314. Advanced Classical Chinese Texts — (Same as Philosophy 314.)

4 units (Ivanhoe) not given 1995-96

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 1995-96

319. East Asian Religions — Directed research.

(Bielefeldt, Faure, Ivanhoe, Yearley) by arrangement

321. Graduate Seminar in Modern Judaism — Prerequisite: consent of instructor.

4 units (Eisen) not given 1995-96


(Bach, Eisen, Gregg) by arrangement

339. Medieval Western Religions — Directed research.

(Yearley, Bielefeldt) by arrangement

369. Religion and Literature — Directed research.

(Bach) by arrangement

370. Graduate Seminar in Religious Ethics — Topics and authors in Western religious traditions, concentrating on those in the Christian tradition. Topics in comparative religious ethics, especially those involving E. Asia and the West. Prerequisite: consent of instructor.

4 units (Yearley) not given 1995-96

379. Religious Thought — Directed research.

(Ivanhoe, Bielefeldt, Eisen, Gelber, Yearley, Harville) by arrangement


(Eisen, Faure, Harvey, Yearley) by arrangement

390. Teaching in Religious Studies — Required supervised internship.

4 units, Aut, Win, Spr (Staff) by arrangement

392. Candidacy Essay — Prerequisite: consent of graduate director.

variable units, Aut, Win, Spr (Staff) by arrangement

395. Master of Arts Thesis

2-9 units (Staff) by arrangement
The A.M. program, which may be taken either separately or coterminally with an A.B. degree program, is directed by the CREES steering committee, which is composed of faculty members affiliated with the center. The interdisciplinary A.M. program typically serves three types of students:

1. Those who intend to apply to a Ph.D. program involving Russian and East European studies and who need to enhance their academic skills and credentials.

2. Those who intend to pursue advanced degrees and/or careers in such fields as government, journalism, business, law, or education, and who wish to establish a corollary competence in Russian and East European studies.

3. Those who are as yet undecided on a career but who wish to continue an interest in Russian and East European studies.

Each A.M. candidate works with the CREES academic coordinator who advises on a program of coursework, monitors the student's progress toward completing the degree, and assists the student in planning for postgraduate employment or further education. In addition, each A.M. candidate is encouraged to consult with CREES-affiliated faculty members concerning academic and career plans.

UNDERGRADUATE PROGRAMS

There is no established interdisciplinary undergraduate degree program in Russian and East European Studies at Stanford University. However, with appropriate faculty approval, an undergraduate may petition to set up an individualized program (see the “Individually Designed Majors” section of this bulletin.)

COTERMINAL A.B./A.M.

To qualify for a coterminal A.M. degree in Russian and East European Studies, a student must, besides completing University requirements for the A.B. degree:

1. Submit a coterminal application for admission to the program no earlier than the beginning of the eighth quarter, and no later than the end of the 11th quarter of undergraduate study. Students with advanced placement and transfer credit must apply at least four quarters before the expected master’s degree conferral date. Applications may be obtained from Graduate Degree Progress Section of the Registrar’s Office. The annual deadline for all applications, to the A.M. program in Russian and East European Studies is January 1. The Admissions Committee considers coterminal applications at the same time that it reviews applications from outside Stanford and from other
graduate degree programs within the University.

2. Include in the application a program which outlines, by quarter, the schedule of courses the student plans to complete toward the A.M. degree. The student should seek the advice of his or her proposed adviser in Russian and East European Studies in drafting this schedule. The application also should include: (a) a current Stanford transcript, (b) a one-page statement of purpose, and (c) two letters of recommendation from Stanford professors. Applicants must have an average letter grade indicator (LGI) of at least 'B' (3.0). Coterminal applicants must take the General Test of the Graduate Record Examination and have the results sent to Graduate Admissions, the Registrar’s Office.

3. Complete 15 full-time quarters or the equivalent, or three quarters in full-time residence after completing 180 units; and complete, in addition to the 180 units required for the bachelor’s degree, a minimum of 40 units for the master’s degree.

The same courses may not be counted to meet both undergraduate and graduate requirements, and no courses taken before the junior year may be used to meet the course requirements for the master’s degree. Requirements for completion of the A.M. degree are summarized below; a more detailed description of the program and requirements is available from the center.

SLAVIC THEME HOUSE
Slavianskii Dom, at 650 Mayfield Avenue, is an undergraduate residence which houses 50 students and offers them a wide variety of opportunities to expand their knowledge, understanding, and appreciation of Russia and Eastern Europe. A member of the Department of Slavic Languages and Literatures serves as resident fellow.

OVERSEAS STUDIES PROGRAMS
Undergraduate students interested in the study of the languages, history, culture, and social organization of Russia and Eastern Europe can apply to study at Stanford centers in Berlin and Moscow. For information about these programs, contact the Overseas Studies office in Sweet Hall.

GRADUATE PROGRAMS
MASTER OF ARTS
ADMISSION
CREES offers an interdisciplinary master’s degree in Russian and East European Studies (REES). An application packet may be obtained directly from Graduate Admissions, Registrar’s Office, Stanford University, Stanford, CA 94305.

In addition, prospective applicants are strongly encouraged to consult with the academic coordinator at CREES regarding the application process.

The materials in the application packet provide detailed instructions for applying. To qualify for admission to the program, the following apply:

1. Applicants must have earned an A.B. or B.S. degree or the equivalent.
2. Applicants must have completed at least three years of college-level Russian language study or the equivalent prior to beginning the program. Other languages of Eastern Europe or the former Soviet Union may be accepted on a case-by-case basis.
3. Applicants whose native language is not English are ordinarily expected to take the Test of English as a Foreign Language (TOEFL) and have the results sent to Graduate Admissions, the Registrar’s Office.
4. All applicants must take the general test of the Graduate Record Examination and have the results sent to Graduate Admissions, the Registrar’s Office.

The deadline for submission of applications for admission and for financial aid is January 1. Admission is normally granted for Autumn Quarter, but requests for exceptions are considered.

The successful applicant generally demonstrates the following strengths: adequate foreign language study, course work in Russian and East European studies in various disciplines, outstanding grades in previous academic work, high GRE scores (particularly verbal and analytical), strong letters of recommendation, and a persuasive statement of purpose explaining why and how the program fits the applicant’s academic and career goals.

DEGREE REQUIREMENTS
Candidates for the A.M. degree must meet University requirements for an A.M. degree as described in the “Graduate Degrees” section of this bulletin.

The A.M. program in REES can ordinarily be completed in one academic year by a well-prepared student; longer periods of study are permitted.

Requirements to complete the interdisciplinary A.M. degree are principally ones of distribution rather than specific courses, with the exception of the three-quarter Core Seminar which all A.M. students are required to take. Each student, with the advice of the CREES academic coordinator, selects courses according to the student’s interests, needs, and goals.

All students in the A.M. REES program must complete a minimum of 40 academic credit units within the following guidelines.
1. Language study: students in the program must study Russian or another language of the former Soviet Union or Eastern Europe. Credit towards the 40-unit minimum (up to a total of 9 units) is allowed for advanced language work; in the case of Russian, “advanced” is defined as third-year Russian language instruction and above. Similar standards apply for other languages.

2. Interdisciplinary course work: a minimum of five graduate courses in Russian and East European studies must be completed and distributed among at least three departments; these are in addition to the Core Seminar. All course work applied to the 40-unit minimum must dealprimarily with Russian/Soviet/post-Soviet or East European studies.

3. Core Seminar: students must successfully complete the three-quarter Core Seminar (see below) in Russian and East European Studies.

4. All course work qualifying for the 40-unit minimum must have a letter grade indicator (LGI) of ‘B’ or higher. (“B-” does not count for degree credit.)

5. Students are expected to complete introductory course work in Russian and East European studies in the disciplines of history, literature, and politics. Courses taken prior to graduate work at Stanford are considered on a case-by-case basis towards satisfying this requirement.

6. Students are expected to do course work in both Russian/Soviet/post-Soviet studies and in East European studies. Course work completed prior to graduate work at Stanford is considered in determining whether this requirement has been satisfied.

7. All courses counting towards the 40-unit minimum should be approved by the CREES academic coordinator, who ensures that planned course work satisfies requirements towards the degree. The CREES faculty director and steering committee determine the specific requirements.

A more detailed description of the A.M. program is sent to all applicants and is available by request from the Center for Russian and East European Studies.

**CORE SEMINAR**

The core seminar is offered each academic quarter and is required of all A.M. students. Content and instructors vary quarter to quarter, taking advantage of the expertise of resident and visiting faculty. The focus is on an interdisciplinary subject area of fundamental importance within modern Russian, Soviet, post-Soviet, and East European studies, and it addresses questions of research, methodology, and current scholarship (see below).

**FINANCIAL AID**

Subject to funding, CREES has a limited amount of financial aid to offer in the form of Foreign Language and Area Studies (FLAS) fellowships and College Work Study Graduate Student Assistantships. Recipients of FLAS fellowships must be American citizens or permanent residents and must enroll in Russian language courses at Stanford at the appropriate level. Applicants in the A.M. program have priority in the annual FLAS competition; in recent years CREES has also awarded FLAS fellowships in the Graduate School of Business and the School of Law. Consult the CREES academic coordinator for further information about the application and award process.

Work Study awards, based on a combination of financial need and merit, are ordinarily made to CREES A.M. students.

For further information regarding financial aid, contact the Center for Russian and East European Studies (CREES), Littlefield Center, Room 14, Stanford University, Stanford, CA 94305-5013; telephone 415-725-2563.

**CONCURRENT DEGREE PROGRAMS**

The Center for Russian and East European Studies collaborates with the Schools of Business and Law to allow students to simultaneously pursue concurrent degrees in Russian and East European Studies (A.M.) and the respective professional field (J.D., M.B.A.). Students must apply to and be independently admitted to each degree program. For additional information about specific plans of study and degree requirements, contact the Center for Russian and East European Studies.

**DOCTORAL PROGRAMS**

Since the University does not offer a Ph.D. in Russian and East European Studies, students wishing to pursue a doctoral program in this field must apply to one of the departments offering a Ph.D. with an emphasis on the area of the former Soviet Union or Eastern Europe, such as Economics, History, Political Science, and Slavic Languages and Literatures.

**COURSES**

200. Directed Individual Study — For students engaged in special interdisciplinary work that cannot be arranged by department.

*1-5 units, Aut, Win, Spr (Staff)*

by arrangement

250,251,252. Core Seminar in Russian/Soviet and East European Studies — Required of all students
in the A.M. program; open to qualified graduate students with the consent of the instructor.

3-5 units, Aut, Win, Spr (Staff)

by arrangement

**AFFILIATED DEPARTMENT OFFERINGS**

The courses listed below by department deal primarily with Russia, the Soviet Union, or Eastern Europe. See the respective department listings for course descriptions. Additional relevant courses by resident or visiting faculty may be offered; for updated information, consult the quarterly *Time Schedule* or contact the Center for Russian and East European Studies. Students in the area studies A.M. program must have their course list approved by the department prior to enrollment.

**ECONOMICS**

217. Money and Finance in Economic Development
5 units, Spr (McKinnon)

**HISTORY**

20S. Russia and Non-Russians: Ethnicity and Nationalism in Imperial Russia and the Soviet Union since 1895
5 units, Spr (Northrop)

23S. Women and Gender in Early Modern Russia
5 units, Win (N. Kollmann) T 1:15-3:05

119. Aristocracies and Absolutism: Early Modern Eastern Europe, 1400-1800
5 units, Spr (N. Kollmann) MTWTh 10

120B. Imperial Russia, 1700-1917
5 units, Win (Emmons) TTh 1:15-3:05

120C. History of the Soviet Union
5 units, Spr (Weiner) MTWTh 11

125. 20th-Century Eastern Europe
5 units, Aut (Naimark) MTWTh 11

137/337. The Holocaust
4-5 units, Aut (Rodrigue) MW 1:15

222A/322A. Undergraduate/Graduate Colloquium: National Identities in 20th-Century Ukraine
4-5 units, Win (Weiner)

222S. Undergraduate Colloquium: Ethnic Cleansing in 20th-Century Europe
5 units, Spr (Naimark) T 2:15-4:05

225S. Undergraduate Research Seminar: Law and Society in Early Modern Russia
5 units, Win (N. Kollmann) Th 1:15-3:05

226/326. Graduate/Graduate Colloquium: Problems in Soviet History and Historiography
5 units, Win (Suny) Th 3:15-5:05

**300W. Graduate Directed Reading**

units by arrangement (Staff)

**320A. Graduate Colloquium: Topics in Early Modern Russia**
4-5 units, Aut (N. Kollmann) T 1:15-3:05

**325A. Graduate Colloquium: The Nation and its Others**
4-5 units, Aut (Suny) W 1:15-3:05

**426. Graduate Seminar: Problems in the History and Historiography of the Soviet Union**
4-5 units, Spr (Weiner)

**433. Graduate Seminar: Modern Eastern Europe**
4-5 units, Win (Naimark) T 3:15-5:05

**PHILOSOPHY**

275. Marx and Weber
3 units, Win (Satz)

**POLITICAL SCIENCE**

5 units, Win (Holloway)

120. The European System Under New Circumstances
5 units, Win (Hafner)

121M. Russian Politics
5 units, Win (McFaul)

123M. Seminar: Postcommunist Politics
5 units, Spr (McFaul)

138B. Seminar: Security and Diplomacy
5 units, Spr (Lewis)

**SLAVIC LANGUAGES AND LITERATURES**

**GENERAL**

130A/230A. Polish Cinema of Moral and Political Involvement
3-4 units, Win (Debski) by arrangement

145/245. The Age of Experiment (1820-1864)
4 units, Aut (Fleishman) MWF10

146/246. Struggles with Authority in the Russian Novel, 1861-1922
4 units, Win (Greenleaf) MWF11

147/247. State and Revolution: Russian Literature in the 20th Century
4 units, Spr (Freidin, Kollmann) MWF10

151. Dostoevsky
4 units, Aut (Frank) TTh 2:15-4:05

156. Nabakov and Modernism
4 units, Spr (Greenleaf) by arrangement

161/261. Poetess: The Grammar of the Self when the Poet is a Woman
4 units, Win (Greenleaf) TTh 11-12:30
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
<th>Meeting Times</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>162/262</td>
<td>Women in 19th-Century Russian Literature</td>
<td>3-4</td>
<td>Spr (McLean) TTh 11-12:30 or TTh 2:15-3:05</td>
<td></td>
</tr>
<tr>
<td>190</td>
<td>Modernism and the Humanities: Tolstoy’s Anna Karenina and the Social Thought of its Time</td>
<td>5</td>
<td>Spr (Freidin) MW 1:15-3:05</td>
<td></td>
</tr>
<tr>
<td>1A</td>
<td>First-Year Russian A</td>
<td>5-6</td>
<td>Aut (Schupbach, Radivilova, Staff) MTWThF 9, 10</td>
<td></td>
</tr>
<tr>
<td>2B</td>
<td>First-Year Russian B</td>
<td>5-6</td>
<td>Win (Schupbach, Radivilova, Staff) MTWThF 9, 10</td>
<td></td>
</tr>
<tr>
<td>3C</td>
<td>First-Year Russian C</td>
<td>5-6</td>
<td>Spr (Schupbach, Radivilova, Staff) MTWThF 9, 10</td>
<td></td>
</tr>
<tr>
<td>5A,B,C</td>
<td>Beginning Polish</td>
<td>4</td>
<td>Aut, Win, Spr (Debski) by arrangement</td>
<td></td>
</tr>
<tr>
<td>6A,B,C</td>
<td>Intermediate Polish</td>
<td>4</td>
<td>Aut, Win, Spr (Debski) by arrangement</td>
<td></td>
</tr>
<tr>
<td>7A,B,C</td>
<td>Advanced Polish</td>
<td>4</td>
<td>Aut, Win, Spr (Debski) by arrangement</td>
<td></td>
</tr>
<tr>
<td>11A,B,C</td>
<td>Beginning Czech</td>
<td>4</td>
<td>Aut, Win, Spr (Vanisova) by arrangement</td>
<td></td>
</tr>
<tr>
<td>12A,B,C</td>
<td>Intermediate Czech</td>
<td>4</td>
<td>Aut, Win, Spr (Vanisova) by arrangement</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Review of Russian Grammar: Repair Russian</td>
<td>3</td>
<td>Aut (Schupbach) MWF 10</td>
<td></td>
</tr>
<tr>
<td>51,52,53</td>
<td>Second-Year Russian</td>
<td>5</td>
<td>Aut (Mueller-Vollmer Win, Spr (Mueller-Vollmer, Greenhill) MWF 12 or 1:15, TTh 12</td>
<td></td>
</tr>
<tr>
<td>111,112,113</td>
<td>Third-Year Russian</td>
<td>3</td>
<td>Aut, Win, Spr (Schupbach) MWF 2:15</td>
<td></td>
</tr>
<tr>
<td>114,115,116</td>
<td>Third-Year Russian Conversation and Composition</td>
<td>2</td>
<td>Aut, Win, Spr (Greenhill) TTh 1:15</td>
<td></td>
</tr>
<tr>
<td>177/201</td>
<td>Advanced Russian</td>
<td>3</td>
<td>Aut (Greenhill) TTh 3:15-4:30</td>
<td></td>
</tr>
<tr>
<td>178/202</td>
<td>Advanced Russian</td>
<td>3</td>
<td>Win (Greenhill) TTh 3:15-4:30</td>
<td></td>
</tr>
<tr>
<td>179/203</td>
<td>Advanced Russian</td>
<td>3</td>
<td>Spr (Greenhill) TTh 3:15-4:30</td>
<td></td>
</tr>
<tr>
<td>181/204</td>
<td>Fifth-Year Russian</td>
<td>3</td>
<td>Aut (Radivilova) by arrangement</td>
<td></td>
</tr>
<tr>
<td>182/205</td>
<td>Fifth-Year Russian – Continuation of 181/204.</td>
<td>3</td>
<td>Win (Radivilova) by arrangement</td>
<td></td>
</tr>
<tr>
<td>183/206</td>
<td>Fifth-Year Russian – Continuation of 182/205.</td>
<td>3</td>
<td>Spr (Radivilova) by arrangement</td>
<td></td>
</tr>
<tr>
<td>187</td>
<td>Russian Poetry of the 18th and 19th Centuries</td>
<td>4</td>
<td>Aut (Fleishman) MWF 12</td>
<td></td>
</tr>
<tr>
<td>188</td>
<td>Russian Poetry of the 20th Century</td>
<td>4</td>
<td>Spr (Timenchik) by arrangement</td>
<td></td>
</tr>
<tr>
<td>194/294</td>
<td>Demonology in Russian and other Slavic Cultures</td>
<td>4</td>
<td>Aut (Arkhipov) TTh 9-10:30</td>
<td></td>
</tr>
<tr>
<td>197A/297</td>
<td>Comparative Grammar of Russian and West Slavic Languages</td>
<td>4</td>
<td>Win (Arkhipov) TTh 9-10:30</td>
<td></td>
</tr>
<tr>
<td>198</td>
<td>Comparison of Russian and English</td>
<td>4</td>
<td>Win (Schupbach) MWF 10</td>
<td></td>
</tr>
<tr>
<td>199</td>
<td>Individual Work</td>
<td>1-5</td>
<td>any quarter (Staff) by arrangement</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>Proseminar in Russian Literature</td>
<td>4</td>
<td>Aut (Freidin) M 2:15-4:05</td>
<td></td>
</tr>
<tr>
<td>200A</td>
<td>Introduction to Slavic Bibliography</td>
<td>1 or 3</td>
<td>Win (Zalewski) W 3:15-5:05</td>
<td></td>
</tr>
<tr>
<td>207A</td>
<td>Advanced Polish – For graduate students.</td>
<td>4</td>
<td>Aut, Win, Spr (Debski) by arrangement</td>
<td></td>
</tr>
<tr>
<td>211</td>
<td>Introduction to Old Church Slavic</td>
<td>4</td>
<td>Aut (Arkhipov) MWF 9</td>
<td></td>
</tr>
<tr>
<td>212</td>
<td>Old Russian and Old Church Slavic</td>
<td>4</td>
<td>Win (Arkhipov) MWF 9</td>
<td></td>
</tr>
<tr>
<td>213</td>
<td>History of the Russian Literary Language</td>
<td>4</td>
<td>Spr (Fleishman) TTh 9-10:30</td>
<td></td>
</tr>
<tr>
<td>215</td>
<td>Humor and Russian Literature</td>
<td>2-4</td>
<td>Spr (Schupbach, Greenhill) by arrangement</td>
<td></td>
</tr>
<tr>
<td>229</td>
<td>Russian Versification</td>
<td>4</td>
<td>Win (Fleishman) TTh 11-12:30</td>
<td></td>
</tr>
<tr>
<td>299</td>
<td>Individual Work</td>
<td>1-12</td>
<td>any quarter (Staff) by arrangement</td>
<td></td>
</tr>
<tr>
<td>399A,B,C</td>
<td>Advanced Research Seminar in Russian Literature</td>
<td>2-4</td>
<td>Aut, Win, Spr (Staff) by arrangement</td>
<td></td>
</tr>
</tbody>
</table>
SLAVIC LANGUAGES AND LITERATURES

Emeriti: (Professors) Joseph Frank*, Joseph A. Van Campen; (Assistant Professor) Elisabeth Stenbock-Fermor

Chair: Gregory Freidin

Professors: Lazar Fleishman, Gregory Freidin, Richard D. Schupbach

Assistant Professors: Monika Greenleaf (on leave Autumn), Stephen Moeller-Sally (on leave 1995-96)

Senior Lecturer: Rima Greenhill

Lecturers: Jasmina Bojic, Patricia Mueller-Vollmer, Sima Radivilova, Wojciech Zalewski (Curator, Russian and East European Collection, Stanford Libraries)

Visiting Professors: Hugh McLean (Spring), Roman Timenchik (Spring)

Visiting Assistant Professors: Andrey Arkhipov, Robert Debski

Visiting Lecturer: Zvzana Vanisova

* Recalled to active duty.

The department accepts candidates for the degrees of Bachelor of Arts, Master of Arts, and Doctor of Philosophy. Particular requirements for each degree are described below.

UNDERGRADUATE PROGRAMS

BACHELOR OF ARTS

The Department of Slavic Languages and Literatures offers two concentrations for undergraduate majors: Russian Language and Literature, and Russian Language, Culture, and History.

RUSSIAN LANGUAGE AND LITERATURE

The concentration in Russian Language and Literature is designed for those students who desire to gain a firm command of the Russian language and to study the nation’s literary tradition. Emphasis is placed on the linguistic and philological study of literature, as well as the history of Russian literature and related media in the broader context of Russian culture. Students may explore historically related literary traditions (for example, French, German, English), as well as other related fields. The Russian Language and Literature concentration also welcomes students with an interest in Russian and Slavic linguistics.

PREREQUISITE

Successful completion of Slavic 51, 52, 53 or the equivalent as determined by the results of the department placement examination is a prerequisite for a concentration in Russian Language and Literature.

REQUIREMENTS

Candidates for the A.B. degree with a concentration in Russian Language and Literature must complete an additional 55 units according to the following distribution.

Russian Language — A minimum of 15 units selected from the following Slavic Languages and Literatures courses: 111, 112, 113, 114, 115, 116, 177, 178, 179, 181, 182, 183.

Russian Literature — The 20-unit core literature sequence consisting of the following Slavic Languages and Literatures courses: 145, 146, 147, 187, 188.

Electives — Students must take 20 units of electives embracing at least two of the following categories: (1) Russian language or linguistics, (2) Russian literature, (3) historically related literatures. These courses are selected in consultation with the undergraduate director. With department permission, work in related academic fields may apply toward the degree requirements.

Majors who concentrate in Russian Language and Literature must earn a letter grade indicator (LGI) of ‘C’ or better in order to receive credit toward the major.

RUSSIAN LANGUAGE, CULTURE, AND HISTORY

The concentration in Russian Language, Culture, and History is for students who would like to obtain a firm command of the Russian language and to pursue a broad, interdisciplinary study of Russian literature, other expressive media (including film), as well as cultural traditions and institutions. Emphasis is placed on the relation of the Russian literary tradition to disciplines that have enriched the historical understanding of Russian literature: primarily history, but also anthropology, sociology, political science, and communications.

PREREQUISITE

The prerequisite for a concentration in Russian Language, Culture, and History is the successful completion of Slavic 51, 52, 53 or the equivalent as determined by the results of the department placement examination.

REQUIREMENTS

Candidates for the A.B. degree with a concentration in Russian Language, Culture, and History must complete an additional 55 units according to the following distribution.

Russian Language — A minimum of 15 units selected from the following Slavic Languages and Literatures courses: 111, 112, 113, 114, 115, 116, 177, 178, 179, 181, 182, 183.

19th-Century Russian Literature and History — A minimum of 8 units chosen from the following courses or the equivalent: Slavic 141, 145,
Students must choose one course from Slavic and one course from History.

20th-Century Russian Literature and History — A minimum of 8 units chosen from the following courses or the equivalent: Slavic 142, 147; History 120C*, 123A. Students must choose one course from Slavic and one course from History.

Electives — In order to complete the basic degree requirements, students must take 24 additional units of course work embracing at least two of the following categories: (1) Russian language, (2) Russian literature, (3) Russian history. These courses are selected in consultation with the undergraduate director. With department permission, work in related academic fields (for example, anthropology, sociology, religion, political science, communications) may apply toward the degree requirements.

Majors with a concentration in Russian Language, Culture, and History must earn a letter grade indicator (LGI) of ‘C’ or better in order to receive credit toward the major.

* History 120C may be counted only once toward program requirements.

HONORS PROGRAM

Students in either concentration with an LGI of ‘B+’ or better in their major courses are eligible to participate in the department’s honors program. In addition to the basic program requirements above, honors students must also complete the following:

1. One advanced course, usually taken during the Spring Quarter of the junior year and related to the area of the student’s expected research. Majors in either concentration who propose a senior project in literature must take a course in literary or cultural theory. Students concentrating in Russian Language, Culture, and History and pursuing a project in cultural history are required to take a course in literary or cultural theory, or a graduate seminar in the area of their topic. Students concentrating in Russian Language and Literature who propose a senior project in Russian language select their course in consultation with the Undergraduate Director.

2. Slavic 199, Individual Work: a minimum of 8 units during the senior year. To qualify for honors, the candidate must receive an LGI of ‘B’ or better on the thesis or project completed during this period.

OVERSEAS STUDIES

The department encourages students to enhance their education with a term abroad. For information about the Stanford-in-Moscow program, see the “Overseas Studies” section of this bulletin or the Overseas Studies office. Most credits earned in Moscow can be applied to both undergraduate concentrations. Cultural awareness and language ability are enhanced by living with a Russian family in Moscow.

GRADUATE PROGRAMS

MASTER OF ARTS

Admission — The requirements for admission to the master’s degree program in Russian are:

1. A Bachelor of Arts degree (or its equivalent) from an accredited college or university.
2. A command of the Russian language sufficient to permit the student to do satisfactory graduate work in an area of specialization.
3. A familiarity with Russian literature sufficient to permit the student to perform adequately in courses at the graduate level.

Before registering for the first quarter’s work in the department, entering graduate students are required to take placement examinations in language and literature. Students who fail to perform satisfactorily on such examinations must register for remedial courses in the areas in which they are deficient. Such remedial courses, normally completed within the first three quarters of residence, carry no credit toward either the A.M. or the Ph.D. degree.

Course Requirements — Candidates for the A.M. who are not also candidates for the Ph.D. should plan course work that ensures adequate preparation for the A.M. final examination at the end of the third quarter of work. Ph.D. candidates with a concentration in language and linguistics should include in the first year’s work any courses needed for the A.M. examination in that area. Ph.D. candidates with a concentration in literature should attempt to include as many of the department’s basic course offerings as possible in the first-year program to ensure sufficient time to complete the A.M. thesis during the fifth quarter of registration. In any case, course work should be planned in consultation with the graduate adviser, whose written approval of the overall course load is required.

Candidates for the A.M. must complete a program of 36 units, of which 27 units must be selected from courses given by the department. The other 9 units may, with approval of the candidate’s adviser, be selected from courses in related fields. Of the 27 units in the department, a minimum of
9 must be in language and a minimum of 9 in literature. The remaining 9 may be distributed in accordance with needs and interests of the student, with advice and approval of the department adviser. No credit toward the A.M. degree is allowed for first- or second-year courses in non-Slavic languages required for the Ph.D. degree.

Final Examination—Students not enrolled in the Ph.D. program may either submit an A.M. thesis or take a final examination. In the latter case, regardless of the area of specialization, the student must demonstrate in a written examination: (1) command of the phonology, morphology, syntax, and lexicology of contemporary Standard Russian sufficient to teach beginning and intermediate courses at the college level; (2) an ability to read contemporary Standard Russian sufficient to assist students studying contemporary Russian poetry or literary prose; and (3) sufficient familiarity with Russian literature of either the 19th or 20th century to handle successfully survey courses dealing with a chosen period of specialization. The examination should be passed at the end of the final quarter of required course work.

MASTER OF ARTS IN TEACHING

The degree of Master of Arts in Teaching is offered jointly by the department and the School of Education. It is intended for candidates with a teaching credential or relevant teaching experience who wish to further strengthen their academic preparation. Requirements for the degree are outlined in the “School of Education” section of this bulletin. The program includes 45 units, of which 25 must be in the teaching field and 12 in education. Specific language requirements are established in consultation with the department.

DOCTOR OF PHILOSOPHY

Students enrolled in the Ph.D. program in Slavic Languages and Literatures are expected to fulfill the following requirements:

1. Minor or Related Fields: during the course of study, students must develop substantial expertise in a field contiguous to the area of specialization. A candidate may elect to present a full minor or, in consultation with the graduate adviser, develop a special program in a related field.

a) Related Field: a student is required to complete a sequence of basic courses (12 units) in a chosen discipline outside the Department of Slavic Languages and Literatures. The choice of patterns is one of the following:

1) A sequence of three courses in one West European literature, selected in consultation with the adviser, or

2) three basic courses in comparative literature to be selected in consultation with the graduate adviser and the Department of Comparative Literature.

b) Minor: if the student elects a minor (for example, French, German, Spanish, or Russian history) he or she should take six graduate courses in that department with a minimum of 20 units at the graduate level. Students considering minors in other areas, such as Asian languages, English, or comparative literature, should consult with the adviser, the chair of the Department of Slavic Languages and Literatures, and the chair of the minor department. Students who wish to enroll in the Graduate Program in the Humanities should apply there.

2. Admission to Candidacy: candidates should read carefully the general regulations governing the degree, as described in the “Graduate Degrees” section of this bulletin. For specific department requirements and recommendations, the student should consult with the department graduate adviser. No student is accepted as a candidate until the equivalent of the A.M. degree requirements, including thesis described above, are completed. Ph.D. students in literature may not opt for a written examination. Admission to candidacy is determined by the end of the fifth quarter of graduate studies. The candidate by that time must have demonstrated commitment to graduate studies by completion of a minimum of 60 quarter units of credit with a letter grade indicator (LGI) of 'B+' or better. Candidates specializing in literature must have submitted to the faculty three seminar papers completed in the Department of Slavic Languages and Literatures and must have completed an acceptable thesis before the end of the fifth quarter, and those specializing in Slavic linguistics must have passed a written examination based on course materials and a reading list. Failure to comply with the above requirements results in termination of enrollment for the Ph.D. degree. The terminated student may, at the discretion of the faculty, be given the opportunity to take the A.M. written examinations. If successful, the student is then awarded the A.M. degree, but is not accepted as a candidate for the Ph.D. degree.

3. Proficiency Test: administered for all entering graduate students, this test determines whether the student's knowledge of Russian language and literature falls below the department's standard. Students who fail this test are asked to complete appropriate courses in the first year of graduate study.

4. Course Requirements: before qualifying for the department oral and written examinations, a Ph.D. candidate is expected to accumulate
at least 72 quarter units of credit for courses taken while in graduate school. No less than half of this course work (36 units) must be done in the Department of Slavic Languages and Literatures, including at least 12 units of credit for seminar-level courses. (All entering graduate students are expected to enroll in Slavic 200.) The candidate must submit to the department’s Academic Progress Committee three seminar-level papers completed at the Department of Slavic Languages and Literatures as well as the A.M. thesis.

5. Foreign Languages: a candidate must demonstrate reading knowledge of French and German by passing written examinations.

6. Examinations: a candidate must pass departmental general qualifying examinations. The written part covers:

   a) The history and structure of the Russian language and its relationship to the other Slavic languages. (Students specializing in literature are excused from this portion of the examination if they have completed Slavic 211, 212, and 213 with an LGI of ‘B-‘ or better.)

   b) The history of Russian literature, including its relationship to the development of other Slavic literatures, or West European literature, or to Russian intellectual history. (Students specializing in Slavic linguistics are excused from this portion of the examination if they have completed, with an LGI of ‘B-‘ or better, Slavic 221, 222, and either 187 or 188. They should also have taken Slavic 245, 246, and 247, or show equivalent training.)

   The oral portion follows shortly after the successful completion of the written portion. The department oral examination is designed to test students’ knowledge of the major cultural and literary trends in a period of their choice. It can be used most profitably as an opportunity to do intensive reading in the period of a candidate’s projected dissertation work. Preparation for the oral should begin immediately following the successful completion of the department’s written examination. After consulting with members of the faculty, the student proposes a reading list, which, once approved, serves as the basis for the examination. The exam structure requires that the student make an opening presentation on a topic or set of topics of particular interest or relevance to the period in question. After an open discussion of the presentation, each examiner is given the chance to question the student on other topics related to the reading list.

Following the department examinations, a candidate must pass a University oral examination which is a defense of a dissertation proposal covering content relevant to the area of study, rationale for the proposed investigation, and strategy to be employed in the research.

Specialization — Candidates in Slavic Languages and Literatures specialize either in language and linguistics or in literature. Candidates may draw up individual programs of study and research in consultation with the graduate adviser. Requirements vary according to the nature of the specialized program requested.

Continuation — Continuation in the Ph.D. program is contingent on: for first-year students, a high quality of performance in course work (decided by department evaluation); for second-year students in literature, an A.M. thesis; and, for linguistics students, a written examination based on course materials and a reading list. Both thesis and written examination should be completed no later than the end of the second quarter of the second year.

Course Work, Breadth Requirements, and Overall Scheduling

1. Candidates for the Ph.D. degree are allowed as much freedom as possible in the selection of course work to suit their individual program of study. However, candidates are held responsible for all of the areas covered by the general examinations, regardless of whether they have registered for the department’s offerings in a given field. For this reason, it is strongly recommended that before taking Ph.D. examinations, students specializing in literature complete seminar-level work directly related to the following broad areas:

   a) Russian poetry

   b) the Russian novel

   c) 20th-century Russian literature

   d) 19th-century Russian literature (the Age of Pushkin and after)

   e) 18th-century Russian literature (from the early 1700s to the Age of Pushkin)

   f) medieval Russian literature

   g) a monograph course on a major Russian author

   h) theory of literature

   It should be noted that students may not normally register for individual work in a given area until they have covered the basic course offerings in that area. First-year students may register for individual work only under special circumstances and must obtain the written approval of the graduate adviser. Those candidates who are also candidates for the A.M. degree should consult the course requirements for that degree in planning their first year’s work. The A.M. thesis or written examination should be completed by the end of the fifth quarter of graduate study at the latest. The remainder of the second year should be devoted to course work preparing the student for the
general qualifying examination and to fulfill the requirements of the minor, if any. The department’s general qualifying examinations must be taken by the end of the first quarter of the third year of study; they may be taken during the second year if the student and the adviser feel this is appropriate. During the two quarters following the general qualifying examinations, the student should be concerned primarily with preparation for the University oral examination, which should take place no later than the end of the third quarter of the third year. However, students may, if necessary, do limited amounts of course work not directly related to the dissertation proposal. The fourth year should be devoted to completion of the dissertation.

2. Students possessing the equivalent of the Stanford A.M. are normally expected to adhere to the schedule for the second, third, and fourth years of work outlined under item 1 above.

3. Students in the Ph.D. program are required to do at least four quarters of teaching in partial fulfillment of the requirements of the Ph.D. degree: three quarters of first-year Russian, and one quarter of literature as teaching assistant to a faculty member (usually for one of the survey courses in translation; 145, 146, 147). While teaching a section of first-year Russian supervised by a faculty member, students are required to enroll in department’s Teaching Colloquium (Slavic 206A,B,C). In addition, students must enroll in Slavic 207D, the department’s TAPreparatory Course, which is offered to all graduate students in the Spring Quarter preceding their first quarter of language teaching. While enrolled in Slavic 207D, students participate in actual language teaching sections.

Non-Slavic Language Requirements—Credit toward either the A.M. or the Ph.D. degrees is not given for first- or second-year courses in non-Slavic languages. It is assumed that, on entering the program, the student has a reading knowledge of both German and French or, at the very least, one of these languages. The reading examination in one of these languages must be passed by the end of the first year of study. The reading examination in the second language must be passed by the end of the second year of study. Both language examinations must be passed before the candidate takes the University oral examination, that is, before the end of the third year.

JOINT Ph.D. IN SLAVIC LANGUAGES AND LITERATURES AND HUMANITIES

The Department of Slavic Languages and Literatures participates in the Graduate Program in Humanities leading to the joint Ph.D. degree in Slavic Languages and Literatures and Humanities. For a description of that program, see the “Humanities Special Programs” section of this bulletin.

COURSES

For additional offerings in literature, see the “Comparative Literature” section of this bulletin.

Students interested in languages not listed should contact the Special Language Program, Department of Linguistics.

GENERAL

This curriculum covers topics of general interest. Courses are open to all students and have no prerequisites. Some courses may be taken for graduate credit. Additional work in the original language may be arranged with individual instructors.

The courses:

1. Introduce students to the major authors and texts in the Russian literary and cultural tradition.
2. Offer broad conceptual frameworks for the understanding of the material covered.
3. Demonstrate the dynamic interaction between cultural texts and a variety of contexts (literary, intellectual, and socio-political).

While these goals are pursued to some extent in all of the courses, the general curriculum may be roughly classified according to contextual emphasis to assist students in choosing courses according to their interests.

Literary Movements and Genres: Slavic 145, 146, 147, 155, 156
Literature and Intellectual History: Slavic 151, 153, 157, 190
Literature and Social History: Slavic 141, 142
Media, Gender, Ethnicity: Slavic 130A, 161, 162, 163, 164, 198A

130A/230A. Polish Cinema of Moral and Political Involvement—Issues of morality and the fabric of life in a socialist state: two co-existing and intertwined themes in post WW II Polish cinema. Students examine the response made by Polish society to its irresolution, and the effect of these anxieties on moral attitudes and political choices. Nine films, deeply rooted in Polish history and social issues, provide the basis for analysis and discussion.

3-4 units, Win (Debski) by arrangement

141. The Culture of Modern Russia: Between Empire and Nation-State, 18th and 19th Centuries
not given 1995-96
142. The Culture of Modern Russia: Between Empire and Nation-State, 20th Century
not given 1995-96
143/243. Early Russian Art and Architecture, 1050-1725 — The emergence of a Muscovite Russian synthesis in art and architecture deriving from the cultures of Byzantium and Kievan Rus', and combining Russian regional schools and village traditions; oriental and Western influences. The ecclesiastical origins and purposes of medieval Russian art and architecture. The evolution of Muscovite art/architecture in the 17th century under the impact of secularization and Westernization, culminating with the reign of Peter the Great.
4 units, not given 1995-96

144/244. The Art and Architecture of Imperial and Soviet Russia — The founding and evolution of St. Petersburg, the influence of W. European art/architecture in Imperial Russia, the search for “Russianness” (the Itinerants, Social Realism, Medieval Slavic Revival), avant-garde art and politics from 1905-1935, the triumph of Socialist Realism in the Stalinist 1930s. Slide-illustrated.
4 units, not given 1995-96

145/245. The Age of Experiment (1820-1864) — Part I of a three-quarter survey of the Russian prose tradition. Emphasizes 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. Struggles with Authority in the Russian Novel, 1861-1922 — Readings of Turgenev’s Fathers and Sons, Tolstoy’s Anna Karenina, Dostoevsky’s Brothers Karamazov focus on the conflict between the individual (son, woman) and authority (social, moral, political) as a characteristic feature of the 19th-century Russian novel. Chekhov’s short fiction as an example of the deformation and adaptation of this tradition at the end of the “age of Realism.” Literary, social, and political contexts.
DR:7(2)
4 units, Win (Greenleaf) MWF 11

147/247. State and Revolution: Russian Literature in the 20th Century — Major works of Russian fiction and selected poetry, including the emigre and samizdat writings, in their literary and historical context (Babel, Bely, Blok, Brodsky, Grossman, Kataev, Mayakovskiy, Nabokov, Olesha, Pasternak, Sholokhov, Siniavsky, Solzhenitsyn, Zoshchenko, etc.). The way poets and novelists have constituted the post-revolutionary “historical experience” of the Russians. DR:7(2)
4 units, Spr (Freidin, Kollmann) MWF 10

151. Dostoevsky — Open to graduate students, seniors, and juniors. Major works in English translation with reference to related developments in Russian and European culture and intellectual history. Lectures and discussion section. DR:7(2)
4 units, Aut (Frank) TTh 2:15-4:05

153/253. Self and History in Tolstoy’s War and Peace — The writer’s work and thought in the context of Russian and European culture and intellectual history. Readings: War and Peace, A Confession, and selected short fiction.
4 units, not given 1995-96

155/255. Transitions: Chekhov, the Modern Short Story, and Modern Drama — Chekhov’s art in its Russian and European literary, historical, philosophical, and political contexts. Readings of short stories and major plays (The Seagull, Uncle Vanya, Three Sisters, and The Cherry Orchard) illuminate Chekhov’s pivotal role in the development of these literary forms. Supplemental readings from Joyce, Maupassant, Tolstoy, Ibsen, and Mansfield.
4 units, not given 1995-96

156. Nabokov and Modernism — Stories, novels, and memoirs from Nabokov as a prose writer. The contemporary context of other modernist writers (Proust and Joyce) and media (film), and 20th-century social factors and intellectual discourses (Freud), whose influences Nabokov belittled or ignored. Critical approaches that elude the author’s control. Readings: “Spring in Fialta,” The Gift, Camera Obscura, Invitation to a Beheading, Lolita, Pale Fire, Pnin, excerpts from Commentary to Pushkin’s Eugene Onegin, and Speak Memory: An Autobiography Revisited, background readings in V. Alexandrov’s Nabokov’s Otherworld, Brian Boyd’s biography, and John Burt Foster’s European Modernism and Nabokov’s Art of Memory.
4 units, Spr (Greenleaf) by arrangement

4 units, not given 1995-96

161/261. Poetess: The Grammar of the Self when the Poet is a Woman — Examines individual strategies of “entry” into the lyrical (intimate-turned-public) “space,” distribution of roles and modes of address, legacy of tropes, and poetic lexicon shaped by a national male tradition. How does the female poet switch from object to subject of poetic language and its repetitive narratives? Does the crossover from silence (or domestic arts) into cultural authority symbolically change her “gender?” Readings in Emily Dickinson, Anna Akhmatova, Marina Tsvetaeva, Sylvia Plath, and Elizabeth Bishop, with theoretical, sociological, linguistic, psychoanalytical, and feminist background readings by Felman,
Kristeva, Gilbert and Gubar, Terry Castle, Svetlana Boym, Laura Engelstein, Elaine Scarry, etc. Slavic students read Akhmatova and Tsvetaeva in Russian. Graduate students enroll for a unit or more of additional supervised work on the latter.

4 units, Win (Greenleaf) TTh 11-12:30

162/262. Women in 19th-Century Russian Literature — Undergraduate level includes readings in translation of selected Russian classics by male authors, focusing on the treatment of female characters: their “morality,” their roles in private and public life, the “woman question” as then perceived and argued. Graduate students for an additional unit read and report on their choice of untranslated novels or collections of short stories by Russian women writers of the era, as representing a feminine point of view and considering whether their exclusion from the “canon” has been justified.

3-4 units, Spr (McLean) TTh 11-12:30 (undergraduate)
TTh 2:15-3:05 (graduate)

163. The Jewish Voice in Central and East European Literature
not given 1994-95

164. Revolutionary Medium: Russian Film and Literature in Interaction
not given 1995-96

190. Modernism and the Humanities: Tolstoy’s Anna Karenina and the Social Thought of its Time — (Same as Humanities 197F.) Focusing on the novel, seminar explores the phenomenon of the emerging modernity of the late 19th century (reason and the irrational, authority and legitimacy, the institution of the family and the question of gender; individualism and estate society; capital and the city; autonomy of art, etc.) The novel and its historical and cultural context. The confrontation between two hypothetical cultural systems (“modernity” and “tradition”) with their own assumptions and codes. Conceptual framework is provided by pragmatic studies of society produced in Tolstoy’s lifetime (James and John Stuart Mills, Nietzsche, Marx, Weber, Durkheim) and recent cultural semiotics of Clifford Geertz. To what extent does Tolstoy’s novel and contemporary social thought mutually illuminate?

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

198A. Yugoslav Cinematography — Dialogue Tutorial — For sophomores only, with the instructor’s consent. Understanding European cinematography, focusing on Yugoslav film. Discussion of symbolism, the selection of topics, Yugoslav values, and hidden political messages. Issues in production, distribution, and social problems: how Yugoslav films reach the domestic and foreign public and obtaining funds for projects. Comparisons between American and Yugoslav cinematography. Does the Yugoslav film still exist?

2 units, Aut (Bojic) by arrangement

UNDERGRADUATE AND GRADUATE LANGUAGE

By special arrangement with the department, courses numbered 100-159 can be taken for graduate credit. Students are urged to take all three quarters of first-, second-, and third-year language series consecutively in the same academic year.

1A. First-Year Russian A — Three-quarter sequence. Optional unit for extra work on pronunciation and grammar, by arrangement.

5-6 units, Aut (Schupbach, Radivilova, Staff) MTThF 9, 10

1B. First-Year Russian B — Three-quarter sequence. Continuation of 1. Optional unit for extra work on pronunciation and conversation.

5-6 units, Win (Schupbach, Radivilova, Staff) MTThF 9, 10

1C. First-Year Russian C — Three-quarter sequence. Continuation of 2. Optional unit for extra work on pronunciation and reading.

5-6 units, Spr (Schupbach, Radivilova, Staff) MTThF 9, 10

5A. Beginning Polish
4 units, Aut (Debski) by arrangement

5B. Beginning Polish — Continuation of 5A.
4 units, Win (Debski) by arrangement

5C. Beginning Polish — Continuation of 5B.
4 units, Spr (Debski) by arrangement

6A. Intermediate Polish
4 units, Aut (Debski) by arrangement

6B. Intermediate Polish — Continuation of 6A.
4 units, Win (Debski) by arrangement

6C. Intermediate Polish — Continuation of 6B.
4 units, Spr (Debski) by arrangement

7A. Advanced Polish
4 units, Aut (Debski) by arrangement

7B. Advanced Polish — Continuation of 7A.
4 units, Win (Debski) by arrangement

7C. Advanced Polish — Continuation of 7B.
4 units, Spr (Debski) by arrangement

8A. Beginning Serbo-Croatian
4 units, Aut (Bojic) by arrangement

8B. Beginning Serbo-Croatian
not given 1995-96

8C. Beginning Serbo-Croatian
4 units, Win (Vanisova) by arrangement

8D. Beginning Serbo-Croatian
not given 1995-96

11A. Beginning Czech
4 units, Aut (Vanisova) by arrangement

11B. Beginning Czech
4 units, Win (Vanisova) by arrangement

11C. Beginning Czech
4 units, Spr (Vanisova) by arrangement
### 12A. Intermediate Czech
- 4 units, Aut (Vanisova) by arrangement

### 12B. Intermediate Czech
- 4 units, Win (Vanisova) by arrangement

### 12C. Intermediate Czech
- 4 units, Spr (Vanisova) by arrangement

### 50. Review of Russian Grammar: Repair Russian — Accelerated, remedial Russian for students with sufficient background to place, with the help of this course, into 52. Prerequisite: consent of instructor.
- 3 units, Aut (Schupbach) MWF 10

### 51,52,53. Second-Year Russian — Three-quarter sequence consisting of intensive review and expansion of grammar and vocabulary and development of written and oral proficiency. Prerequisite: 1A, 2B, 3C, or equivalent.
- 5 units, Aut (Mueller-Vollmer) MWF 12 or 1:15, TTh 12
- Win, Spr (Mueller-Vollmer, Greenhill) MWF 12 or 1:15, TTh 12

### 110A/210A, 110B/210B. Ukrainian Reading Course — Provides a knowledge of Ukrainian as a research tool. Prerequisite: knowledge of basic Ukrainian or a reading knowledge of Russian or Polish.
- 3 units, not given 1995-96

### 111,112,113. Third-Year Russian — Emphasis on reading, vocabulary building, and textual analysis. Prerequisites: 51-53 or equivalent. Recommended: take 114, 115, 116 in conjunction with this series.
- 3 units, Aut, Win, Spr (Schupbach) MWF 2:15

- 2 units, Aut, Win, Spr (Greenhill) TTh 1:15

### 119/219. Advanced Russian for Social Scientists — Develops reliable reading skills in the technical language, underscoring systematic differences between this level, spoken Russian, and the language of literature. Questions of terminology, the use of participles, and other parts of speech, and use of the cases, prepositions, derivational innovations, et al. Extensive practice is provided.
- 1 unit, not given 1995-96

### 119A/219A. Technical Translation
- 3 units, not given 1995-96

### 120/205A. Advanced Russian for Students of the Physical Sciences, Mathematics, and Engineering — Develops reliable reading skills in Russian technical language, emphasizing mathematics and the physical sciences.
- 1 unit, not given 1995-96

### ADVANCED UNDERGRADUATE AND GRADUATE LANGUAGE AND LITERATURE

#### 167,168. Fourth-Year Russian Seminars I-II — Perfects verbal and written skills while concentrating on major problems in Russian cultural history as reflected in its literature. Texts are approached systematically as “literature” and “documents” in the social and intellectual history of Russia. (In Russian)
- 4 units, not given 1995-96

#### 167. Fourth-Year Russian Seminars I — Alexander Pushkin’s major poetical works.
- 3 units, not given 1995-96

#### 168. Fourth-Year Russian Seminars II — Tolstoy’s Anna Karenina in literary, historical, and political context. Relevant contemporary texts in a variety of genres.
- 3 units, not given 1995-96

#### 177/201. Advanced Russian — Reading, conversation, and composition. Prerequisites: 111, 112, 113, 114, 115, 116, or consent of instructor.
- 3 units, Aut (Greenhill) TTh 3:15-4:30

- 3 units, Win (Greenhill) TTh 3:15-4:30

- 3 units, Spr (Greenhill) TTh 3:15-4:30

#### 181/204. Fifth-Year Russian — Open to graduate and undergraduate students with high fluency in Russian. Focuses on the issues of contemporary Russian life and culture and uses them as a vehicle for bringing speaking, writing, and comprehension abilities up to superior proficiency levels, emphasizing productive skills, i.e., speaking and writing. Structured around topics in history, sociology, demography, education, cross-cultural understanding, morals, and domestic and international politics. Instruction is based on active communicative interaction among students and creative language practice, imaginative tasks, and role playing derived from: radio and TV broadcasts, films, newspaper articles, samples of contemporary Russian prose, interviews with native speakers. Attention to linguistic accuracy, idiomatic and culturally specific words and concepts. Readings of brief literary and expository writings.
- 3 units, Aut (Radivilova) by arrangement

#### 182/205. Fifth-Year Russian — Continuation of 181/204.
- 3 units, Win (Radivilova) by arrangement

#### 183/206. Fifth-Year Russian — Continuation of 182/205.
- 3 units, Spr (Radivilova) by arrangement

#### 186. 18th-Century Russian Literature — 18th-century literature in Russia evolved from a barely appreciated didactic tool to a major force for the
expression of a wide variety of social and cultural ideals. The aesthetic development of 18th-century literature and the gradual rise of its socio-political function. Emphasis is on the aspects of 18th-century Russian literary culture that paved the way for the age of Pushkin.

4 units, not given 1995-96

187. Russian Poetry of the 18th and 19th Centuries — Open to undergraduates who have completed three years of Russian, and to graduate students. Major poetic styles of the 19th century as they intersected with late classicism, the romantic movement, and the realist and post-realist traditions. Representative poems by Lomonosov, Derzhavin, Zhukovsky, Pushkin, Baratynski, Lermontov, Tsiutchev, 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. Surveys the main developments in Russian poetry in this century, focusing on Symbolism and post-Symbolist movements (Acmeism, Futurism, Constructivism, OBERIU). Close analysis of representative lyric poems of major modern poets (Bal'mont, Blok, Khlebnikov, Maiakovskii, Tsvetaeva, Pasternak, Sel'vinskii, Kharmas, and others). Prerequisite: 187 or consent of instructor.

4 units, Spr (Timenchik) by arrangement

189/289. Literature of Old Rus' and Medieval Russia — From the earliest times through the 17th century. Lectures concentrate on development of literary and historical genres and on links between literature and art, architecture, and religious culture. Readings in English. Graduate students read in original.

4 units, not given 1995-96

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 1995-96

192. Russian Oral Tradition

4 units, not given 1995-96

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 1995-96

194/294. Demonology in Russian and other Slavic Cultures — Cultural anthropological introduction to popular demonological beliefs, focusing on Russian culture. Popular practices, myths, rituals, texts, and their uses in medieval and modern Russian culture.

4 units, Aut (Arkhipov) TTh 9-10:30


3 units, not given 1995-96

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 1995-96

197. Advanced Topics in Russian Grammar III

3 units, not given 1995-96

197A/297A. Comparative Grammar of Russian and West Slavic Languages — Comparative grammar and the development of practical skills for using Russian as a tool for understanding Czech, Polish, Slovak, Ukrainian, and other W. Slavic languages.

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

198. Comparison of Russian and English — The history of the Russian language and its literature. Comparisons with the history of the English language. Prerequisite: two years of Russian or consent of instructor.

4 units, Win (Schupbach) MWF 10

199. Individual Work — Open to Russian majors or students working on special projects. May be repeated for credit. Prerequisite: consent of instructor.

1-5 units, any quarter (Staff) by arrangement

200. Proseminar in Russian Literature — Required of all entering graduate students. May be taken to satisfy the undergraduate honors requirement for literary and cultural theory. Literary scholarship as a profession. Topics: rhetoric, poetics, aesthetic theory, narrative, psychoanalysis, history, and sociology of literature, reception.

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

200A. Introduction to Slavic Bibliography — Open to undergraduate and graduate students. Introduces students to library's bibliographic and book resources, reference sources in English and Western languages, and provides a historical and critical analysis of Slavic bibliographic and reference tools and search methodology. Final bibliography project required. Knowledge of a Slavic language is required for students registered for 3 units; others register for 1 unit.

1 or 3 units, Win (Zalewski) W 3:15-5:05

206A. Colloquium on Russian Language Teaching Methodology — Required of all first-time teaching assistants. Practical forum for the discussion of teaching methods and strategies in the Russian language classroom.

1-2 units, Aut (Radivilova) by arrangement
206B. Colloquium on Russian Language Teaching Methodology — Continuation of 206A.
1-2 units, Win (Radivilova) by arrangement

206C. Colloquium on Russian Language Teaching Methodology — Continuation of 206B.
1-2 units, Spr (Radivilova) by arrangement

207A,B,C. Advanced Polish — For graduate students.
4 units, Aut, Win, Spr (Debski) by arrangement

207D. Preparatory TA Training — Designed to prepare department’s TAs for teaching Russian language.
3 units, Spr (Radivilova) by arrangement

208. Reading Real Polish — Open to intermediate students of Polish and advanced learners of other Slavic languages. Techniques of approximative reading, skimming, scanning, searching for coherence, and text-puzzle are used with specially designed texts, and by authentic texts of different types. The usefulness and effectiveness of a proposed technique of computer-assisted approximative translation is tested.
4 units, not given 1995-96

211. Introduction to Old Church Slavic
4 units, Aut (Arkhipov) MWF 9

212. Old Russian and Old Church Slavic
4 units, Win (Arkhipov) MWF 9

213. History of the Russian Literary Language — Major structural and semantic changes from the 10th to the 19th centuries. Prerequisites: 211, 212.
4 units, Spr (Fleishman) TTh 9-10:30

214. Biblical Apocrypha and Pseudepigrapha
4 units, not given 1995-96

215. Humor and Russian Literature — The history of Russian literature from the standpoint of the humor it contains, Old Russian times to the present. Lectures are in English and may be taken separately from the reading and discussion sections, which are conducted in Russian. Prerequisites: for the lecture course, Beginning Russian; for the reading/discussion, three years of Russian or consent of instructor
2-4 units, Spr (Schupbach, Greenhill) by arrangement

4 units, not given 1995-96

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 1995-96

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 1995-96

223A,B. Graduate Seminar: Russian Literature and the Literary Milieu of the NEP Period: The Problem of Authorship (1921-1928) — Texts (primarily journal fiction and criticism) which deal with the problem of authorship, examined in the contemporary literary and socio-historical context. Emphasis on non-Party authors. Babel, Eikhenbaum, Mandelstam, Olesha, Tynianov, Zamiatin, and Zoshchenko.

223A. 4 units, not given 1995-96
223B. Continuation of 223A.
4 units, not given 1995-96

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 1995-96

225A. Bulgakov — Close analysis of Mikhail Bulgakov’s major prose works.
3 units, not given 1995-96

3 units, not given 1995-96

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 1995-96

228. Boris Pasternak’s Safe Conduct (1929-1931) — Close analysis of the text. Theoretical and historical problems of the study in the autobiographical genre.
4-5 units, not given 1995-96

229. Russian Versification — History and theory of Russian versification from the 17th to the 20th century.
4 units, Win (Fleishman) Th 11-12:30

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
4 units, not given 1995-96

230B. Russian Formalism and Structuralism in their Historical Background — Consideration of formalist and structuralist ideas in their historical context.
4 units, not given 1995-96

230C. 20th-Century Russian Literary Theory from Symbolism and Formalism to Semiotics — Survey of Russian theoretical works on literature. Scholarships of Alexander Vesebovsky, Peteby; theories of Symbolism and Formalism. Symbolist authors (Belyi, Blok, Bryusov, Vyacheslav Iv. Ivanov) are seen in the fusion of their theoretical and poetical work as the Formalists’ school is understood in its correlation to post-symbolist (Futurists and Acmeists) poetical movements. Postformalist studies of the 30s and 40s (Bakhtin, Florensky, Frejdenberg, Polivanov, Propp, etc.) in their relation to contemporary studies of the Prague Circle and later Moscow-Tartu semiotics school. No knowledge of Russian is required.
4 units, not given 1995-96

235. Akhmatova and Tsvetaeva
4 units (Greenleaf) not given 1995-96

4 units, not given 1995-96

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 1995-96

270A. Pushkin’s Eugene Onegin
2 units, not given 1994-95

270B. Pushkin in the Romantic Context — Open to students from comparative and other literatures, including advanced undergraduates. The ways Pushkin used current European aesthetic and literary discourses to fashion and refashion autoportraits in ironic and dynamic interaction. A theoretical and comparative textual framework is derived from comparative literature’s study of Romanticism, integrating a variety of perspectives. Topics: the “fragment” as the quintessentially modern poetic genre; the morbid elegy as the “genre of entry” for young poets; the real narrative innovations of Byronism; Russian male “identity” and disempowerment through the Oriental erotic tale; Pushkin’s use of Shakespeare’s chronicle plays to rewrite Karamzin’s history of Boris Godunov; his renovation of Gothic conventions for Russian uses; the ability of the concept “Romantic irony” to shed new light on Eugene Onegin, “Egyptian Nights,” and Pushkin’s relation to Romanticism.
4 units, not given 1995-96

271. Solzhenitsyn — Solzhenitsyn in the novel, short story, drama, and essay forms, and in the genre most characteristic of him: “literary investigation.” Knowledge of Russian not required, but concentrators in Slavic are expected to do a major portion of the reading in Russian.
4 units, not given 1995-96

272. Mandelstam and the Modernist Paradigm — Examination of his poetry, prose, critical writings, and reception in the context of contemporary letters, scholarship, and politics. The function of poetry in Modern Russian culture. Mandelstam’s Acmeist paradigm in Soviet civilization.
4 units, not given 1995-96

277. Gogol — Open to advanced undergraduates with instructor’s consent. Examination of Gogol’s enigmatic artistic career, focusing on issues such as history, authorship, aesthetics, and society. Gogol’s fictional, dramatic, and non-fictional works from a variety of theoretical and contextual perspectives. Readings in Russian.
4 units (Moeller-Sally) not given 1995-96

278. Tolstoy — Open to exempt undergraduates. Tolstoy’s creative evolution from his early and late short fiction (Childhood, The Sevastopol Tales, and The Kreutzer Sonata, etc.) and nonfiction, (Confession and Anna Karenina), together with the appropriate critical texts. Readings in Russian.
4 units, not given 1995-96

279. Dostoievsky — The writer’s shorter works in the context of European thought and literature.
4 units, not given 1995-96

299. Individual Work — For graduate students in Slavic working on theses or engaged in special work. Prerequisite: written consent of instructor.
1-12 units, any quarter (Staff) by arrangement

300. Graduate Seminar: Theory of Narrative
4-5 units, not given 1995-96

300A. Graduate Seminar: Russian Literature as Institutions — Investigation of the institutions of Russian literature in selected periods, focusing on theoretical and practical issues: ideology, value, production and dissemination, authorship, and reading publics. Students without reading knowledge of Russian may take course only with the consent of instructor.
4 units, not given 1995-96
Sociology offers two programs leading to the A.B. degree: the general sociology major and the specialized major. Both are designed around a core curriculum, the intent of which is to ensure adequate coverage of basic sociological knowledge and to provide enough flexibility for tailoring the degree program to fit individual needs and interests. The general major consists of the core curriculum plus a selection of additional courses intended to provide breadth of exposure to the variety of areas encompassed by sociology. The specialized major consists of the core curriculum plus a concentrated set of courses in one area of sociology. Areas of concentration include Social Psychology and Interpersonal Processes, Organizational Studies, Social Stratification and Inequality, and Political and Comparative/Historical Sociology. If a specialized major is completed, the student’s transcript will reflect his or her specialized field of study. These programs and the requirements for each are described below.

Emeriti: (Professors) Joseph Berger, Bernard P. Cohen, Sanford M. Dornbusch, Alex Inkeles, Dudley Kirk, Seymour M. Lipset, James G. March
Chair: Cecilia Ridgeway
Associate Professors: David B. Grusky, Susan Olzak (on leave Winter)
Assistant Professor: Szonja Szelenyi
Courtesy Professors: Roberto Fernandez, JoAnne Martin, Michael Wald
Courtesy Associate Professors: Larry Diamond, Clifford J. Nass
Lecturer: Susan F. Chow
Consulting Professor: George Bohrnstedt
Visiting Assistant Professors: Ronald L. Jepperson, Mark C. Suchman.
Visiting Lecturers: Andrew Creighton, Robert Parker
Senior Research Scholar: Mikk Titma

Sociology is concerned with the full spectrum of social behavior (of individuals, small groups, large organizations, communities, institutions, and societies) and provides a strong intellectual background for students considering careers in the professions and in business. Students may pursue degrees in sociology at the bachelor’s, master’s (coterminal), or doctoral levels.

UNDERGRADUATE PROGRAMS

Sociology offers two programs leading to the A.B. degree: the general sociology major and the specialized major. Both are designed around a core curriculum, the intent of which is to ensure adequate coverage of basic sociological knowledge and to provide enough flexibility for tailoring the degree program to fit individual needs and interests. The general major consists of the core curriculum plus a selection of additional courses intended to provide breadth of exposure to the variety of areas encompassed by sociology. The specialized major consists of the core curriculum plus a concentrated set of courses in one area of sociology. Areas of concentration include Social Psychology and Interpersonal Processes, Organizational Studies, Social Stratification and Inequality, and Political and Comparative/Historical Sociology. If a specialized major is completed, the student’s transcript will reflect his or her specialized field of study. These programs and the requirements for each are described below.

Emeriti: (Professors) Joseph Berger, Bernard P. Cohen, Sanford M. Dornbusch, Alex Inkeles, Dudley Kirk, Seymour M. Lipset, James G. March
Chair: Cecilia Ridgeway
Associate Professors: David B. Grusky, Susan Olzak (on leave Winter)
Assistant Professor: Szonja Szelenyi
Courtesy Professors: Roberto Fernandez, JoAnne Martin, Michael Wald
Courtesy Associate Professors: Larry Diamond, Clifford J. Nass
Lecturer: Susan F. Chow
Consulting Professor: George Bohrnstedt
Visiting Assistant Professors: Ronald L. Jepperson, Mark C. Suchman.
Visiting Lecturers: Andrew Creighton, Robert Parker
Senior Research Scholar: Mikk Titma

Sociology is concerned with the full spectrum of social behavior (of individuals, small groups, large organizations, communities, institutions, and societies) and provides a strong intellectual background for students considering careers in the professions and in business. Students may pursue degrees in sociology at the bachelor’s, master’s (coterminal), or doctoral levels.

UNDERGRADUATE PROGRAMS

Sociology offers two programs leading to the A.B. degree: the general sociology major and the specialized major. Both are designed around a core curriculum, the intent of which is to ensure adequate coverage of basic sociological knowledge and to provide enough flexibility for tailoring the degree program to fit individual needs and interests. The general major consists of the core curriculum plus a selection of additional courses intended to provide breadth of exposure to the variety of areas encompassed by sociology. The specialized major consists of the core curriculum plus a concentrated set of courses in one area of sociology. Areas of concentration include Social Psychology and Interpersonal Processes, Organizational Studies, Social Stratification and Inequality, and Political and Comparative/Historical Sociology. If a specialized major is completed, the student’s transcript will reflect his or her specialized field of study. These programs and the requirements for each are described below.

Emeriti: (Professors) Joseph Berger, Bernard P. Cohen, Sanford M. Dornbusch, Alex Inkeles, Dudley Kirk, Seymour M. Lipset, James G. March
Chair: Cecilia Ridgeway
Associate Professors: David B. Grusky, Susan Olzak (on leave Winter)
Assistant Professor: Szonja Szelenyi
Courtesy Professors: Roberto Fernandez, JoAnne Martin, Michael Wald
Courtesy Associate Professors: Larry Diamond, Clifford J. Nass
Lecturer: Susan F. Chow
Consulting Professor: George Bohrnstedt
Visiting Assistant Professors: Ronald L. Jepperson, Mark C. Suchman.
Visiting Lecturers: Andrew Creighton, Robert Parker
Senior Research Scholar: Mikk Titma

Sociology is concerned with the full spectrum of social behavior (of individuals, small groups, large organizations, communities, institutions, and societies) and provides a strong intellectual background for students considering careers in the professions and in business. Students may pursue degrees in sociology at the bachelor’s, master’s (coterminal), or doctoral levels.

UNDERGRADUATE PROGRAMS

Sociology offers two programs leading to the A.B. degree: the general sociology major and the specialized major. Both are designed around a core curriculum, the intent of which is to ensure adequate coverage of basic sociological knowledge and to provide enough flexibility for tailoring the degree program to fit individual needs and interests. The general major consists of the core curriculum plus a selection of additional courses intended to provide breadth of exposure to the variety of areas encompassed by sociology. The specialized major consists of the core curriculum plus a concentrated set of courses in one area of sociology. Areas of concentration include Social Psychology and Interpersonal Processes, Organizational Studies, Social Stratification and Inequality, and Political and Comparative/Historical Sociology. If a specialized major is completed, the student’s transcript will reflect his or her specialized field of study. These programs and the requirements for each are described below.

Emeriti: (Professors) Joseph Berger, Bernard P. Cohen, Sanford M. Dornbusch, Alex Inkeles, Dudley Kirk, Seymour M. Lipset, James G. March
Chair: Cecilia Ridgeway
Associate Professors: David B. Grusky, Susan Olzak (on leave Winter)
Assistant Professor: Szonja Szelenyi
Courtesy Professors: Roberto Fernandez, JoAnne Martin, Michael Wald
Courtesy Associate Professors: Larry Diamond, Clifford J. Nass
Lecturer: Susan F. Chow
Consulting Professor: George Bohrnstedt
Visiting Assistant Professors: Ronald L. Jepperson, Mark C. Suchman.
Visiting Lecturers: Andrew Creighton, Robert Parker
Senior Research Scholar: Mikk Titma

Sociology is concerned with the full spectrum of social behavior (of individuals, small groups, large organizations, communities, institutions, and societies) and provides a strong intellectual background for students considering careers in the professions and in business. Students may pursue degrees in sociology at the bachelor’s, master’s (coterminal), or doctoral levels.

UNDERGRADUATE PROGRAMS

Sociology offers two programs leading to the A.B. degree: the general sociology major and the specialized major. Both are designed around a core curriculum, the intent of which is to ensure adequate coverage of basic sociological knowledge and to provide enough flexibility for tailoring the degree program to fit individual needs and interests. The general major consists of the core curriculum plus a selection of additional courses intended to provide breadth of exposure to the variety of areas encompassed by sociology. The specialized major consists of the core curriculum plus a concentrated set of courses in one area of sociology. Areas of concentration include Social Psychology and Interpersonal Processes, Organizational Studies, Social Stratification and Inequality, and Political and Comparative/Historical Sociology. If a specialized major is completed, the student’s transcript will reflect his or her specialized field of study. These programs and the requirements for each are described below.

Emeriti: (Professors) Joseph Berger, Bernard P. Cohen, Sanford M. Dornbusch, Alex Inkeles, Dudley Kirk, Seymour M. Lipset, James G. March
Chair: Cecilia Ridgeway
Associate Professors: David B. Grusky, Susan Olzak (on leave Winter)
Assistant Professor: Szonja Szelenyi
Courtesy Professors: Roberto Fernandez, JoAnne Martin, Michael Wald
Courtesy Associate Professors: Larry Diamond, Clifford J. Nass
Lecturer: Susan F. Chow
Consulting Professor: George Bohrnstedt
Visiting Assistant Professors: Ronald L. Jepperson, Mark C. Suchman.
Visiting Lecturers: Andrew Creighton, Robert Parker
Senior Research Scholar: Mikk Titma

Sociology is concerned with the full spectrum of social behavior (of individuals, small groups, large organizations, communities, institutions, and societies) and provides a strong intellectual background for students considering careers in the professions and in business. Students may pursue degrees in sociology at the bachelor’s, master’s (coterminal), or doctoral levels.

UNDERGRADUATE PROGRAMS

Sociology offers two programs leading to the A.B. degree: the general sociology major and the specialized major. Both are designed around a core curriculum, the intent of which is to ensure adequate coverage of basic sociological knowledge and to provide enough flexibility for tailoring the degree program to fit individual needs and interests. The general major consists of the core curriculum plus a selection of additional courses intended to provide breadth of exposure to the variety of areas encompassed by sociology. The specialized major consists of the core curriculum plus a concentrated set of courses in one area of sociology. Areas of concentration include Social Psychology and Interpersonal Processes, Organizational Studies, Social Stratification and Inequality, and Political and Comparative/Historical Sociology. If a specialized major is completed, the student’s transcript will reflect his or her specialized field of study. These programs and the requirements for each are described below.
CONCENTRATION AREAS

Each area identifies a specialized arena of inquiry, a set of skills within sociology, and basic preparation for a variety of careers. A brief description of each area follows.

CORE CURRICULUM AND GENERAL SOCIOLOGY MAJOR

All recipients of the A.B. degree in Sociology must complete a minimum of 60 units of course work in the major. All courses taken to satisfy this 60-unit requirement must be taken for a letter grade indicator (LGI) of 'C-' or better (except for Sociology 190-194). Related course work from other departments may fulfill part of this requirement, but such work must be approved in advance by a department 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. 180, Methods for Sociological Research, or its equivalent.
3. An introductory course in statistics, such as Sociology 181, Statistics 60, Psychology 60 or equivalent.
4. 170, Classics of Modern Social Theory, or an equivalent course in social theory.
5. At least three foundation courses, each from a different area of concentration.
6. 200, Senior Seminar for Majors, to be taken by majors during their senior year.

To complete the general sociology major, the student must complete 25 additional units of work, up to 15 units of which may be related course work in other departments.

SPECIALIZED SOCIOLOGY MAJOR

The department recognizes that some students may wish to engage in more in-depth study than that provided by the major in General Sociology. The specialized Sociology major permits students to pursue a more focused program in one of the four areas of concentration described below. To complete the requirements for the A.B. degree in Sociology with a field designation in Social Psychology and Interpersonal Processes, Organizational Studies, Political and Comparative/Historical Sociology, or Stratification and Inequality, the student must (1) complete all the core curriculum, and (2) complete 20 units of course work in the selected area of concentration.

Social Psychology and Interpersonal Processes—This area of inquiry focuses on the social organization of individual identity, beliefs, and behavior; and upon social structures and processes which emerge in and define interpersonal interactions. Processes studied include social acceptance and competition for prestige and status, the generation of power differences, the development of intimacy bonds, the formation of expectation states which govern performance in task oriented groups, and social pressures to constrain deviance. Foundation courses emphasize the effect of social processes on individual behavior and the analysis of group processes. This area provides excellent training for careers having a significant interpersonal component, including law, management, business, advertising and marketing, medicine and health, education, or social work.

Organizational Studies—This area studies individual behavior within organizations and the behavior of organizations as collective actors, and the factors which affect them. Organizations are the primary tool by which specialized goals are pursued in modern societies; they are found in every sector of modern life. Organizations studied include private profit making firms and public organizations; voluntary associations and total institutions such as prisons; and small, single purpose companies as well as giant diversified corporations. Foundation courses stress the environmental and technological factors which shape the structure of organizations and the social psychological and interpersonal process which shapes the behavior of individuals within organizations. Careers which relate to this study include all areas of management and administration: public, business, education; management consulting and analysis; and organizational development.

Social Stratification and Inequality—This area offers a comprehensive overview of various forms of social inequality. It examines the shape and nature of social inequalities, the competition for power, the allocation of privilege, the production and reproduction of social cleavages, and the consequences of class, race, and gender for such outcomes as attitudes, political behavior, and lifestyles. Many courses emphasize changes in the structure of social inequalities over time, and the processes which produce similarities or differences in stratification across nations. Topics include educational inequality, employment history, gender differences, income distributions, poverty, race and ethnic relations, social mobility, and status attainment. Careers which relate to this field include administration, advertising, education, foreign service, journalism, industrial relations, law, management consulting, market research, public policy, and social service.

Political and Comparative/Historical Sociology—This area encompasses the study of the emergence, persistence, and dissolution of political and economic institutions within nation-states. Evolutionary, institutional, structural, and comparative perspectives encourage students to
think about why different forms of nation-states, citizenship incorporation, and economic distribution exist. Foundation courses introduce students to the relationships among economic diversity, distribution, and political transitions such as social movements, revolutions, and nationalist secession movements. Processes such as the development of markets and transition to market economies and political democracies are also a focus. Careers related to this area include law, government service, and national and international business applications.

**CONCENTRATION AREA COURSES**

Many of the department courses can be categorized as primarily oriented to one of the four areas of concentration; a few courses are relevant to more than one area. Within each area of concentration, one or more undergraduate foundation courses are identified which provide a general introduction to the area or some portion of it. Courses, classified by area, are as follows:

1. **Social Psychology and Interpersonal Processes**
   - Foundation Courses: 120, 121
   - Other Courses: 132, 142, 150, 220-229
2. **Organization Studies**
   - Foundation Course: 160
   - Other Courses: 110, 130, 161-169, 260-269
3. **Social Stratification and Inequality**
   - Foundation Course: 140
   - Other Courses: 132, 134, 141-149, 150, 240-249
4. **Political and Comparative/Historical Sociology**
   - Foundation Courses: 110, 130
   - Other Courses: 111-119, 133, 210-219, 230

**HONORS PROGRAM**

Students desiring to undertake an independent scholarly project under the direction of a faculty member are encouraged to apply for admission to the department’s honors program. Formal applications are considered no later than the end of the Autumn Quarter during the student’s senior year. Admission to the program requires an average LGI of ‘B+’ or better in courses taken within the major, and an overall LGI of ‘B’ or better in their undergraduate course work.

Work on the project can begin at any time, but ordinarily is initiated in connection with meeting the course requirements of Sociology 200, Senior Seminar for majors. Students are encouraged to begin designing their honors project in this seminar, in consultation with the seminar leader and a faculty member who is willing to serve as sponsor for the honor’s project. If admitted to the program, the work can then be completed during Winter and Spring Quarters.

Honors students may earn up to 12 units credit for work leading to completion of the required honors thesis. To be eligible for an honors degree, an LGI of ‘A-’ or better must be earned on the honors thesis. If an ‘A-’ is not earned, the thesis credit counts toward the standard major requirements.

**COTERMINAL MASTER’S PROGRAM**

Stanford undergraduate students who wish additional training in sociology (whatever their undergraduate major), and who have a good academic record (ordinarily an average LGI of at least ‘B+’ in their previous undergraduate work), may apply to the coterminal master’s program as described in the “Undergraduate Degrees” section of this bulletin.

To apply for admission to the coterminal program, students should submit with the coterminal application the following: (1) a statement of purpose providing the rationale for the proposed program of study, (2) a proposed program that specifies at least 45 units of course work relevant to the degree program and at least 36 units in Sociology, (3) a current undergraduate transcript, and (4) two letters of recommendation from Stanford faculty familiar with the student’s academic work.

All 45 course units to be counted toward the graduate degree must be at or above the 100 level; at least 18 course units must be above the 200 level. Because the acquisition of research skills is an important component of graduate training in the social sciences, it is recommended that coterminal students take one or more research methodology courses, for example, Sociology 381A and 381B. An LGI of ‘B-’ or better must be secured in each course satisfying the 45-unit requirement.

Most coterminal students propose programs that concentrate on one of the four specialized areas of study offered by the department: Social Psychology and Interpersonal Relations; Organization Studies; Political and Comparative/Historical Sociology, or Stratification and Inequality. This approach helps to ensure program coherence.

**GRADUATE PROGRAMS**

**Admission**—Applicants to the graduate program should have some undergraduate preparation in sociology; however, the department does consider for admission those without such preparation. Each applicant must submit results from both the quantitative and the verbal tests of the Graduate Record Examination. The GRE Advanced Tests in Sociology may be taken, but it is not mandatory. In addition, foreign students must take the TOEFL exam; a minimum score of 600 is required by the University to be considered for admission. Admission forms can be obtained from Graduate Admissions, Registrar’s Office,
Old Union, Stanford University, Stanford, CA 94305-3005. Completed forms should be returned to the Department of Sociology. Students are admitted once each year for graduate study beginning in the Autumn Quarter. The University deadline for receiving applications for admission is January 1.

MASTER OF ARTS

Ordinarily, the department does not admit students who are candidates solely for the A.M. in Sociology. This degree is, however, granted as a step toward the fulfillment of Ph.D. requirements. To receive the A.M., 45 units of approved work must be completed with a letter grade indicator (LGI) of 'B-' or better. All course work must be at level 100 or above; 18 units must be above the 200 level.

Students enrolled in business, education, law, medicine or any other advanced degree program at Stanford may wish to obtain a master's degree in Sociology. In this instance, the usual admission requirements are waived, but course requirements are determined in consultation with the Sociology adviser for doctoral candidates from other departments and schools. All 45 units must be taken in Sociology courses at Stanford. Interested students should contact the department for advance approval of their programs.

DOCTOR OF PHILOSOPHY

The department admits only those students who show potential for admission to Ph.D. candidacy. For the first three quarters of residence, all students have probationary status. At the end of this period, the department's faculty review the academic progress of each student. Possible outcomes of this review include (1) removal from probationary status, (2) continued probationary status for an additional period, or (3) termination from the program. In the sixth quarter of residence, the faculty decide whether the student should be admitted to Ph.D. candidacy. Admission implies that the student's position in the department is secure, subject only to continued satisfactory progress toward completion of remaining department and University requirements.

A student who is admitted to Ph.D. candidacy must satisfy the following department requirements:

1. Complete a research apprenticeship for three quarters in a faculty research program. At least one of these three quarters must be completed within the first 12 academic quarters (including summers). The remaining work must be completed before the end of the fourth year in residence.

2. Complete a teaching apprenticeship for three quarters under the supervision of a faculty member.

3. Complete five required graduate foundation courses, one in each of four areas of specialization: Political and Comparative/Historical Sociology (310, and either 210 or 218), Social Psychology (320), Stratification (340), and Organization Studies (360). These broad courses provide an analytic and rigorous introduction to each area. At least four foundation courses must be completed in the first year of graduate study, and the fourth foundation course must be completed by the end of the second year.

4. Develop a thorough grounding in sociological theory and research methods. Students with little background in statistics are encouraged to take Sociology 381A in the first quarter after entering the department. In the next three quarters, methodology courses (Sociology 382, 383, 384) are required of all students, as is Sociology 381B in Autumn Quarter. After completing the foundation and methodology courses, all students must take a required course in Research Analysis and Design, focusing on the structure of sociological theory, strategic choice of methods, and the relation of theory to data.

5. Complete a publishable paper by the end of the first quarter of the third year. This paper may be on any sociological topic, and may address theoretical, empirical, or methodological issues. These third-year research papers are evaluated by a two-person committee: one primary adviser and one secondary adviser/reader. Students invite faculty members to serve in this capacity; at least one of the committee members must be a regular faculty member of the department. The Graduate Studies Committee (GSC) must approve all proposed committees.

6. Write a dissertation prospectus and pass the University oral examination. The oral exam is intended to evaluate the dissertation prospectus.


Required Sociology Courses —

1. Introduction to the Discipline:
   - 210. Politics and Society or 218. Seminar on Collective Action
   - 310. Political and Comparative/Historical Sociology
   - 320. Foundations of Social Psychology
   - 340. Social Stratification
   - 360. Foundations of Organizational Sociology

2. Research Methods:
   - 381A. Design and Analysis (required only of students with little statistics background)
   - 381B. Social Scientific Computing
   - 382. The General Linear Model
383. Advanced Models for Discrete Outcomes
384. Advanced Models for Continuous Outcomes
3. Theory, Analysis, and Research Design:
   372. Analysis and Design
4. Additional Course Work: students must complete course work adequate to prepare them to write their third-year research paper.

Ph.D. MINOR
Sociology offers a minor for School of Education doctoral students. Students must complete a minimum of 30 graduate-level units with an LGI of 'B-' or better. The specific program must be approved by a Sociology adviser and filed with the Department of Sociology.

JOINT PROGRAM WITH THE SCHOOL OF LAW
The faculties of the School of Law and the Department of Sociology conduct joint programs leading to either a combined J.D. or J.M. degree with an A.M. degree in Sociology or to a combined J.D. or J.M. degree with a Ph.D. in Sociology.

Normally, the student interested in pursuing an A.M. degree in Sociology completes one full year of the law program, applying for admission to the Department of Sociology during the first year of law school. If admitted, the student must complete regular Department of Sociology master's degree requirements. Applications for a joint program must be approved by the Research and Interdisciplinary Studies Committee of the School of Law and by the Department of Sociology. Faculty advisers from both the department and the school participate in the planning and supervise the study program of students admitted to joint degree status.

The joint J.D.-Ph.D. degree program is designed for students who wish to prepare themselves for research or teaching careers in areas relating to legal and sociological concerns. Participation requires application to both the School of Law and the Department of Sociology and acceptance by each. Upon admission, the student may elect to begin his or her study program in either the School of Law or the Department of Sociology. Normally, the student spends the first full year in one program and the second full year in the other. Thereafter, the student may take courses concurrently until requirements for both degree programs have been met.

COURSES
Courses are open to all students without prerequisites, unless specifically indicated. Courses numbered 200-299 are open to advanced undergraduate and graduate students. Courses numbered 300 and above are normally offered to graduate students only. Courses with an 'X' suffix are taught at an overseas campus only.

OPEN TO ALL STUDENTS INTRODUCTORY
1. Introduction to Sociology — Introduces central concepts, methods, and theoretical orientations of the discipline. Sociological imagination is illustrated by recent theory and research. Possible topics: the persistence of class cleavages; ethnic, racial, and gender inequalities; religious beliefs and the process of secularization; functions and dysfunctions of educational institutions; criminology and social deviance; social movements and social protest; production and reproduction of culture; rise of organizational society. DR:9(5).

5 units, Aut (Jepperson) MWF 11
   Win (Staff) MWF 1:15
   Spr (Szelenyi) TTh 1:15-2:30

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, Spr (Berger) MWF 10
   section M or T 2:15-4:05
   or T 7:50 p.m.

POLITICAL AND COMPARATIVE/HISTORICAL SOCIOLOGY
110. Politics and Society — (Graduate students register for 210.) Themes of political sociology, origins and expansion of the modern state, linkages between state and society, impact of the modern world system on national policies, internal distribution of power and authority, and the structure of political group formation and individual participation in modern states. Emphasizes modern empirical literature. DR:9(5)

5 units, Aut (Meyer) TTh 1:15-3:05

114. Economic Sociology — (Graduate students register for 214.) The sociological approach to the study of production, distribution, consumption, and markets, emphasizing the impact of social structure and institutions on the economy. Comparison of classic and contemporary approaches to the economy among the social science disciplines. Topics: industrial organization, business alliances, labor markets, the role of informal networks in the production of goods and services, the allocation of goods through non-market mechanisms, capitalism in non-west-
ern societies, power relations in business, and the organization of professions such as law and medicine. Prerequisite: at least one course in economics or sociology.

5 units, Win (Granovetter) TTh 3:15-4:30

119. Political, Social, and Economic Structures of Modern States — (Graduate students register for 219.) Basic features of the political, social, and economic structures of modern states and alternative theories of how these structures evolve and are related to one another. Case studies of major states elucidate various theories and arguments. Emphasis on former socialist states and their attempts to forge new political and economic structures since comparisons of these transformations to one another and to the structures in democratic states with established markets bring many issues concerning the interdependencies of societal structures into sharper focus.

5 units, Spr (Titma) MWF 11

130. Education and Society — (Graduate students register for 230; same as Education 220C.) Effects of schools and schooling on individuals, the stratification system, and society. Education as socializing individuals and as legitimizing social institutions. Social and individual factors affecting the expansion of schooling, individual educational attainment, and the organizational structure of schooling.

5 units, Spr (Meyer) MW 9-10:50

136A. Law and Society — Surveys sociological approaches to the study of law and the legal system. Lectures on theoretical perspectives with examples from legal settings. Topics: central philosophical debates in the sociology of law; social-psychological foundations of legal behavior; relations between law and the economy, stratification, culture, ideology, and social change. Contemporary legal issues (crime, litigiousness, civil rights, etc.) provide opportunities to link sociological theories with current events. Prerequisite: 1.

5 units, Win (Cohen) W 2:15-5:05

136B. Law, Institutions, and Organizations — The intersection between political sociology, the sociology of organizations, and the sociology of law. Theories of legislation, regulation, adjudication, and the professions highlight the role of “filtering agents” in translating the “law on the books” into the “law in action.” The role of law in regulating and legitimating the activities of corporations and other organizations outside the formal legal system. The functioning of law in policy domains: health and safety regulation, insider trading and corporate takeovers, the litigation “crisis,” technological innovation, equal employment opportunity, and antitrust. Prerequisite: 136A or consent of instructor.

5 units, Spr (Suchman) WF 9:30-10:50

120. Interpersonal Relations — (Graduate students register for 220.) Power, exchange, coalition formation, status, conformity, and deviance. Important traditions of research have developed from the basic theories of these processes. Emphasis is on understanding basic theories and drawing out their implications for change in a broad range of situations, families, work groups, and friendship groups. DR:9(4 or 5)

5 units, Aut (Ridgeway) TTh 9-10:15

121. Social Psychology and Social Structure — (Graduate students register for 225.) Understanding the individual’s relationship to social groups, from intimate two-person groups to society at large. Emphasis is on socializing institutions, the family, ethnic groups in American society, gender differences, and international comparisons of social processes.

5 units, Win (Staff) MWF 12

128. Groups, Teams, and Organizations — What makes groups productive? What is an effective group member? How does “team spirit” affect individual performance? How do organizations expand and constrain individuals? Provides experience with group and organizational phenomena through use of simulation games, and structured exercises. Lectures/readings provide tools for analyzing these experiences based on empirical research and theoretical ideas.

5 units, Win (Staff) MWF 10

150. The Family — Examines American families, employing theories of social psychology to study interactions within the family and between the family and other institutions. Topics: the nature and history of the family, state regulation of families, variations by class and ethnicity, family violence, gender roles, parenting, and divorce.

5 units, Aut (Staff) MWF 10


5 units, Win (Wald) TTh 9-10:50

STRATIFICATION AND INEQUALITY

132. Gender and Education — (Same as Education 170.) The impact of organizational and larger societal forces on the experience of men and women in educational institutions. These forces have effects on educational outcomes and on the way boys and girls relate to each other in educational settings. Emphasis is given to the
evidence for bias against girls within schools, focusing on making arguments and forming policies based on research evidence.
4 units, Spr (E. Cohen) MW 3:15-5:05

134. Education and the Status of Women: Comparative Perspective — (Same as Education 197.) Theories and perspectives from the social sciences relevant to an understanding of the role of education in changing, modifying, or reproducing structures of gender differentiation and hierarchy. Cross-national research on the status of women and its uses to evaluate knowledge claims from varying perspectives. DR:9†(4 or 5)
4-5 units (Ramirez) given 1996-97

140. Introduction to Social Stratification — (Graduate students register for 240.) Introduction to social stratification theory and research. The shape and nature of social inequalities; competition for power; allocation of privilege; production and reproduction of social cleavages; and the consequences of class, race, and gender for such outcomes as attitudes, political behavior, and lifestyles. Topics: distribution of educational opportunities and cultural capital; labor market segmentation by race, ethnicity, and gender; status attainment and occupational mobility; income inequalities and urban poverty; class differences in consciousness, values, and lifestyles. DR:9†(5)
5 units, Win (Szelenyi) TTh 1:15-2:30

142. Sociology of Gender — Gender inequality in contemporary American society with different explanations for how it is maintained. The social and relative nature of knowledge and the problems this poses for understanding sex differences and gendered behavior in society. Three analytical levels of explanation for gender inequalities: socialization, interaction processes, and socio-economic processes. Arguments and evidence for each approach. Social consequences of gender inequality, e.g., the feminization of poverty and problems of interpersonal relations. DR:9†(5)
3-5 units (Ridgeway) given 1996-97

143. Gender Stratification — (Graduate students register for 243.) Historical and contemporary patterns in gender stratification. Topics: division of labor between men and women; relationship between social class and gender; dynamics of occupational sex segregation; gender differences in social mobility, socialization, and educational attainment; racial and cross-national variations in gender inequality.
5 units (Szelenyi) given 1996-97

145. Race and Ethnic Relations — Race and ethnic relations in the U.S. and elsewhere. Analysis of processes that render ethnic and racial boundary markers (e.g., skin color, language, culture) salient in interaction situations. Explanations of why only some groups become targets of ethnic attacks. Analysis of the social dynamics of ethnic hostility and ethnic/racial protest movements. DR:9(5)
5 units, Aut (Olzak) TTh 11 section by arrangement

147. Women of Color: The Intersection of Race, Ethnicity, Class, and Gender — Focuses on the changing status and consciousness of women of color in the U.S. The experiences of Latinas, Asian-Americans, and Afro-Americans. International developments among Third World women are introduced in discussions of emerging transnational patterns. Changing social, economic, and political status of women of color and changes in cultural ideologies and self-perceptions.
5 units, Win (Chow) MW 1:15

148. Issues in Asian American Communities — (Graduate students register for 248.) Asian American ethnic communities (e.g., longstanding urban and new suburban Chinatowns, Koreatowns, and Little Saigons) and their internal and external dynamics. Asian American identity. Emphasizes development of a critical understanding of theories relevant to both phenomena, including ethnic enclave theories, concepts of immigrant enterprises, and social psychological theories of identity development.
5 units, Win (Chow) F 2:15-5:05

149. The Urban Underclass — (Graduate students register for 249.) Analysis of recent research and theory on the urban underclass, including evidence on the concentration of African Americans in urban ghettos, and the debate surrounding the causes of poverty in urban settings. Analysis of ethnic/racial conflict, residential segregation, and changes in the family structure of the urban poor.
5 units, Spr (Olzak) TTh 11 section by arrangement

151. Assimilation or Ethnic Persistence: Asians in America — The nature of Asian-American assimilation. The extent to which Asian-American assimilation has paralleled that of white ethnic groups. The limits and possibilities of non-white assimilation. The adequacy of current indicators of assimilation. In class interviews of Asian-Americans from local communities.
5 units, Aut (Chow) MW 3:15

FORMAL ORGANIZATIONS

DR:9(5)
5 units, Aut (Creighton) MW 1:15 section by arrangement
161. Organizational Ecology — (Graduate students register for 261.) Recent research on populations of market and non-market organizations. Processes determining when new organizations emerge, what forms they assume, and how long they last. Relations between organizations and the environment, and the competitive, commensal, and symbiotic relations that tie organizations together. 5 units (Hannan) given 1996-97

SOCIOLOGICAL THEORY
170. Classics of Modern Social Theory — The work of classical sociological theorists Karl Marx, Max Weber, and Emile Durkheim. Their contributions to the discipline through their ideas on: the transition from feudalism to capitalism, problems of modern social organization, and the nature of the emergent social relation. Material from George Lukacs, Robert K. Merton, and Talcott Parsons places these theories in a contemporary perspective. DR:8(3) or 9(5) 5 units, Spr (Szelenyi) TTh 9-10:30

RESEARCH METHODS
180. Methods for Sociological Research — (Graduate students register for 380.) Introduces the methods used in contemporary sociological research, focusing on strategies for designing research and analyzing data. 5 units, Win (Szelenyi) TTh 9-10:30
181. Introduction to Statistical Methods for Sociologists — Elements of statistical description and inference, emphasizing the statistical methods of principal relevance to sociology. Discussion of contingency tables, and elementary correlation and regression. A special section develops computer skills. 5 units, Spr (Staff) MWF 2:15

182. Computer Assisted Data Analysis — For Sociology majors only. Introduces students to the use of computers for organizing/analyzing sociological data. 5 units, Aut (Staff) WF 10-11:15

200. Senior Seminar for Majors — Assists the student to bring together theory, methods, and substantive courses by illustrating the ways in which sociological problems are framed, linked to theories, and answers pursued through appropriate designs. Student project could be continued with an honors thesis. 3 units, given 1996-97

FOR ADVANCED UNDERGRADUATES AND GRADUATE STUDENTS

POLITICAL AND COMPARATIVE/HISTORICAL SOCIOLOGY
210. Politics and Society — For graduate students; see 110. 5 units, Aut (Meyer) TTh 1:15-3:05
213. Political and Economic Organization of the World System — Seminar on current theory and research on the structures of the world polity, economy, and culture as they affect the organization and development of national societies. Dependency theories, world-economy theories, and world effects on the evolution, dominance, and modern forms of states and regimes. Prerequisite: previous work in comparative or political sociology. 5 units (Meyer) given 1996-97
214. Economic Sociology — For graduate students, see 114. 5 units, Win (Granovetter) TTh 3:15-4:30
218. Seminar: Collective Action — Contemporary research on social movements and collective action. Strategies used by researchers for collecting and analyzing information on collective events, protests, conflicts, and social movements organizations. Analysis of different theories and methods that have attempted to account for rise and fall of social movement activity over time. 5 units (Olzak) given 1996-97

219. Political, Social, and Economic Structures of Modern States — For graduate students; see 119. 5 units, Spr (Staff) MWF 11

193. Undergraduate Teaching Apprenticeship 1-5 units (Staff) by arrangement
194. Departmental Seminar for Undergraduate Majors — Required of all sociology majors. Introduces sociology as an academic discipline, career opportunities in the field, and current faculty research interests. 2 units, Aut (Scott) T 12
196. Senior Thesis — Work intensively on an honors thesis project under faculty supervision (see description of honors program). Must be arranged early in the year of graduation, or before. 15 units (Staff) by arrangement
200. Senior Seminar for Majors — Assists the student to bring together theory, methods, and substantive courses by illustrating the ways in which sociological problems are framed, linked to theories, and answers pursued through appropriate designs. Student project could be continued with an honors thesis. 3 units, given 1996-97

INDIVIDUALIZED LEARNING EXPERIENCES, PRIMARILY FOR UNDERGRADUATE MAJORS
190. Undergraduate Individual Study 1-5 units (Staff) by arrangement
191. Undergraduate Directed Research — Work on a project of one's own choice under the close supervision of a faculty member. Prior arrangement required. 1-5 units (Staff) by arrangement
192. Undergraduate Research Apprenticeship — Work in an apprentice-like relationship with specific faculty member(s) in an on-going research project. Prior arrangement required. 1-10 units (Staff) by arrangement
230. Education and Society — For graduate students; see 130.
   5 units, Spr (Meyer) MW 9-10:50

SOCIAL PSYCHOLOGY AND INTERPERSONAL PROCESSES

220. Interpersonal Relations: Lectures and Seminars — For graduate students; see 120.
   5 units, Aut (Ridgeway) TTh 9-10:15

223. Gender, Interaction, and Inequality — Seminar on the diverse effects of gender on patterns of interaction and the role of these interactional patterns in the maintenance of gender inequality in U.S. society. Empirical evidence for gender effects in interaction, major theoretical perspectives for explaining them, and the implications of these perspectives for analyzing gender inequality. Emphasis is on the critical evaluation of the theories in light of the evidence. Topics: power and power use, influence, social emotional behavior, nonverbal behavior, and language in interaction.
   5 units (Ridgeway) given 1996-97

224. Interaction Processes in Education: Design and Evaluation — (Same as Education 312.) Educational applications of sociological/social psychological theory and research to classroom processes, staff relations, teams, task forces. The principles for design and evaluations of group-work for students and teamwork for teaching staff. Topics: social process of influence, role differentiation, and evaluation. Methods of systematic evaluation and observation. Students receive practical experience in using these methods.
   4 units, Aut (E. Cohen) MW 3:15-5:05

225. Social Psychology and Social Structure — For graduate students; see 121.
   5 units, Win (Staff) MWF 12

STRATIFICATION AND INEQUALITY

232. Problems in Sociology of Education — (Graduate students register for 330; same as Education 210.) Introduction to sociological approaches to educational phenomena. Topics: school organization and environment, the relationship of education to adult roles, the impact of social class and ethnicity on classroom learning, and the social structure of the classroom. Read and evaluate social sciences research. Short written assignments and individual feedback.
   4 units, Win (E. Cohen) MW 3:15-5:05

240. Introduction to Social Stratification — For graduate students; see 140.
   5 units, Win (Szelenyi) TTh 1:15-2:30

243. Gender Stratification — For graduate students; see 143.
   5 units (Szelenyi) given 1996-97

245. Seminar: Comparative Race and Ethnic Relations — Evaluation of theory and research on race and ethnic relations, including the study of the dynamics of race and ethnic boundaries, ethnic solidarity, assimilation, and causes of ethnic and racial conflict and protest in a variety of settings and across historical periods.
   5 units (Olzak) given 1996-97

249. The Urban Underclass — For graduate students; see 149.
   5 units, Spr (Olzak) TTh 11 section by arrangement

FORMAL ORGANIZATIONS

260. Formal Organizations — For graduate students; see 160.
   5 units, Aut (Scott) M 2:15-4:05

261. Organizational Ecology — For graduate students; see 161.
   5 units (Hannan) given 1996-97

262. Organization and Environment — (Same as Business 672R.) Seminar considers alternative theoretical approaches useful for analyzing organization-environment and interorganizational relations. Approaches: resource dependence, population ecology of organizations, and Williamson's markets and hierarchies. Perspectives analyze mergers and vertical integration, joint ventures, interlocking directorates, and organizational forms and structures. Prerequisite: consent of instructor.
   5 units, Aut (Fernandez) W 2:5-3:30

267. Institutional Analysis of Organizations — Reading and research on the nature, origins, and effects of the modern institutional system. Emphasis on the effects of institutional systems on organizational structure.
   5 units, Win (Scott) M 2:15-5:05

268. Seminar: Technology and Organizations — The fast pace of technological development has spurred the increasing globalization of private sector organization. The constraints and opportunities that managing innovation poses for American firms. Interdisciplinary readings from economics, business, and the sociology of organizations show the importance of organizational structure, managerial decision-making, and culture to the adaptation of innovation. Theories on the process of technology transfer, diffusion of innovation, and role of multinational corporations and international cooperative alliances. Enrollment limited to 15.
   5 units, Spr (Staff) F 2:15-5:05

POLITICAL AND COMPARATIVE/HISTORICAL SOCIOLOGY

310. Issues in Political and Comparative/Historical Sociology — For sociology doctoral students only. A review of major theoretical and empirical issues in macrosociology.
   2 units, Aut (Meyer, Olzak) M 12-1:45
311A,B,C. Workshop: Comparative Systems —
(Same as Education 387A,B,C.) Analysis of quantitative and longitudinal data on national systems and political structures. Prerequisite: consent of instructor.
2-5 units, Aut, Win, Spr (Meyer)
by arrangement

312A,C. Workshop: Ethnic Collective Action —
Issues of research design, data gathering, measurement, and analysis of evidence on the occurrence of race and ethnic collective action. Prerequisite: consent of instructor.
312A. 3-5 units Aut (Olzak) F 1:15-3:05
312C. 3-5 units Spr (Olzak) M 3:15-5:05

332. World, Societal, and Educational Change:
Comparative Perspectives — (Same as Education 306D.) Analysis of the relations between educational and societal developments from a comparative perspective. Readings on theoretical perspectives and empirical studies on structural and cultural sources of educational expansion and differentiation, and on cultural and structural consequences of educational institutionalization. Research topics: education and nation-building; education, mobility, and equality; education, international organizations, and world culture.
5 units, Win (Chabot) MWF 11-12:30
and by arrangement

SOCIAL PSYCHOLOGY AND
INTERPERSONAL PROCESSES

320. Foundations of Social Psychology — Major theoretical perspectives in interpersonal processes and social psychology. Basic principles, assumptions, and substantive problems associated with each perspective; techniques of investigation and methodological issues. Perspectives: symbolic interaction, social structure and personality, cognitive, and group processes.
5 units, Win (Ridgeway) F 2:15-5:05

STRATIFICATION AND INEQUALITY

330. Problems in Sociology of Education —
(Same as Education 310.) For graduate students, see 232.
4 units, Win (E. Cohen) MW 3:15-5:05

340. Social Stratification — Classical and contemporary approaches to understanding the differential distribution of valued goods and the social processes by which such inequality comes to be seen as legitimate, natural, or desirable. Introduction to modern analytic models of the effects of social contacts, cultural capital, and “luck” in generating inequality; the role of educational institutions in perpetuating and undermining modern forms of stratification; the causes and consequences of stratification by race and gender; the structure of social classes, status groupings, and prestige hierarchies in past and present societies; the sources of “labor markets” and their functions in early and advanced industrialism; the implications of social stratification for individual lifestyles, consumption patterns, and personality traits; and the rise of the “new class,” the “underclass,” and other emerging forms of stratification under post-industrialism.
5 units, Aut (Grusky) Th 9-10:30

341A,B,C. Workshop: Social Stratification —
Stratification theory and research for advanced students. Discussion of current theories and research agendas, critical reviews of recent publications, presentations of ongoing research by faculty and students. Prerequisite: registration in a Ph.D. program or consent of instructor.
341A. 1-5 units, Aut (Grusky) Th 3:15-5:05
341B. 1-5 units, Win (Granovetter, Grusky) T 1:15-3:05
341C. 1-5 units, Spr (Granovetter, Grusky) Th 1:15-3:05

FORMAL ORGANIZATIONS

360. Foundations of Organizational Sociology — Core problems in the sociology of organizations, main theoretical perspectives, and research programs directed at evaluating these perspectives. Prerequisite: registration in a Ph.D. program.
5 units, Spr (Hannan) T 2:15-5:05

361. Seminar: Social Psychology of Organizations — (Same as Business 671.) Selected curriculum issues in social psychology relevant to behavior in organizations. Prerequisite: consent of instructor.
5 units (Martin) given 1996-97

366A,B,C. Workshop on Organizational Ecology — Workshop for designing, collecting, and analysis of data on long term change in populations and communities of organizations. Prerequisites: 360, consent of the instructor.
5 units, Aut, Win, Spr (Hannan)
by arrangement

368A,B. Workshop on Organization of Medical Care — Workshop for designing, collecting, and analyzing data related to trends in health care organizations in the San Francisco Bay area. Prerequisites: 160, 260 or 360, and consent of instructor.
368A. 2-5 units, Aut (Scott) T 2:15-4:05
368B. 2-5 units, Win (Scott) T 3:15-5:05

SOCIOLOGICAL THEORY

370. Sociological Theory — Introduces theoretical strategies in sociological analysis selected from among functionalism, historical materialism, human ecology, the theory of action, symbolic interactionism, social phenomenology, decision theory, and behaviorism illustrated by one or more programs of theoretical research originating in the classical literature (e.g., Durkheim, Marx, Weber, et al) still active in the contemporary literature. Some elementary methods required to intelligently read and analyze theory.
5 units (Zelditch) given 1996-97
372. Theoretical Analysis and Design — Teaches skills in theoretical analysis and the logical elements of design, including the systematic analysis of the logical structure of arguments, the relationship of arguments to more encompassing theoretical or metatheoretical assumptions, the derivation of logical implications from arguments, assessments of theoretically significant problems or gaps in knowledge, etc.

5 units, Win (Zelditch) TTh 9-10:50

RESEARCH METHODS

380. Methods for Sociological Research — Same as 180 but restricted to Ph.D. candidates in Sociology or Sociology of Education.

5 units, Win (Szelenyi) TTh 9-10:30

381A. Sociological Methodology IA: Design and Analysis — Basic principles of research design and of descriptive, exploratory, and inferential statistics. Reviews basic math skills needed for advanced statistical training. An evaluation is given at first class meeting to determine whether students have the appropriate background. Alternate course: Statistics 190. Corequisite: 381B.

4 units, Aut (Staff) TTh 1:15-3:05

381B. Sociological Methodology IB: Social Scientific Computing — Introduction to the computer as a research tool and to common datasets in the social sciences. Emphasis is on development of necessary skills for advanced courses in the Sociology methodology sequence.

2 units, Aut (Staff) WF 10-11:15

382. Sociological Methodology II: The General Linear Model — The general linear model for discrete and continuous variables. Introduction to principles of estimation, model selection, specification error, and assessment of fit. Prerequisites: 381A,B or equivalent.

4-6 units, Win (Grusky) MWF 11-12:50


4-6 units, Spr (Tuma) MWF 11-12:50

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: 382 and 383, or equivalent.

4-6 units, Aut (Parker) MW 6:30-9 p.m.

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, given 1996-97


5 units (Tuma) given 1996-97

387. Seminar: Frontiers of Quantitative Sociological Research — Advanced topics in quantitative sociological research, especially recently-developed models and methods. Possible topics: robust regression methods, boot-strapping, local likelihood estimation, quantile regression, two-sided logit models, event count models, event sequence models, heterogeneous diffusion models, and models for change in social networks.

5 units, Spr (Tuma) W 2:15-5:05

388. Advanced Models for Analysis of Tabular Arrays — Analysis of categorical data with log-linear, log-multiplicative, latent class, latent trait, Markov, Rasch, and related models.

5 units (Grusky) given 1996-97

GRADUATE INDIVIDUAL STUDY

390. Graduate Individual Study (Staff) by arrangement

391. Graduate Directed Research (Staff) by arrangement

392. Research Apprenticeship (Staff) by arrangement

393. Teaching Apprenticeship (Staff) by arrangement

394. Thesis (Staff) by arrangement

AFFILIATED DEPARTMENT OFFERINGS

See individual department sections for descriptions of the following, all of which are accepted for credit toward a major in Sociology.

COMMUNICATION

169. Communication, Technology, and Society — (Same as Science, Technology, and Society 162.)

4 units, Spr (Nass) TTh 10-11:50
FOOD RESEARCH

136. Population Perspectives in the Third World
5 units, Spr (Arthur) MW 9-10:50

POLITICAL SCIENCE

116L. Social Foundations of Democracy
5 units (Diamond) given 1996-97

143L. Seminar: War, Peace, and Organization Theory
5 units (Eden) not given 1995-96

227D. Seminar: Consolidating Democracy
5 units, Spr (Diamond) T 2:15-5:05

243J. The Contemporary World System: Political Economy and Culture
5 units, Spr (Jepperson)

340. New Approaches to International Security
5 units, Aut (Holloway, Eden)

OVERSEAS STUDIES

These courses are approved for the Sociology major and taught at the campus indicated. Students should discuss with their major advisers which courses would best meet educational needs. Course descriptions can be found in the "Overseas Studies" section of this bulletin or in the Overseas Studies Program office, 126 Sweet Hall.

145X. Race and Ethnicity in Modern Britain — (Same as Overseas Studies IIIIX.) Oxford.
3 units, Spr (Lustgarten)

CENTER FOR SPACE SCIENCE AND ASTROPHYSICS


Director: Peter A. Sturrock
Associate Directors: Umran S. Inan, Philip H. Scherrer, Robert V. Wagoner
Assistant Director: Roger W. Romani

Professors (Research): C-W. Francis Everitt, Philip H. Scherrer
Consulting Professors: Alan M. Title, Martin Walt

The center is an interdepartmental organization coordinating teaching and research in space science and astrophysics. Its members are drawn from the Departments of Geological and Environmental Sciences in the School of Earth Sciences; the Department of Aeronautics and Astronautics, Electrical Engineering, and Mechanical Engineering in the School of Engineering; the Departments of Applied Physics and Physics in the School of Humanities and Sciences; the W. W. Hansen Experimental Physics Laboratory, and the Stanford Linear Accelerator Center.

Research now in progress covers a wide field and is approached in a variety of ways, including experiments flown on rockets, satellites, and space probes; ground-based observations made from the Wilcox Solar Observatory and from national observatories; and theoretical research including computer modeling. Topics currently being studied include the technical aspects of space projects such as guidance and control, planetary sciences, ionospheric and magnetospheric physics, solar-terrestrial phenomena, solar physics, stellar structure, infrared astronomy, x-ray and extreme ultraviolet astronomy, gamma-ray astronomy, high-energy astrophysics, theoretical astrophysics, gravitation theory and experiments, cosmology, and the study of life in the universe. Some of these projects involve collaboration with scientists at the NASA/Ames Research Center and with scientists at the Lockheed Palo Alto Research Laboratory through the Stanford-Lockheed Institute for Space Research.

Stanford is a member of the Universities Space Research Association, a consortium of universities which operates the Lunar Science Institute in Houston, Texas, the University Corporation for Atmospheric Research in Boulder, Colorado, and the San Diego Supercomputing Consortium.

Stanford is the lead institution for the EGRET experiment at the Compton Gamma Ray Observatory and the Solar Oscillations investigation on the Solar and Heliospheric Observatory spacecraft, and participates in the Solar X-Ray Telescope program on the Yohkoh spacecraft.

Stanford is also a member of the Hobby-Eberly Telescope Consortium constructing a 10.4-meter telescope at the McDonald Observatory of the University of Texas. First light is expected in mid-1996, and full science operations are scheduled to start in 1997.

The facilities of the center are available to any interested and qualified student, who must be admitted by and registered in a department. The Departments of Aeronautics and Astronautics, Electrical Engineering, Mechanical Engineering,
Applied Physics, and Physics offer opportunities leading to an M.S. or Ph.D. degree for work in space science or astrophysics. The center also offers opportunities to undergraduates who may, for instance, participate in research projects in their junior or senior years, either on a part-time basis during the school year or on a full-time basis during the summer. The Astronomy Course Program operates a small student observatory where students may gain practical experience in astronomical observing. The course list at the end of this entry includes courses of interest to undergraduates as well as courses primarily of interest to graduates.

Further information is available from the director.

**COURSES**

For descriptions, see the listings under Aeronautics and Astronautics, Applied Physics, Electrical Engineering, Engineering, Geophysics, and Physics.

**AERONAUTICS AND ASTRONAUTICS**

131. Experimentation in Aeronautics and Astronautics
213. Atmospheric Entry
236A,B,C,D. Spacecraft Design
279. Space Mechanics
280. Rocket Propulsion Fundamentals
290. Problems in Aeronautics and Astronautics

**APPLIED PHYSICS**

312. Basic Plasma Physics
363. Solar and Solar-Terrestrial Physics

**ASTRONOMY**

15A. The Nature of the Universe

**ELECTRICAL ENGINEERING**

106. Planetary Exploration
249. Electromagnetic Probing of the Space Environment
350. Radioscience Seminar
352. Electromagnetic Waves in the Ionosphere and Magnetosphere
354. Introduction to Radio Wave Scattering
453. Geomagnetically Trapped Radiation

**ENGINEERING**

235A,B. Space Systems Engineering

**GEOPHYSICS**

195. Terrestrial Planets

**PHYSICS**

15B. Cosmic Horizons
27. Evolution of the Cosmos
50. Astronomy Laboratory and Observational Astronomy
100. Introduction to Observational and Laboratory Astronomy
160. Introduction to Stellar and Galactic Astrophysics
161. Introduction to Extragalactic Astrophysics and Cosmology
262. Introduction to Gravitation and Astrophysics
301. Astrophysics Laboratory
360. Stellar Physics
362. High Energy Astrophysics
364. Advanced Gravitation
365. Extragalactic Astrophysics and Cosmology
460. Astrophysics Seminar
463. Special Topics in Astrophysics

**SPANISH AND PORTUGUESE**

Emeriti: (Professors) Fernando Alegria, Aurelio M. Espinosa, Jr., Bernard Gicovate, Isabel Magaña Schevill, Sylvia Wynter*; (Assistant Professor) Grace Knopp
Chair: Mary Louise Pratt
Director, Undergraduate Language Program: María-Paz Haro
Professors: Mary Louise Pratt, Michael P. Predmore, Jorge Ruffinelli, Guadalupe Valdés
Associate Professor: Yvonne Yarbro-Bejarano
Assistant Professors: Claire Fox, Adrienne L. Martín (Autumn, Spring), Richard Rosa
Professor (Teaching): María-Paz Haro
Courtesy Professor: Hans U. Gumbrecht (French and Italian, Comparative Literature)
Lecturers: Nelson F. de Carvalho, Juergen Hahn, Alice Miano, María Sandoval
Visiting Professor: João Almino

* Recalled to active duty, Spring

The Department of Spanish and Portuguese accepts candidates for the degrees of Bachelor of Arts, Master of Arts, and Doctor of Philosophy in Spanish.

Students interested in Iberian and Amerindian languages not offered in this department should contact the Special Language Program, Department of Linguistics.
UNDERGRADUATE PROGRAMS
BACHELOR OF ARTS

Recognizing that students have different interests and reasons for pursuing a major, the Department of Spanish and Portuguese offers the following major paths. Each has different objectives and requirements. Students should consider, in consultation with a faculty adviser, which major path corresponds most closely to their own personal and professional objectives.

Language Emphasis — This path is recommended for those who wish to pursue a career in translation, teaching, or conducting research in the language. Candidates complete a minimum of 50 units from courses numbered 100 or higher.

Requirements: Spanish 140, Introduction to Methods of Literary Analysis; Spanish 170, Undergraduate Colloquium; Spanish 201, 202, Advanced Grammar and Composition; Spanish 203, History of the Spanish Language; one course in introductory linguistics (in the Department of Linguistics); two courses in Spanish linguistics.

Recommended: two literature courses in one area; Portuguese language and literature courses.

SUGGESTED SEQUENCE
A series of core courses designed to fulfill the requirements for all the major paths are offered each year. All majors must take Spanish 140, 170, 201, and 202. Courses numbered 150-151 (Peninsular literature) and 160-161 (Latin American literature) are introductory survey courses which satisfy the minimum literature requirements for all the paths. After completion of 150-151 and/or 160-161, remaining courses should be taken at the 200 level.

The 130B, 131B, 132B series is recommended for bilingual students and/or students who do not wish to make literature their major area of concentration but wish to continue studying Spanish beyond the second-year level. This series does not fulfill major requirements.

It is also recommended that all Spanish majors take Portuguese 50, Reading Portuguese, so as to acquire a basic knowledge of Portuguese. This is not a substitute for first- or second-year Portuguese but is intended to build skills for conducting research in the language.

HONORS PROGRAM

Spanish and Portuguese majors in the junior year, with a letter grade indicator (LGI) of ‘B+’ or better in all major courses, may apply to the honors program. Students should submit an Application for Honors Program and a proposal outline by the end of Winter Quarter of the junior year. Each honors student must write an honors essay of 20 to 25 pages and be accepted by a faculty member who serves as adviser. Work on the essay normally begins in the Spring Quarter of the junior year and must be completed by the end of the third week of March of the senior year. Consult the undergraduate secretary or the major adviser for more information.

EXTENDED MAJORS

Candidates for the A.B. in English and Spanish Literature or English and Portuguese/Brazil-
ian 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, and so on.

For students in the honors program in Humanities, up to 6 units of that program may be applied toward completion of the Spanish major.

OVERSEAS STUDIES

SANTIAGO

All majors are strongly encouraged to study abroad. For information on the Stanford Program in Santiago, contact the Overseas Studies Program (OSP) in Sweet Hall. Detailed information, including program requirements and curricular offerings, may be obtained in the “Overseas Studies” section of this bulletin, or from the OSP office in Sweet Hall. Internships and research opportunities may be arranged in both technical and non-technical fields.

Students either planning to attend Stanford in Santiago, or returning from this program, are encouraged to consult with the Spanish undergraduate adviser in order to ensure that course work and skills acquired abroad can be coordinated appropriately with their degree program upon return. A limited amount of credit for courses taken in Santiago may be applied to the major.

BRAZIL, LATIN AMERICA, AND SPAIN

For information on programs in Brazil or Latin America, consult Bechtel Overseas Resource Center. For information on programs in Spain, consult Professors Haro and Martin. To transfer credits from programs abroad, consult the Office of the Registrar.

INTENSIVE SUMMER PROGRAM

Stanford University offers first-year intensive language and conversation courses in Spanish during the summer. For further information, contact the department or the Summer Session office.

TEACHING CREDENTIALS

For information concerning the requirements for teaching credentials, see the “School of Education” section of this bulletin and the Credentials Administrator, School of Education.

COURSES FOR BILINGUAL STUDENTS

The department offers a series of second- and third-year courses especially for bilingual students wishing to concentrate on special problems of language or who have particular cultural interests. For specific courses, consult the course offerings section. The suffix B in course numbers below 200 indicates bilingual courses.

PROFICIENCY NOTATION

Seniors are encouraged to qualify by examination (given every Spring Quarter) for the departmental Language Proficiency Notation on their transcript which certifies foreign language competence. For further information, contact Professor Haro.

COTERMINAL A.B. AND A.M.

The requirements for the coterminal A.M. are the same as those outlined below for the A.M. No course can count for both the A.B. and A.M. degrees. Contact Graduate Admissions, the Registrar’s Office for information.

GRADUATE PROGRAMS

MASTER OF ARTS IN SPANISH

This terminal A.M. degree program is for students who do not intend to continue their studies through the Ph.D. degree. Students in this program may not apply concurrently for entrance to the Ph.D. program. Students must complete a minimum of 45 graduate-level units, 36 of which must have a letter grade indicator (LGI) of ‘B’ or above.

Requirements: Spanish 201, 202, Advanced Grammar and Composition or waiver by examination; one linguistics course (203, 204, 205, 206, 207); 301, Methods of Teaching Spanish; 306, Introduction to Literary Theory; two 200-or-above courses in Latin American literature and two 200-or-above courses in Peninsular literature; and reading knowledge of one foreign language other than Spanish (preferably Portuguese). Independent study courses (299, 399), and cross-listed courses originating outside the department may not be used to fulfill requirements unless specially designated.

In addition, students may take approved courses in related fields such as classics, comparative literature, education, history of art, linguistics, modern thought, and philosophy. Students planning a career in language teaching may also take part in the University’s STEP teacher training program.

DOCTOR OF PHILOSOPHY

The requirements of the Ph.D. are: (1) 90 units of graduate-level course work with a letter grade indicator (LGI) of ‘B’ or above; units completed toward the A.M. degree can be counted for the Ph.D.; (2) Spanish 201 and 202, Advanced Grammar and Composition or waiver by examination; 203, History of Language or equivalent course in Spanish linguistics; 301, Methods of Teach-
ing Spanish, and 306, Introduction to Literary Theory; (3) a reading knowledge of Portuguese and one other foreign language; (4) the qualifying paper, the comprehensive, and the University oral examinations, as described below; (5) teaching of three to six courses in the department; (6) completion of a dissertation. Independent study courses (299, 399) and cross-listed courses originating outside the department may not be used to fulfill requirements unless specially designated. For basic residency and candidacy requirements, see the "Graduate Degrees" section of this bulletin.

For further information, consult the department's Graduate Student Handbook.

 Newly admitted students are required to take an oral proficiency examination in Spanish with the Language Program Director by the third week of Autumn Quarter to determine the level of previous preparation. The student is required to remedy deficiencies indicated by this examination before a teaching assignment is awarded.

In preparation for teaching, Ph.D. candidates must take Spanish 301, Methods of Teaching Spanish, in the Spring Quarter of the first year. In consultation with the adviser, students select one major field of study from the following: (1) Spanish Literature of the Golden Age, (2) Modern Spanish Literature, (3) Spanish-American Literature to Independence, (4) Spanish-American Literature of the 19th and 20th Centuries, (5) Chicano Literature, (6) Spanish-American Film. In addition, candidates select two secondary areas of study outside the major field from the following: (1) Spanish Medieval Literature, (2) Spanish Literature of the Golden Age, (3) Modern Spanish Literature, (4) Spanish-American Literature of the Colonial Period, (5) Spanish American Literature from Independence, (6) Chicano Literature, (7) Literary Theory, (8) Spanish Linguistics, (9) Spanish American Film.

At least four courses must be taken in the major field of study. At least two courses must be taken in each secondary area. Students whose major field is in Spanish American or Chicano Literature must choose one secondary area in Peninsular literature and vice versa. One secondary area of concentration may be taken outside the department in consultation with the adviser.

In addition to department course offerings, students may take relevant courses with the approval of their adviser in other departments and programs, such as the Graduate Programs in Comparative Literature, Feminist Studies, History, Humanities, or Modern Thought and Literature. It is also possible to complete a minor in another department with approval of the adviser. Normally, not more than 25 units are taken outside the department.

After the first year of study, the student’s course work and teaching are evaluated by the faculty to determine whether continuation to the Ph.D. is recommended and whether there are particular areas where improvement is needed. For this evaluation, students submit a term paper of approximately 20 pages by the first week of Autumn Quarter of the second year.

If approval of the qualifying paper is granted, the student should file a formal application for candidacy no later than the end of the second year, as prescribed by the University. Course requirements are usually completed by the third year of study. A written comprehensive examination on the major field and secondary areas is then taken. The examination is based on a list of readings, selected in consultation with the adviser, which integrates major and secondary topics in both Peninsular and Latin American Studies. At this time, students hand in a long research paper to be evaluated by the faculty. For further details, consult the Graduate Student Handbook.

Following the examination, students should find a topic requiring extensive original research and request that a member of the department serve as dissertation adviser. The student must complete the Reading Committee form and request that the chair approve a committee to supervise the dissertation. The committee may advise extra preparation within or outside the department, and time should be allowed for such work. The University oral examination usually takes place one or two quarters after passing the comprehensive examination. The oral examination covers plans for the dissertation based on a prospectus approved by the committee (15 to 20 pages, written in English), and may be taken in English, Spanish, or Portuguese.

The dissertation must be submitted to the reading committee in substantially final form at least four weeks before the University deadline in the quarter during which the candidate expects to receive the Ph.D. degree. Ph.D. dissertations must be completed and approved within five years from the date of admission to candidacy. Candidates taking more than five years must apply for reinstatement of candidacy.

Ph.D. MINOR
For a minor in Spanish or Portuguese, the student must complete 25 units, with a letter grade indicator (LGI) of 'B' or above, selected from courses numbered 200 or higher. Spanish 201 and 202 (or waiver by examination) are required. Students who choose a minor in another department should consult with advisers in that department.

JOINT Ph.D. PROGRAMS
The Department of Spanish and Portuguese participates in the Graduate Program in Humanities leading to a joint Ph.D. degree in Spanish and Humanities. For a description of that pro-
gram, see the "Humanities Special Programs" section of this bulletin.

COURSES

OVERVIEW

1. First- and Second-Year Spanish (1-99)
   - Culture and Bilingual (130-139)
   - Literature (140-198)
   - Chicano Literature (180-189)
   - Sophomore Seminars (190)
   - Individual Work (199)

2. Intermediate Courses (100-199)
   - Culture and Bilingual (130-139)
   - Literature (140-198)
   - Chicano Literature (180-189)
   - Sophomore Seminars (190)
   - Individual Work (199)

3. Courses for Advanced Undergraduates and Graduates (200-299)
   - Advanced Language, Linguistics, and Theory (200-210)
   - Peninsular Literature (211-239)
   - Medieval and Golden Age Literatures (211-219)
   - Modern and Contemporary Literatures (220-229)
   - Genre Survey Courses (230-235)
   - Individual Authors (236-239)
   - Latin American Literature (240-279)
   - Periods (240-247)
   - National and Regional Literatures (248-254)
   - Genres and Literary Movements (255-271)
   - Individual Authors (272-279)
   - Chicano Literature (280-289)
   - Special Topics (290-298)
   - Individual Work (299)

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 and Culture (1-199)
   - Portuguese Literature (211-239)
   - Brazilian Literature (240-279)
   - Individual Authors (280-289)
   - Special Topics (290-298)
   - Individual Work (299)
   - Graduate Seminars (300-398)
   - Individual Work (399)

All courses are taught in Spanish or Portuguese unless otherwise noted.

SPANISH LANGUAGE PROGRAM

Students registering for the first time in a first- or second-year course should take a placement test if they studied Spanish before entering Stanford. Students who have passed the AP exam with a 3 should take the placement test and receive 5 units of AP credit if placed in Spanish 12 or above. For 11B, 12B, and 13B, see the special section for bilingual students. Auditors are not permitted in language courses.

INTRODUCTORY

Note — A letter grade indicator (LGI) of 'C' or better is required to enter the next higher course in the language sequence.

1. First-Year Spanish (1st Quarter) — Proficiency-oriented introduction emphasizing speaking and oral comprehension.
   - 5 units, Aut, Win, Spr (Staff) MTWThF plus language lab

2. First-Year Spanish (2nd Quarter) — As above, with additional development of reading and writing skills, and cultural readings. Prerequisite: 1 or equivalent.
   - 5 units, Aut, Win, Spr (Staff) MTWThF plus language lab

3. First-Year Spanish (3rd Quarter) — As above, with additional cultural and/or literary readings. Prerequisite: 2 or equivalent.
   - 5 units, Aut, Win, Spr (Staff) MTWThF plus language lab

10. Elementary Conversation — Conversation practice supplementing 2 or 3. May also be taken when student intends to continue in first-year series but current course load does not permit. Prerequisite: 1 or equivalent.
    - 2 units, Aut, Win, Spr (Staff) TTh

11. Second-Year Spanish (1st Quarter) — Intensive review of grammar concepts; composition and conversation based primarily on cultural journalistic, and literary readings. Prerequisite: 3 or placement test.
    - 4 units, Aut, Win, Spr (Staff) MTWTh

12. Second-Year Spanish (2nd Quarter) — Continuation of 11. Prerequisite: 11 or placement test.
    - 4 units, Aut, Win, Spr (Staff) MTWTh

13. Second-Year Spanish (3rd Quarter) — Application of grammatical concepts to composition, conversation, and oral presentation. Advanced readings. Prerequisite: 12 or placement test.
    - 4 units, Aut, Spr (Staff) MTWTh

15. Intermediate Conversation — Recommended as complement to second-year courses. Prerequisite: 3 or equivalent.
    - 3 units, Aut, Win, Spr (Staff) MWF

100. Advanced Conversation — Conversation and discussion on contemporary issues, based on Hispanic newspapers and magazines, short stories, and cinema. May be taken twice for credit (after an
interval of three quarters) but counted only once for the major. Prerequisite: 13 or equivalent.
3 units, Aut, Win, Spr (Staff) MTWF

FOR BILINGUAL STUDENTS
Designed to meet specific linguistic needs of the bilingual student. See also 130 sequence.

11B,12B,13B. Second-Year Spanish for Bilingual Students — Series for bilingual students of Hispanic background and others with equivalent language skills who wish to refine command of the language and to enlarge vocabulary. Short readings by and about Chicanos and other Hispanics in the U.S. Slides, tapes, videos, and films.
4 units, Aut, Win, Spr (Staff) MTWTh

SPECIAL

1A. Accelerated First-Year Spanish Part 1 — Accelerated, proficiency-oriented; recommended for students who have some previous knowledge of Spanish, or for those with background in a Romance language. Equivalent to the first half of the regular first-year sequence.
5 units, Aut (Staff) MTWThF plus language lab

2A. Accelerated First-Year Spanish Part 2 — Continuation of 1A. Equivalent to the second half of the regular first-year sequence. Students completing 1A/2A may enroll in 11.
5 units, Win (Staff) MTWThF plus language lab

1S,2S,3S. First-Year Individualized Spanish — Primarily for seniors who have demonstrably restrictive scheduling conflicts and must complete the language requirement for graduation. Students proceed at own pace, working with text and tapes. Instructor is available for consultation on a regular basis. Students who complete more than one course (5 units) of 1S, 2S, 3S must complete 10, or pass a first-year oral proficiency examination. Enrollment limited; consent of instructor required.
3-10 units, Win (Hahn)

41A,B,C. Intensive Beginning Spanish — Proficiency-oriented instruction in comprehension, speaking, reading, and writing the language and exposure to Hispanic cultures through short readings, games, newspapers, and videos. Daily work in language lab required. Covers all three quarters of first-year Spanish in 12 weeks, but students may complete one, two, or three quarters. See Summer '96 bulletin for more information. Enrollment limited to 15. No auditors
4, 9, 12 units, Sum (Staff) MTWThF 9-12

50. Reading Spanish — Intensive instruction designed to fulfill the University Ph.D. requirement of a reading knowledge of Spanish. Students must earn an LGI of at least ‘B’ to fulfill the requirement.
3 units, Spr (Staff)

99. Individual Work — For special projects. Cannot be taken as a substitute for any of the regularly scheduled language courses.
1-5 units (Staff) by arrangement

121M,122M,123M. Spanish for Medical Students — (Same as Health Research and Policy 280, 281, 282.) Geared to achieve a practical and rapid command of spoken Spanish. Topics: the human body, hospital procedures, diagnostics, food, and essential phrases for on-the-spot reference when dealing with Spanish-speaking patients. Does not fulfill University language requirement.
3 units, Aut, Win, Spr (Corso)

125. Spanish for the Professions — Helps to prepare for the proficiency exam which must be passed in order to obtain the official transcript notation certifying foreign language proficiency. Provides a solid basis for professional oral and written communication; reading and discussion of career-related materials. Use of TV newscasts for listening comprehension, development of specialized lexicons. Extra unit for individual project. Prerequisite: 13 or equivalent.
4-5 units, Win (Staff)

129. Business Spanish — For students who need to function and communicate in the Spanish-speaking business world. Acquisition of specialized vocabulary on topics such as banking, and finance, import/export, marketing, etc. Composition of business letters and translation of official documents. Prerequisite: 12 or equivalent.
3 units, Win (Staff)

CULTURAL PERSPECTIVES
For students who do not anticipate a literature major but want to continue beyond the second year. May not be used for major credit.

Readings and topics for discussion and composition begin with a focus on Spain and include socio-cultural and historical material from Latin America, and the Mexican-Chicano, Puerto-riqueño, and Cubano heritages, and develop critical perspectives on issues affecting a bilingual-bicultural reality. For special courses in Chicano literature and history, see courses numbered 280-289. Prerequisite: 13 or consent of instructor.

130B,131B,132B. Cultural Perspectives — For non-majors, bilingual students, and others interested in the culture of Spanish speakers. Art, current events, folklore, history, language, and literature of Spain (130B), Latin America (131B), and Mexico and the Hispanic Southwest (132B). Lectures supplemented by slides, movies, tapes, and occasional field trips. Need not be taken in sequence. Extra unit for individual project.

130B. Spanish Cultural Perspectives —
DR:7(2)
4 units, Aut (Haro)
131B. Hispanic American Cultural Perspectives
4 units, Win (Sandoval)
132B. Mexican and Chicano Cultural Perspectives
4 units, Spr (Sandoval)

LITERATURE
Lower-division courses provide a broad perspective on Hispanic literature, an introduction to literary studies, and prepare for more specialized 200-level courses. Prerequisite: 13 or equivalent.

140. Introduction to Methods of Literary Analysis—For students with little or no background in literary analysis. Introduces basic terminology of literary theory and critical approaches to literature through textual analysis. Emphasis varies with instructor. Prerequisite: 13 or equivalent. DR:7(2)
3-5 units, Aut (Rosa)

150-151. Spanish Literature—Basic introduction to Spanish Peninsular literature. Sequence deals with major works from several periods and genres preparing for more specialized 200-level courses. 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, Aut (Martin)

151. Spanish Literature II — Representative works of Spanish literature from the 1830s to the 1930s: Larra, Espronceda, Bécquer, Galdós, Unamuno, Valle-Inclán, Machado, and Lorca. Emphasis is on a close reading of the texts in relation to the “problem of Spain” within the democratic tradition of Spanish liberalism. DR:7(2)
3-5 units, Win (Predmore)

154. Exemplary Short Fiction in Spanish Renaissance—The notion of exemplarity as discursive and moral mechanism is analyzed in representative short stories from early modern Spain (Cervantes, María de Zayas, and the Moorish romance El Abencerraje). Issues of identity and subjectivity, genre and gender within a sociohistorical context. 3-5 units (Martin) not given 1995-96

160-161. Spanish American Literature—Introductory survey with major works from several periods and genres. Need not be taken in sequence. Content varies each year. Prerequisite: 13 or equivalent.

160. Spanish American Literature I — Major themes, writers, and cultural debates from the Colonial Period to independence. Novels, poems, essays, and periodicals from Latin America. DR:7(2)
3-5 units, Win (Rosa)

161. Spanish American Literature II — Continuation of 160, from independence to the present. Readings from a range of genres including essay, poetry, short story, and the novel. DR:7(2)
3-5 units, Spr (Fox)

170. Undergraduate Colloquium: Fiction and Political Imagination—Over the last 25 years, Latin American novelists have produced reflections on the workings of power in the social world. The problem of imaging the state; intersections of state, family, and patriarchy; the workings of fear; resistance; the representations of violence; and alternative social worlds in works by Allende, Roa Bastos, Fuentes, Partnoy, Puig, Valenzuela, and others. 3-5 units, Spr (Pratt)

180. Introduction to Chicano Life and Culture—(Same as Chicano Studies 110.) Interdisciplinary examination of the history and culture of Mexicans in the U.S. Emphasis is on literature and religious studies. DR:3
5 units, Aut (Yarbro-Bejarano)

190D. Sophomore Seminar: Latin American Heroes and Heroines in Postmodern Culture—For sophomores only. Latin American culture through the representations of historical public figures in literature, media, and film. The cultural construction of national and international political and artistic paradigms through historical figures from the 19th and 20th centuries: Artigas (Uruguay), San Martín (Argentina), Túpac Amaru (Peru), Eva Perón (Argentina), Ernesto Che Guevara (Argentina-Cuba), Frida Kahlo (Mexico), Sandino (Nicaragua), and Sub-commander Marcos (Chiapas, Mexico). Application procedure required. 3-5 units, Win (Ruffinelli)

190E. Sophomore Seminar: Chicano/a Art—For sophomores only. Themes in Chicano/a art through the intensive viewing and analysis of images and related materials. Topics: relationships among Chicano/a art, popular culture and the Chicano Movement; the prevalence and nature of certain media (murals, posters, altar installations); the politics of exhibition (including issues of regionalism); creative reinterpretation and hybridization of Mexican and U.S. imagery; urban iconography and the art of La Causa; representation of racial/ethnic identity, gender and sexuality. Traditional bibliographic research and work in Special Collections in Green Library and the new multimedia database “Chicana Art” (still images of the artwork with texts by and about the artists, their work and Chicano/a art in general) and short video and audio clips. Harry
Gamboa and the avant-grade art collective ASCO; the Gamboa archive (papers, photographs, and video/audio tapes) in Special Collections. Application procedure required.

3-5 units, Spr (Yarbro-Bejarano)

191. Spanish Cinema; From Surrealism to Almodóvar — Spanish cinema from the Franco dictatorship through the transition to democratic Spain. The works of internationally-known directors, including Gutierrez Aragón, Bardem, Bunuel, Saura, and the generation of Almodóvar and the basque, catalán, and gallego filmmakers. The relationship of film to literature and the sociopolitical realities of Spain.

3-5 units, Win (Haro)

193. Individual Work — Open only to majors in Spanish, or by consent of instructor.

7-72 units (Staff) by arrangement

FOR ADVANCED UNDERGRADUATES AND GRADUATES

ADVANCED LANGUAGE, LINGUISTICS, AND THEORY

201. Advanced Grammar — Study of grammar at an advanced level.

3 units, Aut (Sandoval)


3 units, Win (Haro)

203. History of the Spanish Language — Study of the development of the Spanish language from its earliest days to the present. Focus is on the historical circumstances in which the growth of the Spanish language took place, and on the phonological, morphological, and syntactic changes that took place during of this development.

3-5 units, Spr (Valdés)

204. Introduction to Spanish Linguistics — The basic conceptual foundations of linguistics. The complexity and systematicity of language in general, emphasizing Spanish. Topics: phonetics, phonology, morphology, syntax, semantics, language acquisition, language variation, and language change.

3-5 units (Valdés) not given 1995-96

205. Dialectology of the Spanish Language — Focuses on the major varieties of Spanish as they are spoken in Spain and in the Americas. Introduction to dialect geography and to the study of social and regional variation from a sociolinguistic perspective.

3-5 units, Aut (Valdés)

206. Spanish Use in Chicano Communities — Significance and consequences of language diversity in the culture and society of the U.S. Using Spanish-English Chicano bilingual communities, focuses on the experiences of non-English background individuals in this country.

3-5 units (Valdés) not given 1995-96

207. Theory and Issues in the Study of Bilingualism — (Same as Education 149/249.) Fulfills linguistics requirement. Key issues in the study of bilingualism from a sociolinguistic perspective. Emphasis on typologies of bilingualism, the acquisition of bilingual ability, the description and measurement of bilingualism and the nature of societal bilingualism. Prepares students to work with bilingual students and their families and to carry out research in bilingual settings.

4 units, Aut (Valdés)

208. Theory of Literature and Society in Latin America — Analysis of themes and problems occurring in Latin American critical writings: acculturation and transculturation, eurocentrism or autonomy, historical periods and genres, literature nomenclature and the concept of America.

3-5 units (Ruffinelli) not given 1995-96

PENINSULAR LITERATURE

216. Don Quijote I — Don Quijote in relation to the principal literary traditions and cultural forces of the European Renaissance.

3-5 units (Martin)

217. Don Quijote II — Continuation of 216.

3-5 units (Martin)

222. Literature and Society in 19th-Century Spain — Representative literary figures of 19th-century Spain: Larra, Espronceda, Zorilla, Bécquer, and Galdós. Major directions in modern lyric poetry and in the modern realist novel studied against the background of Napoleonic invasions, loss of overseas colonies, two Carlist civil wars, and frustrated attempts to establish the First Spanish Republic. Emphasis on close textual analysis.

3-5 units (Predmore) not given 1995-96

223. Literature and Society in Early 20th-Century Spain — First three decades of the 20th century. Works of Unamuno, Valle-Inclán, Baroja, Azorín, A. Machado, and Lorca. Major historical themes concerning the Disaster of 1898, social and
249. Puerto Rican Literature: The Elusive Nation — The production, circulation, and renegotiations of different projections of Puerto Rican identity. Puerto Rico is an extreme case of the phenomenon in which cultural nationhood is constructed as apart from political status. The implications and contradictions of this disjunction and the strained relationships between classes, races, genders, and languages, which contributes to an ambivalent discourse that keeps the “nation” as something permanently postponed. Historical and contemporary texts on culture and geographical representation, mobility and migration, selfhood, and space. Readings: Hostos, Pedreña, Soto, Ana Lydia Vega, Pedro Pietri, Luis Rafael Sánchez, Mohr.

3-5 units, Aut (Rosa)

252. Contemporary Mexican Thought — The writings of theorists of mexicanidad from the post-Revolutionary era to the 1960s (Vasconcelos, Ramos, Zea, Paz). The work of these pensadores in light of recent critiques and refashonings of the concept of national identity including cultural theory, performance art, plastic arts, popular fiction, and activist movements.

3-5 units, Win (Fox)

253. Mexican Short Story — Focuses on the Mexican cuento as expressive of national and cosmopolitan values in works by Arreola, Garro, Pacheco, Poniatowska, Revueltas, and Rulfo.

3-5 units


3-5 units

261. The Avant Garde Novel in Latin America — Surveys 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) not given 1995-96

262. The Origins of the New Latin American Novel — Several works of the 1920s form the foundation of the contemporary novel and provide a powerful image of Latin America: the “novel of the Land” (Don Segundo Sombra, Doña Barbara, La Vorágine), and the “novel of the City” (Los siete locos, Ifigenia). Close readings survey the historical panorama of the 20th century.

3-5 units (Ruffinelli) not given 1995-96

263. The Latin American Novel of the '60s: Cortázar, Vargas Llosa, García Márquez — Examination of novels of the “Boom” era by this “generation” of internationally-known writers. Fo-
Chicana/Latina playwrights, (Scott, music, with a balanced selection of Chicana/o and
literature, visual art, performance, film/video, and
music, with a balanced selection of Chicana/o and Latina/o representations, and gay and lesbian texts.
What constitutes a Latina/o lesbian/gay image or
esthetic? What is the relationship between lesbian/gay
Latinas/os and their larger communities and
movements? What are the implications of Gloria
Anzaldua statement, “people, listen to your joteria”? 

SPECIAL TOPICS

Americas: The History that Literature
Makes — Major literary and other texts related
to the arrival of Columbus and the Spaniards in
the Caribbean, to the prelude voyage of the Por-
tuguese around Cape Bojador, their landing on
the shores of W. Africa, and to the subsequent
yoking of three hitherto vastly separate worlds.
The central role played by the literary and corre-
lated juridico-theological texts of the time in the
structuring of the post-1492 societies of the New
World. Race as a basis of a status-organizing
principle replacing the feudal principle of caste,
a code that would be inseparable from the Renai-
sance’s “invention of Man,” the rise of the modern
State, and the global expansion of the West. (In
English)  
3-5 units, Win (Yarbro-Bejarano)

294. Latin American Cinema: The Short Story in
Film — Focus on the genre of Latin American short
story and those developments by major writers
(Borges, Garcia Marquez, Vargas Llosa, Onetti)
which encouraged adaptations into film. Studies
the specifics of short story literary techniques in
comparison to cinematic techniques. 
3-5 units, Aut (Ruffinelli)

295. Cinema, Literature, and Politics in Latin
America — The relationship between the cinematic
arts and politics examined through films and videos
from Cuba, Venezuela, Argentina, Peru, and Mexico.
Depiction of issues such as slavery, dictatorship,
and liberation movements. 
3-5 units (Ruffinelli) not given 1995-96

299. Individual Work — Open to undergraduates
or graduates majoring or minoring in Spanish. May
be repeated for credit. 
1-12 units, any quarter (Staff)
by arrangement

GRADUATE SEMINARS

Open to undergraduates with consent of in-
structor. 

301. Methods of Teaching Spanish — Analysis
and discussion of second language theory on teach-
ing and learning, classroom practices, and prepara-
tion of Spanish instructional materials. Spanish
A.M. and Ph.D. students register for 5 units and do
a two-week supervised practicum. 
3-5 units, Spr (Haro)
306. Introduction to Literary Theory and Criticism — Discussion of major currents in contemporary criticism. Topics and readings vary each year. In English
4-5 units, Win (Pratt)

307. Latin American Cultural Theory — Introduction to recent work in cultural theory and cultural studies in Latin America. Topics: popular cultures and modernity, the semiotics of the authoritarian state, Latin American postmodernism, the megalopolis, indigenous peoples, and the renegotiation of the national.
3-5 units (Pratt)

309. The Modern Tradition: Criticism and Colonialism — Critical approaches to literature and the study of literature and culture in relation to colonialism, neocolonialism, and the postcolonial world. Topics: representations and hegemony, transculturation, cultural dimensions of decolonization and resistance, psychoanalysis and colonial subjects, ideologies of masculinity and the feminine, colonial discourse, nationalism and the first/second world distinction, popular culture, and syncretism. Readings from Europe, N. America, Latin America, Africa, and the Caribbean. (In English)
3-5 units (Pratt) not given 1995-96

310. Discourse and Ideology — Creation of meaning as a social process, ways in which ideology is produced, reproduced, and transformed in linguistic interaction, whether and how American competence models can interlock with theories that see language as constituting social reality and self. Readings on the concept of socially determined meaning, discursive practices in the French tradition, British empirical analyses, American sociolinguistics. (In English)
4-5 units (Pratt) not given 1995-96

317. Women and Transgression in The Spanish Renaissance — The depiction of marginal/exceptional women in Renaissance Spanish literature as recurring transgressive types who violate accepted gender roles (as procuress, prostitute, writer, churchwoman, gypsy, soldier, cross-dresser, etc.), and who sabotage the division of socially assigned functions of the gendered self into "masculine" and "feminine." Authors: Rojas, Cervantes, Santa Teresa, Zayas, Catalina de Erauso, Ana Caro.
3-5 units (Martin) not given 1995-96

318. Don Quijote
3-5 units (Martin) not given 1995-96

319. Miguel de Cervantes Saavedra — Cervantes as social and literary dissident. Study of works exclusive of Don Quijote; Cervantes’s position with respect to the literary currents of the Renaissance and the concept of literary modernity: poetry, La Galatea, Comedias y entremeses, Novelas ejemplares, Viaje del Parnaso, Persiles y Sigismunda.
3-5 units (Martin) not given 1995-96

321. The Golden Age Storyteller — From novella to novela in the Spanish Golden Age. Issues of identity and subjectivity, social convention and transgression, gender (the masculine/feminine voice in narrative), and problems of genre and canonicity in the short novel. Cervantes, Novelas ejemplares; Lope de Vega, Novelas a Marcia Leonarda; Maria de Zayas, Novelas amorosas y ejemplares and Desengaños amorosos; El Abencerraje.
3-5 units (Martin) not given 1995-96

3-5 units (Martin) not given 1995-96

336. Major Trends in Spanish Poetry: Machado, Jiménez, Lorca — Trends and developments in 20th-century poetry in the context of Restoration Spain (1871-1930), and against the background of the democratic tradition of Spanish liberalism. Emphasis is on close stylistic analysis and such concepts as Generation of 1898, Modernism, Kruasism, pure poetry, and symbolic system.
3-5 units (Predmore) not given 1995-96

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)

342. 19th-Century Constructors — In essays, poetry, and narrative Latin American authors used different strategies for the elaboration of a cultural identity after independence. Renegotiations of racial and gender differences within the misreadings of European literary and philosophical traditions. Relationship to contemporary theories of post-colonialism.
3-5 units, Win (Rosa)

345. Gauchesca Poetry — Focus on gauchesca poetry, a specialized genre of literature from Argentina and Uruguay which dealt with the subject of the Gaucho and the foundation of nationhood. The masterpiece of the genre, Martín Fierro, by Jose Hernandez, and other works by Hidalgo, Lussich, Ascasuibi, E. del Campo.
3-5 units Spr (Ruffinelli)

358. The Short Novel of the '60s and '70s in Latin America — Short novels by Carlos Fuentes, Gabriel Garcia Marquez, Jose Revueltas, Juan Carlos Onetti, Jose Donoso, C. Peri Rossi. First published in Latin America during the '60s and '70s, they constitute an alternative genre, the "nouvelle," with specific char-
characterics. The relationship between the “nouvelle” and other forms such as short-story and novel.

3-5 units, Aut (Ruffinelli)

360. Gender, Race, and Nation in 19th-Century Latin America — Readings of major writers of the 19th century, emphasizing their relation to projects of nation-building and decolonization.

5 units (Pratt) not given 1995-96


5 units (Pratt)

362. Latin American Writing, 1960 to Present: Gender, Authoritarianism, and Resistance — Poetry and fiction by Latin American women writers since WW II. Topics: representations of marginality; women’s inferiority and the critique of domesticity; proletarian novel and testimonio; discourses of nationality, race, and history; literature of project and survival; women’s responses to military authoritarianism and state terror. Works by Alegría, Barros, Belli, Brúnet, Castellanos, Ferré, Garro, Lispector, Menchu, Mercado, Murillo, Peri-Rossi, Poniatowska, Traba, Valenzuela, with readings in history and social analysis.

5 units (Pratt) not given 1995-96

375. José Revueltas and Mexican Marxist Ideology and Aesthetics — Revueltas, the most important noncanonical Mexican writer since the postwar 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)

377. Nationalism and Postnationalism: A Seminar on Literature, Art, and Cinema — Current debates about nationalism and postnationalism could be a terrain for neocolonialism in Latin America in the era of NAFTA and other international projects. Focus is on the concept and representation of nation and nationalism in Latin America (Mexico, Cuba, Argentina, and Venezuela) since 1800. Influential works of literature, art and cinema, and important theoretical and historical texts written by Latin Americans.

3-5 units Spr (Ruffinelli)

384. The Body of Cultural Nationalism — The body as the site of contested constructions of cultural and national identity in representations covering a range of media, emphasizing writing and visual art. What is/was the ideal body of the chicano movement, as represented in cultural nationalist discourses of the 60s and 70s that persist into the 90s? How are these ideal bodies racially marked? How do they establish normative hierarchies of gender and sexuality? What other bodies are excluded as not representing the “nation”? What critiques and representations have put other bodies into circulation, from a position of identification with a nationalist project?

3-5 units (Yarbro-Bejarano) not given 1995-96

385. Chicano/a Literature: Moraga and Anzaldúa — In-depth textual and contextual analyses of the works of Cherrie Moraga and Gloria Anzaldúa, beginning with This Bridge called my Back. Dissimilarities in their subsequent writing, exploring the concept of “plural lesbianism” within the internally diverse term “Chicana.” Selected texts of Chicana feminist theory and criticism. Seminar/workshop with student presentation of readings and papers. Goal is to produce a paper suitable for publication or presentation at a conference.

3-5 units (Yarbro-Bejarano) not given 1995-96

387. Feminists Write Race — Feminist criticism and theory involving race and an in-depth analysis of women-authored texts, providing a diverse collective intellectual and cultural project. Works of Chicana critics, including instructor’s, applied to the writing of Cherrie Moraga and Gloria Anzaldúa. Possible readings of the “writing communities” of women of color in the U.S., Latin American feminists, or white feminists’ interrogation of whiteness. Students lead discussion on readings and workshop-style critique of papers. Goal is to produce a paper suitable for publication or conference presentation.

3-5 units (Yarbro-Bejarano) not given 1995-96

390. Humor in Hispanic Literature — Manifestations of humor in Peninsula literature from medieval times to the present. Comic poetry is discussed; emphasis is on prose. Primary texts are analyzed in the light of theoretical works (Bakhtin, Foucault, Bergson, Cole, Levin) to establish a poetics of Hispanic humor.

3-5 units (Martin) not given 1995-96

391. Humor in Latin American Literature — Satire and other comic forms of literature as a political force for reform in 19th- and 20th-century Latin American writings.

3-5 units (Ruffinelli) not given 1995-96

395. Transnational Film Production — International film production in light of current theoretical work on the subjects of globalization and transnationalism. International cinematic co-productions, audience address, and distribution practices. Theoretical writings by film theorists, historians, and critics (García Canclini, Jameson, Bhabha, and Appadurai). Several of the films studied are Latin American; students interested in other cin-
emas are encouraged to enroll. Weekly film screenings mandatory. (In English)

3-5 units, Spr (Fox)

399. Individual Work — Exclusively for graduate students in Spanish engaged in special work.

1-12 units, any quarter (Staff)
by arrangement

PORTUGUESE LANGUAGE PROGRAM

INTRODUCTORY

1A. Accelerated First-Year Portuguese (Part 1) — 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.

3-5 units, Aut, Spr (Staff) MTWThF
plus language lab

1B. Accelerated First-Year Portuguese (Part 2) — 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. Prerequisite: 2A or equivalent.

5 units, Win (Staff) MTWThF
plus language lab

1C. Elementary Conversation — Conversation practice as a supplement to 1B. No study of grammar per se. Prerequisite: 1A or equivalent.

2 units, Win (Staff) TTh

2A. Accelerated Second-Year Portuguese (Part 1) — Development of oral comprehension, speaking, writing, and reading proficiency, with study of grammar aimed at furthering these skills. Cultural aspects approached through reading of short stories and journalistic material. Prerequisite: first-year sequence or consent of instructor.

5 units, Aut, Spr (Staff) MTWThF

2B. Accelerated Second-Year Portuguese (Part 2) — Continuation of 2A, providing additional study of grammar to support the development of proficiency in oral comprehension, speaking, reading, and writing. Reading of complete plays and news articles provides material for examining cultural aspects and current events. Prerequisite: 2A or equivalent.

5 units, Win (Staff) MTWThF

2C. Intermediate Conversation — Conversation practice recommended as a supplement to the second-year sequence. No study of grammar per se. Prerequisite: completion of first-year sequence or consent of instructor.

2-3 units Spr (Staff) MWF

50. Reading Portuguese for Speakers of Spanish — For students with superior reading proficiency in Spanish. Concentrates on reading competence and oral comprehension for research and courses in Luso-Brazilian studies. Overview of grammar. Literary, journalistic, and academic readings. Fulfills University reading requirements for advanced degrees.

3 units, Win (Staff) MWF

99. Individual Work — For students wishing to engage in special projects. Cannot be taken as a substitute for any of the regularly scheduled language courses.

1-12 units, Aut, Win, Spr (Staff)
by arrangement

100. Advanced Portuguese Conversation — Conversation practice recommended as a supplement to the second-year sequence. No study of grammar per se. May be counted only once for the major. Prerequisite: 12 or consent of instructor.

2-3 units (Staff) not given 1995-96

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

CULTURAL PERSPECTIVES

130. Brazilian Cultural Perspectives — Readings and discussions on diverse aspects of Brazilian culture. Focus varies depending on students' interest. Prerequisite: completion of second-year sequence or consent of instructor.

4 units, Spr (Staff) MWF

190. Brazilian Cinema — Introduction to major issues in the study of Brazilian film culture. The relationships of film, society, class artistic production, and social change; the exploitation of women by male directors.

3 units

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

ADVANCED UNDERGRADUATE AND GRADUATE LITERATURE

120. Portuguese Cultural Perspectives — The history of Portugal, from the formation of the nation to the present day. The so-called “Discov-
cries," from monarchy to republic, colonization of Africa, decolonization, integration into the European Community. The arts in Portugal: main cultural movements and their expressions in painting, literature, architecture, drama, cinema, music through film, and current journalistic production.

3-5 units, Spr (de Carvalho)

125. Portuguese Literature in Translation: From the Middle Ages to Renaissance — The main literary movements from the Middle Ages to the Renaissance, including the Gallego/Portuguese poetry of the Middle Ages, the dramatist Gil Vicent and his plays of humor and criticism, and The Luciads, the epic, neoclassic poem of Luís de Camões.

3-5 units, Aut (de Carvalho)

126. Portuguese Literature in Translation: From the Baroque to the 20th Century — The main literary texts of the 17th and 18th centuries and the European baroque influence in Portugal. Topics: Romanticism, the discourse of love and revolution, realism and its humoristic criticism on Portuguese bourgeois society (19th century); the diverse expressions of the modernist movement and its main mentor, the poet Fernando Pessoa and his heteronyms (20th century); the role of Portuguese literature in the struggle for a free, modern society and trends in contemporary Portuguese literature.

3-5 units, Win (de Carvalho)


3-5 units, Win (de Carvalho)

188. Struggle Literature as a Discourse for Freedom in Lusophone Africa — Struggle literature as a process of affirmation of culture and political identities of African societies on their way to freedom in Angola, Guinea-Bissan, Cape Verde, Mozambique, San Tomé and Principe. Lusophone African intellectuals, their associations and connections with other cultural groups around the world.

3-5 units, Aut (de Carvalho)

265. Tendencies in Contemporary Brazilian Literature — Traits and trends in Brazilian literature (universalism and modernism, the tradition of urban realism). Brazilian writers who exerted a permanent influence on different literary generations and are still considered a key source of inspiration and movements in contemporary Brazilian literature. (In English or Portuguese)

3-5 units, Win (Altmino)

299. Individual Work — Open to graduates or undergraduates. May be repeated for credit.

1-12 units (Staff) by arrangement

**GRADUATE SEMINARS**

399. Individual Work — Exclusively for graduate students in Portuguese engaged in special work. 1-12 units, by arrangement

**AFFILIATED DEPARTMENT OFFERINGS**

The following courses are accepted for credit in the major. See the respective department listings for course description and scheduling information.

**COMPARATIVE LITERATURE**

338. García Lorca’s “Poet in New York” and the Harlem Renaissance (Gumbrecht)

**DANCE**

177. Dance and Culture in Latin America (Cashion)

**ENGLISH**

163K. Contemporary Latina Culture (Romero)

**STATISTICS**


Chair: Iain M. Johnstone


Associate Professors: Trevor J. Hastie, Art B. Owen, Joseph P. Romano

Assistant Professors: Anindita Adhikari (on leave) Amir Dembo (on leave), Laura Lazzeroni, Jun Liu, Michael A. Martin (on leave), Guenther Walther

Courtes Professors: Byron W. Brown, Helena Kraemer, Richard A. Olshen, David R. Rogosa, 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: Economics (Anderson), Education (Olkin, Rogosa, Suppes), Electrical Engineering (Cover), Geological and Environmental Sciences (Switzer), Health Research and Policy (Brown, Efron, Hastie, Johnstone, Moses, Olshen), Mathematics (Dembo), Operations Research (Lieberman), Stanford Linear Accelerator (Friedman). The research activities of the department reflect an interest in both applied and theoretical statistics, and probability. There are workshops in biology-medicine and in environmental factors in health.

In addition to courses for statistics majors, the department offers a number of service courses designed for students in other departments. These tend to emphasize the application of statistical techniques rather than their theoretical development.

A candidate considering graduate work in statistics may be interested in the brochure "Careers in Statistics," which is available upon request from the American Statistical Association, 1429 Duke St., Alexandria, VA 22314-3402.

The Department of Statistics is well equipped for statistical applications and research in computational statistics. Computer facilities include two DEC station 5000s networked to approximately 25 X-terminals, and a Macintosh Ilfx for general research and teaching use. The Mathematical Sciences Library serves the department jointly with the Departments of Mathematics and Computer Science.

The department has always drawn visitors from other countries and universities. As a consequence, there is usually a wide range of seminars offered by both the visitors and our own faculty.

**GRADUATE PROGRAMS**

**MASTER OF SCIENCE**

The department requires that the student take 42 units of work from offerings in the Department of Statistics or from authorized courses in other departments. If advanced statistics courses are included in the program, the total number of units may be reduced. A thesis is not required. Ordinarily, four or five quarters are needed to complete all requirements.

Each student normally fulfills the following requirements for the M.S. degree:

1. Statistics 116, 200, 217, 218. Courses previously taken may be waived, in which case they must be replaced by other approved courses.
2. Math. 103 or 113. Students should be proficient in computer programming at the level of Computer Science 106A, and this course or an equivalent is required for all students who lack sufficient computing experience. Substitution of other courses in mathematics and computer science may be made with consent of the adviser.
3. Three additional courses from offerings in the Department of Statistics. These are normally taken from the group of courses 201, 202, 203, 204, 205, 206, 207, 211, 229.
4. Additional units to complete the requirements chosen from offerings in the Department of Statistics or from authorized courses in other departments. At least half of the units taken for the M.S. degree must be from offerings in the Department of Statistics.

There is sufficient flexibility to accommodate students with interests in applications to business, computing, economics, engineering, health, operations research, and social sciences.

Students with a strong mathematical background who may wish to go on to a Ph.D. in Statistics should consider applying directly to the Ph.D. program.

A 2.75 letter grade indicator (LGI) is required for all statistics courses which are taken for an M.S. degree. All statistics courses required for the M.S. degree (116, 200, 217, 218, and three additional courses) must be taken for letter grades.

**DOCTOR OF PHILOSOPHY**

The department looks for motivated students who want to prepare for research careers in statistics or probability, either applied or theoretical. Advanced undergraduate or master's level work in mathematics and statistics provides a good background for the doctoral program. Quantitatively oriented students with degrees in other scientific fields are also considered for admission. The program normally takes four years.

**Program Summary —** Statistics 300A,B,C, 305, 306A,B, and 310A,B,C (first-year core program); pass two of three parts of the qualifying examination (beginning of second year); breadth requirement (second or third year); University oral examination (end of third year or beginning of fourth year); dissertation (fourth year).

**First-Year Core Courses —** Statistics 300 systematically surveys the ideas of estimation and of hypothesis testing for parametric and nonparametric models involving small and large samples. 305 is concerned with linear regression and the analysis of variance. 306 surveys a large number of modeling techniques, related to but going beyond the linear models of 305. 310 is a measure-theoretic probability theory, beginning with the basic concepts of analysis.

**Qualifying Examinations —** These are intended to test the student's level of knowledge when the first-year program, common to all students, has
been completed. There are separate examinations in the three core subjects of statistical methods, mathematical statistics, and probability theory, and all are given at the beginning of the Autumn Quarter of the student's second year. Students may take two or three of these examinations and are expected to show acceptable performance in two examinations.

**Breadth Requirement** — In order to appreciate scientific problems, students are required to take 9 units of course work at a graduate or advanced undergraduate level in some other department. These units must be in courses higher than 200. Students with a graduate degree in a scientific area that is not essentially mathematics or statistics are exempted from this requirement.

**University Oral Examination** — The University oral examination is taken on the recommendation of the student’s research adviser after the thesis problem has been well defined and some research progress has been made. Usually, this happens early in the student's fourth year. The oral examination consists of a 40-minute presentation on the thesis topic, followed by two question periods. The first relates directly to the student's presentation and the second is intended to explore the student's familiarity with broader statistical topics related to the thesis research.

**Financial Support** — Students accepted to the Ph.D. program are offered financial support. All tuition expenses are paid and there is a fixed monthly stipend determined to be sufficient to pay living expenses. Financial support is continued for four years, department resources permitting, for students in good standing. The resources for student financial support derive from funds made available for student teaching assistantships and research assistantships. Students receive both a teaching and research assignment each quarter which, together, do not exceed 20 hours. Students are strongly encouraged to apply for outside scholarships, fellowships, and other forms of financial support.

**Ph.D. MINOR**

The Department of Statistics will devise individual Ph.D. minor programs, but the department urges all graduate students in other fields who wish to have a 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 average around 30. This difference of 10-12 units can be made up by the student by including in the M.S. program courses from his or her own field which are related to statistics or applications of statistics.

---

**COURSES**

**INTRODUCTORY**

Introductory courses for general students with an interest in the problems of descriptive statistics and statistical inferences are: Statistics 40, 60, 61. These courses have no mathematical prerequisites. Statistics 40 and 60 are approved for the Mathematical Sciences distribution requirement for undergraduates. Statistics 40 covers discrete probability theory, game theory, decision theory, and applications to statistics. The sequence 60, 61, emphasizes mainly the techniques and methods of statistical inference.

Statistics 110, 116, 190, 200, 217-218 are introductory but have a calculus prerequisite. Statistics 110 covers the most important techniques used in the analysis of experimental data in engineering and science. Statistics 190 is a post-calculus course in statistics specifically designed for economists, psychologists, sociologists, and other social science majors. Statistics 116 provides a general introduction to the theory of probability. It may be followed by 200, which deals with statistical theory, or by 217 and 218, which deal with stochastic processes. The sequence 116, 200 is a basic one-year course in mathematical statistics; the sequence 116, 217, 218 is a basic one-year course in probability theory.

**40. Chance and Strategy** — (Graduate students register for 140.) Precalculus for nonmathematical students in probability theory and game theory. How statistical methods touch science, politics, engineering, health, and public policy. DR:4(6)

3 units, Aut (Staff) MWF 10

**60. Introduction to Statistical Methods I** — (Graduate students register for 160.) A nonmathematical study of statistical methods. Emphasis is on statistical techniques. Organization of data, averages, variability, and association. Statistical inference, test of hypotheses, estimation, and confidence intervals. Computer statistical packages are used. Students cannot receive credit for both Statistics 60 and Psychology 60. DR:4(6)

5 units, Aut (Switzer) MTWThF 1:15
Win (Staff) MTWThF 1:15
Spr (Walther) MTWThF 1:15
Sum (Staff) MTWThF 11

**61. Introduction to Statistical Methods II** — (Graduate students register for 161.) Chi-square tests, analysis of variance, regression, correlation, nonparametrics, sample surveys, elementary design of experiments. Prerequisite: 60 or consent of instructor.

5 units, Win (Lazzeroni) MWF 1:15

**110. Statistical Methods in Engineering and the Physical Sciences** — Introduction to applied statistics for engineers and physical scientists. Topics: descriptive statistics, point and interval estimation,
Decision theory; point and interval estimation, tests of hypotheses; Neyman-Pearson theory. Bayesian analysis; maximum likelihood, large-sample theory. Prerequisite: 116.

3 units, Win (Cover) MWF 1:15
Spr (Owen) MWF 11

CONTINUATION

Courses in this category have been designed for particular use in applications. Generally, they have introductory statistics or probability as prerequisites.

201. Statistical Methods — For the mathematically well-qualified student; moves quickly, covering descriptive statistics, tests of hypotheses, comparison of two samples, the binomial distribution, nonparametric methods, regression correlation, and elements of the analysis of variance. Can be followed by 202 or 203 (or both in any order). Prerequisite: 116 or equivalent.

3 units, Aut (Lazzeroni) MWF 3:15


3 units, Spr (Staff) 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 (Staff) 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, Spr (Owen) MWF 2:15

205. Introduction to Nonparametric Statistics — Nonparametric analogs of the one- and two-sample 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, not given 1995-96

206. Applied Multivariate Analysis — Introduction to statistical analysis of several quantitative measurements on each observational unit. Empha-
712

SCHOOL OF HUMANITIES AND SCIENCES

sis on concepts, computer-intensive methods. Examples from economics, education, geology, psychology. Topics: multiple regression, multivariate
analysis of variance, principal components, factor
analysis, canonical correlations, multidimensional
scaling, clustering. Prerequisite: 200 or 201; concurrent registration in 200 is permitted.
3 units, Aut (Olkin) MWF11
207. Introduction to Time Series Analysis — Time
series models used in economics, engineering, physics, geology, etc. Trend fitting, autoregressive
schemes, moving average models, periodograms,
second order stationary processes, spectral analysis. Prerequisites: 116 and a basic course in statistics
(200 or 201A).
3 units, not given 1995-96
208. Introduction to the Bootstrap —The bootstrap is a computer-based method for assigning
measures of accuracy to statistical estimates. By
substituting computation in place of mathematical
formulas, it permits the statistical analysis of complicated estimators. Topics: nonparametric assessment of standard errors, biases, and confidence
intervals; related resampling methods including the
jackknife, cross-validation, and permutation tests.
Theory and applications. Prerequisite: at least one
course in statistics or probability.
3 units, not given 1995-96
211. Statistical Methods for Meta-Analysis—
(Same as Education 493B.) Meta-analysis is a quantitative method for combining results of independent studies, an J enables researchers to synthesize
the results of related studies so that the combined
weight of evidence can be considered and applied.
Examples from the medical, behavioral, and social
sciences. Topics: literature search, publication and
selection bias, statistical methods (contingency
tables, cumulative methods, sensitivity analyses,
non-parametric methods). Project required. Prerequisites: basic sequence in statistics and consent of
instructor.
1-3 units, Win (Olkin) MWF 11-12:30
217. Introduction to Stochastic Processes — Discrete and continuous time Markov chains: communicating classes, irreducibility, periodicity, firstpassage times, recurrence and transience, convergence theorems and stationary distributions, sample
paths. Q-matrix, birth and death processes. Prerequisite: 116.
3 units, Aut (Staff) MWF 2:15
218. Introduction to Stochastic Processes — Renewal theory, point processes emphasizing the Poisson process. Wiener and Gaussian processes and
second-order processes. Prerequisite: 217.
3 units, Win (Walther) MWF 2:15
229. Selected Topics — Topics vary each year. Prerequisite: 200 or equivalent.
3 units, by arrangement

251. Stochastic Models in Operations Research —
(Enroll in Operations Research 252.)
3 units, Spr (Iglehart)
257. Simulation — (Enroll in Operations Research
253.)
3 units, Spr (Iglehart)

PRIMARILY FOR
DOCTORAL STUDENTS
Sequences 300A,B,C, 305, 306A,B, and
310A,B,C comprise the fundamental sequence
which serves as a general introduction to and
prerequisite for further work. Subsequent courses
delve more deeply into special topics.
240. Linear Programming—(Enroll in Operations
Research 241.)
3 units, Aut (Cottle)
260A,B»C. Workshop in Biostatistics — Primarily
for doctoral students in statistics. Applications of
statistical techniques to current problems in medical
science. Enrollment for more than 2 units of credit
involves extra reading or consulting and requires
consent of the instructor.
260A. 1-5 units, Aut (Brown, Efron, Hastie,
Johnstone, Olshen) Th 1:15-3:05
260B. 1-5 units, Win (Brown, Efron, Hastie,
Johnstone, Olshen) Th 1:15-3:05
260C. 1-5 units, Spr (Brown, Efron, Hastie,
Johnstone, Olshen) Th 1:15-3:05
300A,B,C. Theory of Statistics-Elementary finite sample theory of point estimation: statistical
models; sufficiency; applications to exponential
families, group families, and nonparametric families; minimum risk unbiased estimation; minimum
risk equivariant estimation; Cramer-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; asymtotic 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 (Liu) MWF 11
300B. 3 units, Win (Liu) MWF 11
300C. 3 units, Spr (Romano) MWF 11

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 (Donoho) TTh 2:15-3:30

306A, B. Methods for Applied Statistics — Survey of applied statistical methods, including computational methods. Topics: nonlinear least squares (including robust regression), generalized linear models, time series (autocorrelation, autoregression, periodogram, spectrum), survey sampling (finite populations, stratification, clustering, ratio estimation), nonparametric regression (kernels, splines, projection pursuit, CART, MARS), survival analysis (Kaplan-Meier, Mantel-Haenszel, Cox model), design (factorial experiments, response surfaces), random number generation, numerical linear algebra, numerical optimization, sample reuse (bootstrap, jackknife, cross-validation, other Monte Carlo), matrix based multivariate statistics (canonical correlation, T-squared, factor analysis, principal components), and other topics briefly. Prerequisite: 305 or equivalent.

306A. 3 units, Win (Hastie) MWF 2:15
306B. 3 units, Spr (Friedman) MWF 2:15


310A. 3 units, Aut (Walther) MWF 10
310B. 3 units, Win (Lai) MWF 10
310C. 3 units, Spr (Lai) MWF 10

314. Matrix Theory and Inequalities — (Enroll in Math. 252B.)

3 units, not given 1995-96


317. 3 units, Spr (Lai) MWF 10
318. 3 units, Win (Lai) MWF 10

3 units, Aut (Romano) by arrangement
Win (Lai) by arrangement
Spr (Lai) by arrangement


3 units, not given 1995-96


3 units, not given 1995-96


3 units, not given 1995-96

326. Sequential Analysis — The Wald sequential probability ratio test, operation characteristics, and applications. General theory of optimal stopping with applications to sequential statistical decision problems.

3 units, not given 1995-96

3 units, not given 1995-96

328. Nonparametric Statistical Inference — Statistical inference without strong model assumptions; hypothesis testing and estimation using permutations and ranks; nonparametric model-fitting, tolerance limits, discriminant analysis, and analysis of variance.

3 units, not given 1995-96


3 units, not given 1995-96


3 units, not given 1995-96

332. Asymptotic Methods in Statistics — Concepts of efficiency, the asymptotic efficiency of maximum likelihood estimators, best asymptotically normal (BAN) estimators, asymptotic behavior of likelihood ratio tests, optimal designs, empirical Bayes methods.

3 units, not given 1995-96

333. Robust Estimation — Procedures which continue to be effective when the usual parametric assumptions are violated. The estimation of location for symmetric distributions: M, L, and R estimators, asymptotics, the influence curve. Robustness in hypothesis testing. Survey of recent literature. Prerequisites: 236A,B,C.

3 units, not given 1995-96


3 units, not given 1995-96

340. Experimental Design — For graduate students in science, engineering, and statistics. Emphasis on how and why to do experiments and analyzing and presenting the results. Topics: control groups, anova, blocking and balance, factorial experiments, fractional factorials, screening designs, response surfaces, binary outcomes, Taguchi methods, computer experiments. Prerequisite: 116. Recommended: experience with experimentation or data analysis.

3 units, not given 1995-96


3 units, Aut (Hastie) MWF 11


3 units, Aut (Donoho) TTh 11-12:15

344A. Genetic Epidemiology — Methods for the design and analysis of studies in human genetics focusing on the epidemiology of Mendelian disorders and the genetic and environmental contributions to common, complex familial traits. Topics: study designs for assessing the importance of genetic factors (family, twin, and adoption studies); methods for determining modes of inheritance (segregation analysis); identification and mapping of major genes through linkage analysis and disease-marker associations. Applications to birth defects, coronary heart disease, psychiatry, neurology, cancer, and immunology.

3 units, Win (Lazzaroni, Risch) MW 3:15-4:30

344B. Topics in Statistical Genetics — In-depth discussion of statistical methods currently used in human genetic analysis. Topics depend on interests of the students and instructors: concepts of likelihood as used in the genetic context; measures of familial aggregation, including issues of censoring and age-dependent data; genetic modeling of quantitative traits; mode of inheritance analysis, includ-
345. Exponential Families and Data Analysis — Exponential families play a central role in modern statistical theory, and in statistical practice. One-parameter and multi-parameter exponential families. Applications: overdispersion, quasi-likelihood, curved exponential families, missing data and the EM algorithm, and bootstrap confidence intervals.

3 units, Spr (Lazzeroni, Risch) MW 3:35-4:30

350. Topics in Probability Theory — Exchangeable pairs and an explicit formula for the error in a probabilistic approximation. Applications to classical, normal, and Poisson approximation problems, and also problems in combinational probability, such as random permutations, the theory of runs, and random allocations. Prerequisites: 116 or equivalent. Recommended: 310.

3 units, Aut (Stein) MW 1:15-2:30

352. Spatial Statistics — Summary statistics, probability models, smoothing and interpolation, classification, sampling design, applications to remote sensing and environmental monitoring.

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


3 units, Win (Owen, Liu) MWF 1:15


3 units, not given 1995-96

358. Queueing Theory — (Enroll in Operations Research 358.)

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


3 units, Win (Inglehart)


3 units, not given 1995-96

371. Bayesian Modeling and Computations — Bayesian methods treat unknowns as random variables and are coherent and flexible. Basic Bayesian models, whose answers often appear similar to classical answers. Complicated hierarchical and mixture models with nonstandard solutions. Methods for model checking, sensitivity analysis, and predictions. Emphasis on drawing inferences via computer simulation. Mathematical analysis discussion.

3 units, not given 1995-96


3 units, not given 1995-96

375. Discrete Probabilistic Methods — Review of modern probabilistic methods suitable for analyzing discrete structures of the type naturally arising in computer science, number theory, information theory, and molecular sequence analysis. Topics: the basic probabilistic method and the linearity of expectation; the second moment and alterations; the local lemma, correlation, inequalities and their applications; Martingales, large deviations and the method of types; the Poisson paradigm, the Stein-Chen method and applications; branching processes and random graphs. Prerequisite: 116 or equivalent.

3 units, not given 1995-96

376A. Information Theory — (Enroll in Electrical Engineering 376A.)

3 units, Win (ElGamal)

376B. Information Theory — (Enroll in Electrical Engineering 376B.)

3 units, alternate years, given 1996-97

377. Special Topics in Information Theory — (Same as Electrical Engineering 478.) Advanced
topics in information theory including the geometry of information, the relationship of universal data compression and universal investment theory, duality theorems for rate distortion and channel capacity, Bennett's notion of logical depth and its relation to Kolmogorov complexity, Han-Verdu capacity bounds for generating random variables, and the role of feedback in communication.

3 units, Spr (Cover) TTh 1:15-2:30

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, Spr (Friedman) by arrangement
Win (Owen) by arrangement

399. Research — Research work as distinguished from independent study of nonresearch character listed in 199.

(Staff) by arrangement

PROGRAM IN STRUCTURED LIBERAL EDUCATION

Emeritus: (Professor) John Goheen (Philosophy)
Director and Professor: Mark Mancall (History)
Lecturers: Edward Frueh, Suzanne Greenberg,
Jonathan Reider, Mollie Schwartz Rosenhan,
Greg Watkins
Coordinator: Suzanne Greenberg

The Program In Structured Liberal Education (SLE) is designed specifically for freshmen interested in an interdisciplinary approach to the liberal arts and sciences. The program emphasizes intellectual rigor and individualized contact between faculty and students. SLE has three basic purposes: to present a coherent program of instruction; to develop the student's ability to ask effective questions of texts, teachers, the culture, and themselves; and to develop intellectual skills in logical reasoning, critical reading, expository writing, and group discussions.

SLE stresses inquiry, criticism, and a tolerance for ambiguity. Neither the faculty nor the curriculum provides "ready-to-solve" answers to the questions being dealt with; rather, SLE encourages a sense of intellectual challenge, student initiative, and originality.

APPLICATION

Freshmen should apply during the summer preceding the academic year in which they will enroll.

SLE is designed as a three-quarter sequence and students applying should be willing to make a commitment for the entire program, although a student can withdraw from the program at any time.

Correspondence regarding the program should be addressed to Program in Structured Liberal Education, Florence Moore Hall, Stanford University, Stanford, California 94305.

COURSES

SLE is a demanding program which consumes approximately 60 percent of the average academic workload first-year students usually carry. Autumn Quarter concentrates on ancient Greece, Israel, and India. Winter Quarter examines the religious, ideological, and aesthetic transformations that occurred in Europe, Asia, and the New World as a result of the Middle Ages, Renaissance, Scientific Revolution, and Enlightenment. Spring Quarter focuses on the social, political, and artistic forces that shape the modern world. Completion of the SLE program satisfies the Cultures, Ideas, and Values Requirement DR:1, the Literature and Fine Arts Requirement DR:7(2), the Philosophical, Social, and Religious Thought Requirement DR:8(3), and the Writing Requirement.

91. 9 units, Aut (Staff) TWTh 3:15-5,
TW 6:30-8 p.m., and Th 6-8 p.m.

92. 9 units, Win (Staff) TWTh 3:15-5,
TW 6:30-8 p.m., and Th 6-8 p.m.

93. 9 units, Spr (Staff) TWTh 3:15-5,
TW 6:30-8 p.m., and Th 6-8 p.m.

PROGRAM IN SYMBOLIC SYSTEMS

Director: Thomas Wasow (Linguistics and Philosophy)
Program Committee: Fred Dretske (Philosophy),
James Greeno, Nils Nilsson (Computer Science), Brian Smith, Barbara Tversky, Thomas Wasow
Program Faculty: Michael Bratman (Philosophy),
Christopher Chafe (Music), Eve Clark (Linguistics),
Herbert H. Clark (Psychology), Henriette de Swart (Linguistics), Fred Dretske (Philosophy),
Solomon Feferman (Mathematics and Philosophy),
John Gabrieli (Psychology), Peter Godfrey-Smith (Philosophy), James Greeno (Education),
David Heeger (Psychology), Martin Kay (Linguistics), Ellen Markman (Psychology),
John McCarthy (Computer Science),
Raymond McDermott (Education), Clifford Nass (Communication), Nil Nilsson (Computer Science), John Perry (Philosophy), Stanley Peters (Linguistics), Byron Reeves (Communication), Eric Roberts (Computer Science), David Rumelhart (Psychology), Ivan Sag (Linguistics), Peter Sells (Linguistics), Amos Tversky (Psychology), Barbara Tversky (Psychology), Johan van Benthem (Philosophy), Decker Walker (Education), Brian Wandell (Psychology), Thomas Wasow (Linguistics and Philosophy), Terry Winograd (Computer Science)

Consulting Faculty: Joseph Y. Halpern (Computer Science), Jerry Hobbs (Linguistics), Bernardo Huberman (Applied Physics), David Israel (Philosophy), Kurt Konolidge, John R. Koza (Computer Science), Amy Lansky, C. Raymond Perrault (Philosophy), Stanley Rosenschein (Computer Science), Paul Skokowski (Philosophy), Brian C. Smith (Philosophy), Lucy Suchman

Other Faculty: Paul Edwards (Science, Technology, and Society; and Computer Science). Margaret Johnson (Computer Science), Patrick Langley (Psychology)

Program Coordinator: Todd Davies

Computer systems, robots, and people are all examples of symbolic systems, agents that use language to represent the world around them so as to communicate and generally act intelligently. The notions of symbol, representation, information, and action are at the heart of the study of symbolic systems. This common core of notions arises in a variety of fields including artificial intelligence, computer science, cognitive psychology, linguistics, philosophy, and symbolic logic. In recent years, though, a new discipline has begun to emerge from research collaborations across these traditional disciplines, addressing questions such as: In what ways are computers and computer languages like humans and their languages? How can the interaction between humans and computers be made easier and more productive? What would it take to build a computer that thinks?

The Symbolic Systems Program (SSP) offers an opportunity to focus on these issues. Majors must take courses in the Departments of Computer Science, Linguistics, Philosophy, and Psychology, as well as courses designed specifically for the program. The goal is to prepare students with the vocabulary, theoretical background, and technical skills to understand and participate in contemporary interdisciplinary research into questions about language, information, and intelligence—both human and machine. The curriculum offers traditional humanistic approaches to these questions as well as a training in, and familiarity with, contemporary developments in the science and technology of computation.

A degree in Symbolic Systems prepares students for advanced training in the interdisciplinary study of language and information, or for post-graduate study in any of the contributing disciplines. It is also excellent preparation for employment immediately after graduation.

UNDERGRADUATE PROGRAM

BACHELOR OF SCIENCE

The program leads to a B.S. in Symbolic Systems. The curriculum provides students with a core of concepts and techniques from computer science, linguistics, logic, philosophy, and cognitive psychology, drawing on faculty and courses from these and other departments.

Symbolic Systems majors must complete a core of required courses plus a concentration consisting of five additional courses. All major courses are to be taken for letter grades unless an approved course is offered Satisfactory/No Credit only. The core requirements are:

2. Computation and Artificial Intelligence:
   a) Computer Science 106B, Programming Abstractions, or Computer Science 106X, Programming Methodology and Abstractions
   b) Computer Science 109A,B, Introduction to Computer Science
   c) Computer Science 221, Introduction to Artificial Intelligence
3. Philosophical Foundations:
   a) Philosophy 80, Mind, Matter, and Meaning
   b) Philosophy 181, Philosophy of Language or Philosophy 186, Philosophy of Mind or Philosophy 184, Theory of Knowledge
4. Language:
   a) Linguistics 120, Introduction to Syntax. (Students with a special interest in natural language may take, instead, Linguistics 220A, Introduction to Syntactic Theory, by consent of instructor.)
   b) Linguistics 130, Introduction to Semantics and Pragmatics or Linguistics 230A, Semantics and Pragmatics
5. Logic:
   a) Philosophy 160A, First Order Logic
   b) Philosophy 160B, Computability and Logic, or Computer Science 154, Introduction to Automata and Complexity Theory, or Computer Science 254, Automata, Languages, and Computability
6. Mathematics: one course on a mathematical topic other than calculus. Examples are suggested for different concentrations: Math. 109, 120, (Applied Logic); Computer Science 154, 154N, 254 (Human-Computer Interaction and Natural Language); Math. 130 (Neuroscience);
Philosophy 160B, Math. 161 and 162 (Natural Language and Philosophical Foundations); Statistics 116 and 190 (Cognition, Education and Learning, Human-Computer Interaction, and Neuroscience).

7. Senior Seminar: Symbolic Systems 201

Students select concentrations from the list below or design others in consultation with their advisers.

Applied Logic
Artificial Intelligence
Cognition
Computation
Computer Music
Education and Learning
Human-Computer Interaction
Natural Language
Neuroscience
Philosophical Foundations
Rationality

DIRECTED RESEARCH AND SENIOR HONORS

The program strongly encourages all SSP majors to gain experience in directed research by participating in faculty research or by pursuing independent study. Several avenues are offered.

1. Summer Internships: students work on SSP-related faculty research projects.

2. Independent Study: under faculty supervision, students work on independent projects. For course credit they may enroll in Symbolic Systems 196.

3. Senior Honors: under faculty supervision, students pursue extended research projects and complete a senior honors dissertation.

Contact SSP for more information on any of these options. In addition, the Undergraduate Research Opportunities office on campus offers numerous grants and scholarships supporting, at all levels, student research projects.

COURSES

80. Mind, Matter, and Meaning — (Enroll in Philosophy 80.) DR:8(3)

5 units, Aut (Bratman) TTh 11-12:15

106. Introduction to Cognitive Psychology — (Enroll in Psychology 106.) DR:9(4)

4 units, Win (B. Tversky) TTh 1:15-2:30

106B. Programming Abstractions — (Enroll in Computer Science 106B.) DR:6(8)

5 units, Aut (Feldman) MWF 11

Win (Roberts) MWF 1:15

Spr (Feldman) MWF 1:15

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

5 units, Aut (Clausing) MWF 10

Win (Feldman) MWF 3:15

Spr (Clausing) MWF 10

109A,B. Introduction to Computer Science — (Enroll in Computer Science 109A,B.)

109A. — DR:6(8)

4 units, Aut (Dill) MWF 10

Win (Ullman) MWF 3:15

109B. 4 units, Win (Johnson) MWF 10

Spr (Ullman) MWF 2:15

120. Introduction to Syntax — (Enroll in Linguistics 120.)

4 units, Aut (Sag, Wasow)

130. Introduction to Semantics and Pragmaties — (Enroll in Linguistics 130.)

4 units, Win (de Swart)

154. Introduction to Automata and Complexity Theory — (Enroll in Computer Science 154.)

4 units, Win (van Glabbeek) MW 2:15-4:30

Spr (Motwani) MWF 3:15

160A. First Order Logic — (Enroll in Philosophy 160A.) DR:4(6)

4 units, Win (Kremer) MWF 9 plus section

160B. Computability and Logic — (Enroll in Philosophy 160B.)

4 units, Spr (Mints) MWF 9 plus section

181. Philosophy of Language — (Enroll in Philosophy 181.)

4 units, Win (Lazar) MW 2:15

184. Theory of Knowledge — (Enroll in Philosophy 184.)

4 units, Win (Dretske) MWF 11-12:15

186. Philosophy of Mind — (Enroll in Philosophy 186.)

4 units, Spr (Taylor) MWF 1:15

201. Senior Seminar — Core seminar for program majors. Integrates themes from core course work with contemporary cross-disciplinary research in learning, computation, and formal systems.

2 units, Win, Spr (Davies)

220A. Introduction to Syntactic Theory — (Enroll in Linguistics 220A.)

4 units, Win (Webelhut)

221. Introduction to Artificial Intelligence — (Enroll in Computer Science 221.)

3 units, Aut (Latombe) MW 11-12:15

Spr (Staff) TTh 11-12:15

230A. Introduction to Semantics and Pragmaties — (Enroll in Linguistics 230A.)

4 units, Spr (Peters)
254. Automata, Languages, and Computability — (Enroll in Computer Science 254.)
4 units (Pratt) not given 1995-96

RESEARCH
190. Senior Honors Tutorial — Under the supervision of the honors faculty adviser, students work on their senior honors project.
1-5 units, any quarter (Staff) by arrangement
191. Senior Honors Seminar — Under the leadership of the Symbolic Systems program coordinator, students meet, discuss, and present their honors project.
2 units, Win, Spr (Davies) by arrangement
196. Independent Study — Independent work under the supervision of a faculty member.
1-15 units, any quarter (Staff)

OTHER PROGRAM COURSES
10. Symbolic Systems Program Forum — Informal, introductory-level series aimed at exposing prospective and declared Symbolic Systems majors and other interested members of the Stanford community to the questions and phenomena addressed by symbolic systems related fields (cognitive psychology, artificial intelligence, linguistics, philosophy of mind, neuroscience, etc.) and to the people currently doing research in these areas.
1 unit, Aut, Win, Spr (Staff) Th 4:15

20. Problems of Intelligence, Information, and Learning — (Same as Education 120.) Introduction to studies of intelligent reasoning, knowledge, understanding, representation, and meaning. Results of computational linguistics, philosophical, and psychological research discussed and compared. Relevance of the material to instruction and learning. DR:9(4)
4 units, Win (Greeno) MTWTh 2:15

188. Cognition, Connectionism, and Neuroscience — Topics in the philosophy connectionism and neuroscience. Emphasis is on the explanatory value of these disciplines for students interested in mental representation, concept formation, and memory, and on recent work in complexity and emergence of cognitive systems.
3 units, Win (Skokowski) M 10-11:50

192B. Social Dilemmas — For sophomores only. Social dilemmas are insidious problems facing societies, whether social, economic, or organizational. They arise whenever intentional agents collaborate in the production of a common good. Topics: rational individual behavior and irrational collective outcomes. Free riders. The role of expectations. Analytical methods and computer experiments. The existence of a critical group size. Resolving social dilemmas.
3 units, Aut (Huberman) by arrangement

AFFILIATED DEPARTMENT OFFERINGS
Listed below are a sample of other courses, some of which can be used as part of the student’s concentration (see SSP booklet), or may be of special interest to SSP majors. The list is not exhaustive. Students should consult course listings in the related departments for additional courses as well as the further information of quarter and time given.

COMPUTER SCIENCE
201. Computers, Ethics, and Social Responsibility
Spr (Roberts)
223A. Introduction to Robotics
Win (Khatib)
226. Expert System Applications
Win (Staff)
229. Machine Learning
Win (Staff)
273. Concepts of Text for Human-Computer Interfaces — (Same as Art 281.)
Spr (Bigelow)
356A. Reasoning about Knowledge
Win (Halpern)
377. Topics in Human-Computer Interaction
Win (Clanton, Selker)
Win (Winograd, Davis)
547. Human-Computer Interaction Seminar
Aut, Win, Spr (Winograd)

EDUCATION
224. Information Technology in the Classroom
Win, Spr (Walker)
255. Human Abilities — (Same as Psychology 155.)
Win (Snow)
287X. Culture and Learning — (Same as Anthropology 136.)
Sum (Baugh, McDermott)

LINGUISTICS
110. Introduction to Phonetics and Phonology
Spr (Flemming)
139. Introduction to Computational Linguistic
Win (Kay)
207A. Morphology
Win (Zwicky)
207B. Morphosyntax
Spr (Kiparsky)
221A. Head-Driven Phrase Structure Grammar I
Spr (Sag)
233. Semantics Seminar  
Aut (Peters)  

240. Language Acquisition I — (Same as Psychology 240.)  
Aut (E. Clark)  

241. Language Acquisition II: Acquisition of Lexicon — (Same as Psychology 241.)  
Win (E. Clark)  

MATHEMATICS  

161. Set Theory  
Win (Liebman)  

PHILOSOPHY  

60. Introduction to the History and Philosophy of Science — (Same as History and Philosophy of Science 60.)  
Win (Godfrey-Smith)  

159. Basic Concepts in Mathematical Logic — (Same as Linguistics 135.)  
Aut (Wasow)  

162. Philosophy of Mathematics  
Aut (Kremer)  

164. Central Topics in the Philosophy of Science  
Aut (Duménil)  

169. Intensional Logic  
Spr (van Benthem)  

170. Ethical Theories  
Spr (Cohon)  

277. Theory of Action  
Win (Bratman)  

298. Topics in Logic, Language, and Information  
Spr (van Benthem)  

395A. Philosophy of Cognitive Science  
Win (Smith)  

PSYCHOLOGY  

70. Brain and Behavior  
Aut (R. Fernald)  

102. Perception  
Spr (Heeger)  

141. Human Neuropsychology  
Spr (Gabrielli)  

146. Language and Thought  
Aut (H. Clark)  

156. Decision and Judgment  
Win (A. Trevisky)  

200. Foundations of Cognitive Science  
Aut (Rumelhart)  

221. Applications of Vision Science  
Spr (Wandell)  

PROGRAM ON URBAN STUDIES  

Director: Leonard Ortolano (Professor of Civil Engineering)  
The Committee on Urban Studies: (Chair) Paul Seaver (Professor, History); Albert Camarillo (Professor, History), Paulla Ebron (Assistant Professor, Anthropology, on leave 1995-96), Richard Ford (Assistant Professor, Law) Luis Fraga (Associate Professor, Political Science), Steven Gorelick (Associate Professor, Geological and Environmental Sciences), Shirley Heath (Professor, English and Linguistics, on leave Spring), Keith Loague (Associate Professor, Geological and Environmental Sciences), Milbrey McLaughlin (Professor, Education), Thomas Nechyba (Assistant Professor, Economics), Karen Sawislak (Assistant Professor, History, on leave 1995-96), Nancy Tuma (Professor, Sociology, on leave Autumn), Paul Turner (Professor, Art, on leave 1995-96)  

Lecturers: Gerald Gast, Radford Hall, David Neuman, George Sipel, Michael Smiley, Frederic Stout, Patti Walters  

Urban Studies brings together students, faculty, and outside specialists who are concerned with the people and problems of cities. The program stresses two basic themes: developing a critical understanding of how cities evolve and shape urban life, and developing the practical and analytical tools which can help improve the quality of life. Urban Studies enables undergraduates to examine urban problems through a number of disciplinary lenses and to address these problems in a practical way.  
The Urban Studies major examines the city within the broad context of a liberal arts education. It treats urbanism as an interdisciplinary field and encourages students to inquire critically into both the nature of the urban environment and techniques used to modify that environment.  
The major prepares students for a variety of careers and advanced academic pursuits. Graduates from the Program on Urban Studies have established careers in architecture, community service, environmental planning, real estate development, urban design, and urban planning. Many have obtained graduate degrees in architecture, urban design, or urban planning from major universities across the country including UC-Berkeley, Harvard, and MIT. A substantial number have opted to take degrees in business, law, or public policy.
UNDERGRADUATE PROGRAMS

All students majoring in Urban Studies must complete the Urban Studies core. Those who wish to specialize in community organization, urban planning, or architecture and urban design may complete their majors by meeting the appropriate Option Requirements. Students who wish to concentrate in a different area (for example, health care) must complete the Urban Studies core and design the remaining units with an academic adviser who is a member of the Academic Council.

In all cases, a minimum of 60 units (not counting prerequisites) is required for the major. Courses used to satisfy requirements for the major must be taken for a letter grade.

Students considering the major in Urban Studies should visit the program office in Building 60, room 61B, to meet with the program director.

URBAN STUDIES CORE

Urban Studies majors should take 110, Introduction to Urban Studies, before the end of the Autumn Quarter of their junior year. This course should be taken before 115.

Each of the following is required:

110. Introduction to Urban Studies
115. Utopia and Reality in Modern Urban Planning
116. Environmental Planning Methods

Select at least one course from each of the following categories:

Urban Politics:
130. Seminar: Urban Policy
131. Urban Politics

Urban History:
142. Undergraduate Colloquium: Poverty and Homelessness
143. Labor and Leisure in 19th-Century Urban America
144. Undergraduate Colloquium: The Historical Study of Cities
145. Introduction to Race and Ethnicity in the American Experience
146. The Medieval City: Conflict and Community in Premodern Europe
147. Shakespeare’s London: The Social and Cultural Consequences of Growth
148. Introductory Seminar: The Society of Renaissance Florence

Urban Sociology:
150. Process and Practice of Community Service
151. Introduction to Social Stratification
152. Methods for Sociological Research
155. The Urban Underclass

Urban Anthropology:
160. Urban Culture
161. Language and Culture among Urban Youth
162. Urban Youth and Their Institutions: Research and Practice
164. The Multicultural City in Europe

Urban Design and Architecture:
170. Introduction to Urban Design

171. Suburbia: New Downtowns of the 21st Century
174. Architectural Design Process

Urban and Environmental Planning:
180. Geological and Environmental Sciences I (required for students taking the urban planning option)
181. Environmental Planning Methods

Although not required to complete the Urban Studies major, a knowledge of calculus provides students with flexibility in selecting courses that meet requirements. In addition, calculus is required for admission to many graduate programs in architecture, city planning, and public policy. The program strongly recommends that majors take, at a minimum, Math. 19 and 20 during their freshman or sophomore year.

COMMUNITY ORGANIZATION OPTION

The curriculum for the option in Community Organization provides a deep understanding of the concept of community and its manifestations in the work of public-sector, private-sector, and voluntary service organizations working at the community and neighborhood level. Individual directed study involves field work with a community organization. Courses concerned with community institutions, social science research methods, and internship learning provide a foundation for the field work; a follow-up course on community service allows students to analyze and communicate results from their field research experience. Students pursuing this option are prepared to enter graduate programs concerned with urban affairs and community service and to work with a variety of community service and development organizations and with agencies of local government.

There are no formal prerequisites. Students are encouraged to pursue introductory courses in economics, calculus, and computers. Students who are considering the pursuit of a graduate degree in urban affairs and community service and to work with a variety of community service and development organizations and with agencies of local government.

REQUIRED TO COMPLETE THE MAJOR

Each of the following is required:

Courses in Organizations and Group Processes (15 units)

162. Urban Youth and their Institutions: Research and Practice
Drama 113A. Group Communication
Select one from the following courses on organization theory
Soc. 160. Formal Organizations or Soc. 163. Organizational Decision Making
or Indus. Engr. 100. Organizations: Theory and Management

Methods Sequence (5 or more units)

Anthro. 93. Prefield Research Seminar*
and Anthro. 94. Postfield Research Seminar
or
Community Service Sequence (12 units)
134. Preparation for Internship Learning
150. Process and Practice of Community Service†
194. Directed Individual Study in Community Organizations**

* If the Methods Requirement is satisfied using Anthro. 93 and 94, then Anthro. 93 must be taken before completing Urban Studies 194. If the requirement is satisfied using Soc. 180, then that course should be taken before 194.
† Urban Studies 150 must be taken after (or simultaneously with) 194; Urban Studies 194 is only open to department majors and requires field work with a community organization and preparation of a detailed analysis of the organization and the community it serves. Information on the requirements for 194 is available in the Urban Studies Program office, Building 60, room 61B.
** Urban Studies 134 and 162 must be taken before 194.

RESTRICTED ELECTIVES
The total number of units taken to satisfy the major add up to at least 70; restricted electives are used for this purpose.

Core courses listed under urban sociology and urban anthropology that are not otherwise used to meet requirements for the major may be used as restricted electives.

Other courses that may be used as restricted electives include:
135. Policy Making and Problem Solving at the Local and Regional Level
149. Undergraduate Colloquium: Poverty and Homelessness
156. The State of Public Education in Urban Communities
157. Education of Immigrants in Cities
163. Urban Cultures
Ed. 141X. America's Children and Public Policy: Strategies for Change
Pol. Sci. 186K. American Education and Public Policy
Soc. 145. Race and Ethnic Relations
Soc. 155. Children and Society

URBAN PLANNING OPTION
Courses required for the Urban Planning option introduce the techniques and approaches of city and regional planners. A course applying economics to the solution of urban problems is a key element of this option. Students are also required to study land use planning and the methods used to control the use of land. Because urban planners rely heavily on statistics and computers in doing their analyses, the major requires an introduction to each of these subjects. The Urban Planning option provides excellent preparation for graduate programs in urban and regional planning and in public policy analysis.

See department listings for course information.

PREREQUISITES
Course No. and Subject
Math. 41. Calculus
Econ. 1. Elementary Economics
Econ. 51. Economic Analysis I
Econ. 180. Mathematics for Economists
or Math. 43. Calculus

REQUIRED TO COMPLETE THE MAJOR
Course No. and Subject
Geol. and Envir. Sci. 131. Environmental Earth Sciences II
Geol. and Envir. Sci. 132. Environmental Earth Sciences III
Comp. Sci. 105A. Introduction to Computers
Stat. 190. Statistics for Social Scientists
Applied Microeconomics — select one of the following: Economics 148, 150, 154, 155.

RESTRICTED ELECTIVES
Any 100-level courses selected from the Urban Studies core, from any offered by the Program on Urban Studies, or from those listed below to bring the total to 60 units (not including prerequisites).

Civ. Engr. 172. Air Quality Management
Geol. & Envir. Sci. 196. Geologic and Environmental Science: Introduction to ARC/INFO
Soc. 160. Formal Organizations
Soc. 163. Organizational Decision-Making
Soc. 165. Organizational Leadership

ARCHITECTURE AND URBAN DESIGN OPTION
Viewed together with the Urban Studies core, the courses required for the Architecture and Urban Design option allow the student to explore design in the context of architectural and urban history and in response to human needs, social concerns, and cultural values. Required courses focus on drawing and design skills and on the history of architecture. Two of the design courses are sequenced (Art 60 and 160). This option provides strong preparation for graduate study in architecture and urban design. Students considering professional study in architecture are advised to take, in addition to the required courses, a year of calculus and introductory courses in physics.

See department listings for course information.

PREREQUISITES
Course No. and Subject
Art 40. Basic Drawing
Art 60. Basic Design
Math. 19. Calculus*

*
Math. 20. Calculus*
Physics 21. Mechanics and Heat*

* Math and physics not required, except for students who plan to apply to graduate programs in architecture or urban design.

REQUIRED TO COMPLETE THE MAJOR

Course No. and Subject
Art 140. Drawing I
Art 160K or 160L. Design I — Intermediate Design
At least two courses on the history of architecture (or architecture and art) offered by the Department of Art (100 level or above)

RESTRICTED ELECTIVES

Any 100-level courses selected from the Urban Studies core, any offered by the program on Urban Studies, any 100-level course offered by the Department of Art in drawing, painting, sculpture, printmaking, or design, or from those listed below to bring the total to 60 units (not including Art 40 and 60).

Course No. and Subject
Civ. Engr. 108. Introduction to Structural and Geotechnical Engineering
Civ. Engr. 176. Small Scale Energy Systems
Civ. Engr. 177. Building Energy Laboratory
Engr. 11. Mechanics of Materials

RECOMMENDED ADDITIONAL STUDY

Architecture schools typically require applicants to submit a portfolio of work in the visual arts or design as part of the admissions process. The Urban Studies library contains samples of portfolios from alumni who have successfully gained entrance to master’s degree programs. In addition, many graduate schools of architecture require calculus and physics as conditions for admission. Potential applicants to architecture schools are strongly advised to take Math. 19, 20, and 21, and Physics 21.

Students seeking exposure to orthographic projection, sectioning, and other aspects of technical drawing should take Mechanical Engineering 103D, Engineering Drawing. Because of the increased use of computers in architecture, some graduate programs in architecture require “computer literacy.” An introductory course (for example, Computer Science 105A) satisfies this requirement. Students interested in graduate programs in architecture are encouraged to consult with the program director and review catalogues of graduate programs available in the Urban Studies office. Courses in drafting are available at local community colleges including West Valley College and Foothill College.

SELF-DESIGNED OPTION

Students who wish to concentrate on an area other than Community Organization, Urban Planning or Architecture and Urban Design must complete the Urban Studies core and design the remaining units (to bring the total to 60 units) with an academic adviser who is a member of the Academic Council. The self-designed portion of the major should concentrate on a particular area of analysis such as health care or urban public policy. It should include only courses at the 100 level, and must be approved by a subcommittee of the Committee on Urban Studies. Proposals for the self-designed portion of the major focusing on an area other than Community Organization, Urban Planning, or Architecture and Urban Design should include a course list and a description of how the courses meet the student’s educational objectives. Proposals must be submitted for approval by the Urban Studies Committee by the end of the second quarter of the student’s junior year. Applications received after that deadline are not considered. The program director will assist students in designing their own option.

HONORS PROGRAM

The honors program offers qualified students an opportunity to conduct independent research and to write a thesis of superior quality summarizing the results. The program grants honors at graduation to those students who have successfully completed a thesis of honors quality, attained a 3.5 letter grade indicator (LGI) in their major, and successfully completed all the course requirements for their major. Honors students must register for a minimum of 10 units and a maximum of 15 units spread over their senior year. The completed honors thesis must be submitted to the program office by the last week in May before graduation. Students may obtain details regarding application, admission, and honors procedures from the office of the Program on Urban Studies.

COTERMINAL PROGRAMS

Undergraduates in Urban Studies may enter coterminal master’s degree programs in a number of departments in the University. In recent years, Urban Studies majors have developed coterminal programs within the Departments of Anthropology and Sociology, and the School of Education. Information and applications for the coterminal degree programs are available at the Undergraduate Advising office. Students should discuss the coterminal program with the program director during their junior year.

COURSES

Further descriptions and details of current courses offered by lecturers are available prior
to each quarter from the program offices and are listed in each quarter’s Time Schedule.

10. Dialogues Tutorials: Urban Growth Control Analysis — Critical readings, study, and analysis of the philosophy, techniques, and conflicts of urban growth control, emphasizing growth control measures in California. Readings relate to the issues and conflicts surrounding urban growth control, sample local growth control measures, and controversies regarding statewide growth control activities and legislation. Students report on their analysis.
   1 unit, Aut (Hall) F 10-11

11. Sophomore Seminar: Architecture after Modernism — Theory and Practice — For sophomores only. The character and historical context of contemporary styles such as postmodernism and deconstructivism. Introduces architectural theory and analysis. Field trips help apply formal analysis techniques regarding the stylistic vocabularies, physical form, spatial organization, and structural systems of buildings. Simplified design exercises on the architectural design process. Students present personal critiques on architectural work.
   3 units, Aut (Walters) W 1:15-3:05

12. Sophomore Seminar: The Centerless City — Urban Planning Issues for the 21st Century — For sophomores only. Since WW II, most U.S. urban areas have been transformed from a central hub/suburban form to a multi-nucleated form of uniform low density with multiple centers. The changing physical and socioeconomic elements of contemporary urban development in a broad, conceptual manner. The Bay Area as a lab. Readings, case studies, and analysis of the physical and socioeconomic characteristics of the contemporary U.S. city.
   3 units, Win (Smiley) T 7-9 p.m.

13. Sophomore Seminar: The City in Literature and Film — For sophomores only. From the Ancient Sumerian Epic of Gilgamesh to recent films “Bladerunner” and “Menace 2 Society,” works of literary narrative have expressed aspects of city life and the urban experience. Works of imaginative art, especially literature and film, as analytical tools for the interdisciplinary study of the city, its sociocultural dynamics, contemporary problems, and future prospects. Themes: the rural-to-urban shift, social alienation, class conflict, the fear of crime, the search for community. “Texts” (literary and cinematic) from Robert Louis Stevenson’s The Strange Case of Dr. Jekyll and Mr. Hyde and Alfred Hitchcock’s “Rear Window.”
   3-5 units, Win (Stout) M 1:15-3:05

50. Current Trends in Policy Making — (Enroll in Public Policy 50.)
   3 units, Spr (Buckley, Cogan)

110. Introduction to Urban Studies — Interdisciplinary introduction to the study of cities and urban civilization. The history of urbanization through Lewis Mumford’s The City in History and various disciplinary methodologists comprising the unified field of urban studies (sociology, economics, politics, architecture, urban design, and urban public policy formation).
   4 units, Aut (Stout) MW 9:30-10:50

115. Seminar: Utopia and Reality in Modern Urban Planning — (Enroll in Art 280.) Primarily for upper-level undergraduate Urban Studies 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, Spr (Stout, Turner) W 1:15-3:05

120. Urban Economics — (Enroll in Economics 148.)
   5 units, Aut (Nechyba)

130. Seminar: Urban Policy — (Enroll in Political Science 104.)
   5 units, Win (Fraga)

131. Urban Politics — (Enroll in Political Science 186.)
   5 units (Fraga) given 1996-97

   5 units (Fraga) not given 1995-96

133. The Politics of Development — The reality of community development: the tug and pull that cities experience, the interests of developers, and the roles played by various publics. The politics of development deals with values, votes, revenues, conflicts, deals, mistrust, negotiations, and compromise. Tension among environmentalists, developers, and cities, and the effects on cities and the Bay Area in general. Student group project prepares development proposals for Bay Area sites. Required field trip. Prerequisite for Urban Studies majors: 110.
   4 units (Sipel) given 1996-97

134. Housing Law and Policy — (Enroll in Law 777.)

135. Policy Making and Problem-Solving at the Local and Regional Level — (Enroll in Public Policy 182.)
   4 units (Stout) given 1996-97

   5 units, Spr (Heller)

137. Seminar: Politics of Race and Ethnicity in the United States — (Enroll in Political Science 192F.)
   5 units (Fraga) given 1996-97
137A. Seminar: Racial and Ethnic Politics in the U.S.—(Enroll in Political Science 296.)
5 units, Spr (Fraga)

138. Managing Local Government—Urban administration using the urban executive as a focal point. Topics: the mission and structure of government; policymaking processes in urban government; the respective roles of legislators and administrators; and the role and function of the city manager. The manager's role as a "change agent" vis-a-vis contemporary urban problems: productivity, declining resources, housing, and transportation. Prominent elected and appointed officials from the area guest lecture. Prerequisite for Urban Studies majors: 110.
4 units, Win (Sipel) W 7-9:30 p.m.

139. American Education and Public Policy—(Enroll in Education 105, History 158B)
3 units, Aut (Kirst, Tyack) MW 2:15

142. Undergraduate Colloquium: Poverty and Homelessness—(Enroll in History 251A.)
5 units, Win (Camarillo) TTh 2:15-4:05

143. Labor and Leisure in 19th-Century Urban America—(Enroll in History 275.)
5 units, Win (Henkin)

144. Undergraduate Colloquium: The Historical Study of Cities—(Enroll in History 266).
5 units (Sawislak) not given 1995-96

145. Introduction to Race and Ethnicity in the American Experience—(Enroll in American Studies 164, History 164.)
5 units, Aut (Camarillo, Fredrickson) MTWThF 11-12:15

146. Introductory Seminar: The Medieval City—Conflict and Community in Premodern Europe—(Enroll in History 115.)
5 units, Aut (Ott) W 1:15-3:05

147. Shakespeare's London: The Social and Cultural Consequences of Growth—(Enroll in History 240.)
5 units, Spr (Seaver) T 1:15-3:05

148. Introductory Seminar: The Society of Renaissance Florence—(Enroll in History 16S.)
5 units, not given 1995-96

5 units, Win (Thompson) W 1:15-3:05

150. The Process and Practice of Community Service—(Enroll in American Studies 120.)
4 units, Win (Stanton)

151. Introduction to Social Stratification—(Enroll in Sociology 140.)
5 units, Win (Szelenyi) TTh 1:15-2:30

152. Methods for Sociological Research—(Enroll in Sociology 180.)
5 units, Win (Szelenyi) TTh 9-10:30

155. The Urban Underclass—(Enroll in Sociology 149/249.)
5 units, Spr (Olsak) TTh 11 section by arrangement

156. The State of Public Education in Urban Communities—(Enroll in Education 100X.)
3 units, Win (Takemoto) W 4:15-5:45

157. Education of Immigrants in Cities—(Enroll in Education 177X.)
4 units, Aut (Padilla) TTh 2:15-4:05

160. Urban Culture—(Enroll in Anthropology 159.)
5 units (Ebron) not given 1995-96

161. Language and Youth Culture—(Enroll in Anthropology 170A.)
5 units, Aut (Heath)

162. Urban Youth and their Institutions: Research and Practice—(Enroll in Education 179X.)
3 units, Aut (McLaughlin) T 2:15-5:05

164. The Multicultural City in Europe—(Enroll in Anthropology 159A.)
5 units (Delaney) not given 1995-96

170. Introduction to Urban Design—Urban design theory and contemporary practice. Critical issues in urban development and conservation. Neighborhood livability, central city revitalization, historic preservation, and regional growth are examined through comparative case studies from N. America and abroad. Projects focus on neighborhood, downtown, and regional issues in San Francisco and the Bay Area. Two field workshops in San Francisco.
5 units, Win (Gast) Th 1:15-3:05 and 7-9 p.m. plus two Sat. workshops

171. Suburbia: New Downtowns of the 21st Century—Evolution of the American suburb, emphasizing the post WWII suburban centers that emerged as competitors, in terms of size and economy, with the historic urban core. Historical development of the suburbs from 1820 to the present. Current problems (if one exists) and issues of concern. Elements of urban design (circulation, land use, building design, etc.) and their application in the suburban context. Students analyze a case-study non-downtown suburban area near the Stanford campus and recommend improvements.
4 units, Aut (Smiley) T 7-9:30 p.m.

172. Transportation Systems and Urban Development—(Enroll in Engineering-Economic Systems 205.)
3 units (Chiu, Smiley) given 1996-97

174. Architectural Design Process—Lecture/studio. Introduction to the basics of the building design process through case studies, including studio sessions. Visits and discussions with practicing architects/landscape architects. Student work is prepared
   2-4 units (Ortolano) by arrangement

193. Special Projects
   1-5 units (Staff) by arrangement

194. Directed Individual Study in Community Organizations — For Urban Studies majors only. Field work with a community organization and preparation of a detailed analysis of the organization and the community it serves. See Urban Studies program, Building 60, room 61B. Prerequisites: 134 and Anthropology 93, or Sociology 180A and B.
   5 units (Staff) by arrangement

197. Directed Reading
   1-5 units (Staff) by arrangement

199A. Honors Thesis — Each candidate for honors in urban studies is required to conduct a literature review and prepare a detailed proposal and table of contents outlining his or her honors thesis.
   2-5 units (Staff) by arrangement

199B. Honors Thesis — Each candidate for honors is required to submit a complete first draft of the senior honors thesis at least one quarter prior to graduation. Prerequisite: 199A.
   1-5 units (Staff) by arrangement

199C. Honors Thesis — Each candidate for honors is required to revise the draft completed in 199B and submit two final bound copies of the honors thesis two weeks before the end of class in their last quarter at Stanford. One copy goes to the student’s adviser and a second is submitted to the program director.
   1-5 units (Staff) by arrangement

SPECIAL PROGRAMS

SOPHOMORE DIALOGUES AND SEMINARS

Participating Faculty:
Anthropology: George Collier
Art: Richard Vinograd
Business, School of: Gerald Meier
Biological Sciences: Sharon Long, Virginia Walbot
The Sophomore Dialogues and Seminars Program provides opportunities for second-year students to work closely with faculty as they explore their potential or recently-declared major course of study. Designed with sophomores in mind, the courses aim to personalize students' education and foster a spirit of mentorship between faculty and students. The courses are given department credit and most count towards an eventual major in the field. No credit is granted for Distribution Requirements.

Sophomore Seminars are taught for eight to ten students in a seminar format. Dialogues Tutorials take the form of group directed reading for two to four students. Because space is limited, students may enroll in only one of these courses each quarter.

All Dialogues Tutorials and many Sophomore Seminars require a brief application. Check the Time Schedule or with the Dialogues and Seminars office (124 Sweet Hall, phone 415-723-4504) to find out if an application is required for the course you wish to take. Due dates for applications for the 1995-96 courses are: Autumn Quarter, 10 a.m., September 27; Winter Quarter, 5 p.m., December 15; Spring Quarter, 5 p.m., March 22.

COURSES

Sophomore Seminars

ANTHROPOLOGY

98B. The Zapatista Rebellion in Chiapas, Mexico — (Same as Latin American Studies 88.) 3-5 units, Aut (G. Collier)

ART

93. Landscapes, Geographies, Ideologies 4 units, Aut (Vinograd)

BIOLOGICAL SCIENCES

196. Experimental Design in Microbiology 3 units, Aut (Long)

DRAMA

180C. The Drama of August Wilson 4 units, Win (Elam)

180D. Concepts of Modernity: Theater, Art, Politics, and Culture 3-4 units, Spr (Eddelman, Weber)

180E. Improvisation — The Jazz of Theater 3 units, Spr (Ryan)

ECONOMICS

99. State, Market, and Development 5 units, Win (Meier)

ENGLISH

198M. The Modern Lyric Form 3 units, Win (Bacon)

198N. Shakespeare's Plays 5 units, Win (Rebholz)

198P. Feminist Discourse and 20th-Century Literature 3 units, Win (Holland)

FRENCH AND ITALIAN

190A. Popular Culture through the Ages 3 units, Win (Napolitano)

GEOLOGICAL AND ENVIRONMENTAL SCIENCES

50. The Coastal Zone Environment 3 units, Win (Ingle) TTh 1:15-3

52. Petrotectonic Evolution of Mesozoic California 5 units, Spr (Ernst) Th 10-12

GERMAN STUDIES

77A. The German-Americans 3-5 units, Win (Petig)
<table>
<thead>
<tr>
<th>COURSE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HISTORY</strong></td>
</tr>
<tr>
<td>204B. Autos and American History</td>
</tr>
<tr>
<td>5 units, Spr (Corn)</td>
</tr>
<tr>
<td>204C. Jews and Muslims</td>
</tr>
<tr>
<td>5 units, Win (Rodrigue)</td>
</tr>
<tr>
<td>204E. Race and Region in the American Past</td>
</tr>
<tr>
<td>3-5 units, Aut (Camarillo)</td>
</tr>
<tr>
<td>204F. The Black Panther Party</td>
</tr>
<tr>
<td>5 units, Aut (Carson)</td>
</tr>
<tr>
<td>204G. Who are Jews?</td>
</tr>
<tr>
<td>5 units, Aut (Zipperstein)</td>
</tr>
<tr>
<td>204H. Singapore — Multiculturalism, Development, and Democracy</td>
</tr>
<tr>
<td>5 units, Spr (Mancall)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>HUMAN BIOLOGY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>96B. Contemporary Issues in Human Experimentation</td>
</tr>
<tr>
<td>3 units, Aut (Constantinou)</td>
</tr>
<tr>
<td>96C. Adolescent Sexuality</td>
</tr>
<tr>
<td>3 units, Spr (S. Feldman)</td>
</tr>
<tr>
<td>96F. The Human Hand: Evolution, Development, and Molecular Genetics</td>
</tr>
<tr>
<td>4 units, Win (Porzig)</td>
</tr>
<tr>
<td>96G. Guilt: Multidisciplinary Perspectives</td>
</tr>
<tr>
<td>4 units, Win (Katchadourian)</td>
</tr>
<tr>
<td>96J. Analyzing Global Development</td>
</tr>
<tr>
<td>5 units, Aut (Crow)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>LATIN AMERICAN STUDIES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>87. Urbanization, Poverty, and Children in Latin America</td>
</tr>
<tr>
<td>5 units, Spr (Morrison)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>LINGUISTICS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>54. Language, Mind, and Computation</td>
</tr>
<tr>
<td>4 units, Spr (Peters)</td>
</tr>
<tr>
<td>672. Modern Greece: In the Shadow of Homer, Plato, and Alexander the Great</td>
</tr>
<tr>
<td>3-5 units, Aut (Prionas)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MATHEMATICS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>80. Mathematics and Mathematica: Interactive Problem Solving</td>
</tr>
<tr>
<td>3 units, Win (Karidi)</td>
</tr>
<tr>
<td>81. Chaos, Fractals, and Dynamics</td>
</tr>
<tr>
<td>3 units, Win (Andrews)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MEDICINE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>88. Dilemmas in Current Medical Practice</td>
</tr>
<tr>
<td>3 units, Win (Croke, Jones)</td>
</tr>
<tr>
<td>89. Seminar in Biomedical Ethics</td>
</tr>
<tr>
<td>3 units, Aut (Young)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MUSIC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>15A. Topics in Interactive Computer-Music Performance</td>
</tr>
<tr>
<td>4 units (Chafe)</td>
</tr>
<tr>
<td>15B. North American Taiko</td>
</tr>
<tr>
<td>3-4 units, Spr (Sano)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PHYSICS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Science, Society, and Politics</td>
</tr>
<tr>
<td>4 units, Spr (Walker)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PSYCHOLOGY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>181B. Dynamics of Time Perspective</td>
</tr>
<tr>
<td>3-4 units, Win (Zimbardo)</td>
</tr>
<tr>
<td>plus sessions by arrangement</td>
</tr>
<tr>
<td>181C. Studies of Animal Behavior</td>
</tr>
<tr>
<td>3 units, Aut (R. Fernald)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SCIENCE, TECHNOLOGY, AND SOCIETY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>114. Environmental Ethics</td>
</tr>
<tr>
<td>3-4 units, Aut (McGinn)</td>
</tr>
<tr>
<td>114A. Classical Professionalism</td>
</tr>
<tr>
<td>3-4 units, Win (Meehan)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SPANISH AND PORTUGUESE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>190D. Latin American Heroes and Heroines in Postmodern Culture</td>
</tr>
<tr>
<td>3-5 units, Win (Ruffinelli)</td>
</tr>
<tr>
<td>190E. Chicano/a Art</td>
</tr>
<tr>
<td>3-5 units, Spr (Yarbo-Bejarano)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SYMBOLIC SYSTEMS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>192B. Social Dilemmas</td>
</tr>
<tr>
<td>3 units, Aut (Huberman)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>URBAN STUDIES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Architecture after Modernism — Theory and Practice</td>
</tr>
<tr>
<td>3 units, Aut (Walters)</td>
</tr>
<tr>
<td>12. The Centerless City — Urban Planning Issues for the 21st Century</td>
</tr>
<tr>
<td>3 units, Win (Smiley)</td>
</tr>
<tr>
<td>13. The City in Literature and Film</td>
</tr>
<tr>
<td>3-5 units, Win (Stout)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>DIALOGUE TUTORIALS</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>ECONOMICS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>94. World of Finance</td>
</tr>
<tr>
<td>1 unit, Aut (Marotta)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ENGLISH</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>198B. Nabokov's Postmodern Masterpieces</td>
</tr>
<tr>
<td>2 units, Spr (Holeton)</td>
</tr>
</tbody>
</table>
GEOLOGICAL AND ENVIRONMENTAL SCIENCES

53. Environmental Problems
   2 units, Win (Loague) by arrangement

HUMAN BIOLOGY

97A. Approaches to Understanding the Life Course
   1-2 units, Aut (Hastorf) W 1:15-3:05

MUSIC

16A. Contemporary Music—A Reflection of the Times?
   2 units, Win (Hui)

16B. Readings in Early Romantic Music and Aesthetics, 1780-1850
   2 units, Spr (Grey)

PHYSICS

81. Quantitative Observation
   1 unit, Win (Romani)

POLITICAL SCIENCE

98. Promises and Moral Obligation
   2 units, Win (Tunick)

SLAVIC LANGUAGES AND LITERATURES

198A. Yugoslav Cinematography
   2 units, Aut (Bojic) by arrangement

URBAN STUDIES

10. Urban Growth Control Analysis
   1 unit, Aut (Hall) F 10-11

UNDERGRADUATE RESEARCH OPPORTUNITIES (URO)

Director: Laura S. Selznick

The Undergraduate Research Opportunities (URO) program seeks to combine two of Stanford’s greatest strengths: the eminence of its research faculty and excellence in undergraduate education. URO encourages students to work independently on projects with faculty and thus to participate directly in Stanford’s research community.

The collaboration takes place in two principal formats. Faculty members may list ongoing research projects in which undergraduates can become involved. Or, undergraduates may design their own individual projects and pursue them under the sponsorship of an individual faculty member. The URO staff directs students to departments with established research programs, advertises opportunities submitted by individual faculty, and helps to develop resources.

Faculty who have participated in this program have found enthusiastic and energetic assistants, made better progress in research, and freed up time for more specialized work. Students have appreciated the direct contact with faculty, immersion in a topic of mutual interest, and the unique learning opportunity that research provides.

LISTING RESEARCH

Faculty members with ongoing research programs are encouraged to identify a piece of their project appropriate to undergraduate competencies and to list it through URO. (Purely menial or mechanical projects are not appropriate.) The researcher should clearly state the nature of the position, requisite background and qualification, and the expected time commitment. Determination of credit appropriate to each project is left to the researcher and the student. The formula generally used is three hours of intellectual work per week per academic unit. (On average, students have received 3 units of credit per quarter in exchange for a commitment of ten hours per week.)

RESOURCE FILES

Students can obtain free access to two data bases designed to facilitate undergraduate research projects. The Odyssey and Faculty Interests files are available through Stanford’s Portfolio home page on the World Wide Web. Odyssey lists openings for student research assistance on faculty research projects (as well as public service opportunities from the Haas Center for Public Service and internships from the Career Planning and Placement Center). The Faculty Interests file contains information about the research interests of individual Stanford faculty across the University. Students can use faculty interest information in identifying potential sponsors for projects of their own design or in seeking advice about a particular discipline.

FUNDING AVAILABLE

The Fund for Undergraduate Research is administered by URO and is available exclusively to Stanford undergraduates. Application forms for all grants must be obtained at 122 Sweet Hall. The deadlines for major grants (up to $2,500) for 1995-96 are Friday, April 5 for projects in social sciences, natural sciences, and engineering and Friday, April 19 for projects in humanities and creative arts. Students with interdisciplinary projects are encouraged to apply by the earlier deadline.

Small grants ($500 maximum per project) are awarded each quarter. The deadlines are October 27, February 9, and April 19.

Major grants differ from small grants in the scope of the project proposed rather than the level
of reimbursement requested. Small and major grants are restricted to supplies and expenses associated with research. Major grants are awarded once a year, during Spring Quarter, to as many as 100 students whose projects reflect the highest level of creativity and independence and the greatest promise for exciting results. Students on financial aid may sometimes receive funds to replace summer earnings expectations. Summer earnings can occasionally be replaced for small grant winners with a high level of financial need.

The Chappell-Lougee Scholars program is a special opportunity for sophomores in the humanities and social sciences to be involved in research under faculty mentorship. Faculty may nominate students or students may nominate themselves. Financial need is considered, as well as the academic goals of the proposed project. Applications and nominations are due to the URO office by Friday, December 1, 1995. The URO office has information on applications and criteria.

The Future Faculty Incentives Program encourages URO grant recipients from all categories to consider a career in college or university teaching. The award provides undergraduate loan repayment up to $10,000 for graduate work toward a Ph.D. Preference is given to members of under-represented minority groups in selected fields. Financial need and evidence of disadvantaged background are also considered in the selection process. The application deadline is May 15 of the year in which the student plans to matriculate in a graduate program.

The newest URO opportunities benefit students from targeted ethnic minority groups. The Mellon Minority Undergraduate Fellowship program is for students in the humanities, mathematics, or physics and encourages pursuit of honors at Stanford and enrollment in a Ph.D. program after graduation from Stanford. Benefits include earnings replacement, scholarship expenses, and undergraduate loan repayment totaling a maximum of $20,000. The deadline is Friday, June 14, 1996.

Ford Assistantship Awards provide funding for an introduction to the research environment by assisting a faculty member with his or her own research. Ford Research Awards offer term-time earnings replacement so that students can do independent research. Applications are reviewed on a rolling basis.

STANFORD IN WASHINGTON

Director: Adrienne Jamieson

Stanford in Washington provides highly-qualified undergraduates with an opportunity to work and study in the nation's capital. In addition to providing students with an understanding of public policy making, the program offers an opportunity to take advantage of the city's unique cultural resources.

Central in the student's educational experience is an internship. Students serve as interns at such institutions and agencies as the Senate, the House of Representatives, the Office of Management and Budget, the Securities and Exchange Commission, the Smithsonian Institution, the National Gallery, and the Departments of Commerce, Education, Health and Human Services, Justice, and State.

In addition to the internship, students must also complete an academic course of study consisting of small tutorials taught by policy experts (5 units), and weekly policy seminars taught by Stanford faculty members (5 units). Frequently speakers from the Washington policy community join students and faculty for discussions. Students usually write a major paper related to their internship for 3-5 units of credit. Course and seminar topics vary according to student and faculty interest.

Stanford in Washington offers "stretch quarters" in the Autumn and Spring (mid-September to mid-December, and late March to the end of June) and a regular quarter in Winter, which focuses on environmental studies. The program is designed for students in their junior year or the first quarter of their senior year. Applications must be completed two quarters in advance. For Autumn Quarter, apply early Winter Quarter of the previous year. For Winter Quarter, apply early Spring Quarter of previous year. For Spring Quarter, apply early Autumn Quarter. Students interested in the program may obtain a brochure at the Haas Center for Public Service or call for information, 415-723-0992.

WRITING ACROSS THE CURRICULUM

The Writing Across the Curriculum (WAC) Program supports faculty in the School of Humanities and Sciences in their efforts to improve students' writing in courses beyond the Freshman Writing Requirement. The goal of Writing Across the Curriculum is for students to learn discipline-based writing skills by taking a required writing-focus course in their major.

Writing-focus courses incorporate writing instruction appropriate to the topic and level of study. They differ from department to department, and have no set format or minimum number of writing assignments. All writing-focus courses, however, provide help to students as they progress with their writing. There is no limit to the number of writing-focus courses a student may take.
Writing-focus instructors are distinguished by a commitment to improving undergraduate writing in their respective fields. In support of this commitment, WAC provides the instructor and teaching assistants in each writing-focus course with the services of an experienced writing consultant, who advises them on the design of assignments and the critiquing of student work. Therefore, students in writing-focus courses benefit from the unique opportunity of having teachers with expertise not only in the subject matter of the course, but also in writing pedagogy.

Dean: Paul A. Brest
Associate Deans: Susan S. Bell, Frank Brucato
Acting Assistant Dean: Madeline Kochen
Academic Curriculum Officers: Mark G. Kelman, Robert Weissberg
Associate Professors: George Fisher, Bill Ong Hing, Linda Mabry (on leave Spring), Kim A. Taylor-Thompson, Deborah M. Weiss
Assistant Professor: Richard Thompson Ford
Professor (Teaching): William C. Lazier
Courtesy Professor: Jeremy Bulow
Lecturers: Andrei Baev, Karen Biestman, Margaret Caldwell, Flora Chu, Audrey Covner, R. George Crawford, Sally Dickson, Lainey Feingold, Randee G. Fenner, James Fuller, Timothy Hallahan, Ivan Humphreys, Melissa Johnson, Maria Kivel, Cary Klafter, Carol Larson, Frankie Leung, Arlene Mayer- son, Ted McAniff, Jeanne Merino, Judith Miles, Howard Pearson, Lisa M. Pearson, Maude Pervere, Kenneth Rosenblatt, Alan Salzmn, Margaret Sheneman, Charles Siegal, George Skelly, Marshall Small, Brian Smith, Kenneth Taymor, Kent Walker
Acting Assistant Professors: Ariela Gross, Elizabeth Kopelman
Consulting Professors: Allen W. Kleidon, Thomas Nolan
Consulting Associate Professor: Sophie Pirie, William Rubenstein
Visiting Professors: Stephen Bundy, Thomas Ehrlich, Robert W. Gordon, Joseph Grodin, Gerhard Hafner, Sylvia Law, Roman Weil
Visiting Associate Professor: Michael Klausner

The School of Law was established as a department of the University in 1893. Its purpose is to provide a thorough legal education for students who are fitted by their maturity and their previous academic training to pursue professional study under university methods of instruction. The curriculum leading to the first professional degree in law (J.D.) constitutes an adequate preparation for the practice of law in any English-speaking jurisdiction. Graduate work leading to the degrees of Master of the Science of Law and Doctor of the Science of Law is also offered. (For the full curriculum, see the Stanford University bulletin School of Law.) The school is on a two-term academic calendar. Autumn term classes begin on September 7, 1995. Spring term classes begin on January 16, 1996, and the term ends on May 22, 1996.

COURSES

GRADUATE

The following courses are open to qualified graduate students in other departments of the University upon consent of the instructor:

229. Law and Social Science — (Same as Psychology 290.) Viewing social science as an analytic tool, examines its role in the American legal process. Focuses on the relevance of social science theory and empirical findings for such issues as copyright, human responsibility, desegregation, deterrence, fair employment, and jury dynamics. The nature of expertise and its relevance to these matters. Emphasis on scientific method and its relevance to legal analysis.
3 term units (Rosenhan)

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; artnapping and insurance; legal problems of art museums, etc.
3 term units, Spr semester (Merryman)
M 7:30-10 p.m.
325. Interdisciplinary Seminar on Conflict Resolution — (Same as Economics 386, Operations Research 366, Psychology 283.) Addresses problems of conflict resolution and negotiation from an interdisciplinary perspective. Presentations by faculty and scholars from other universities.

2 term units, Win (Alexander, Arrow, Ross, Tversky, Wilson) T 4:10-5:30

327. Jury Decision-Making — (Same as Psychology 355.) Limited to Law and graduate students who have consent of instructor. Seminar examines the psychological processes regulating jury decision-making. The cognitive aspects of a presentation (the amount of information that can be retained and processed), story, and construal processes. The social psychological aspects of group decision-making. Preparation for trial, including trial simulation, voir dire, and juror selection.

3 term units (Rosenhan) not given 1995-96

329. Psychopathology and Mental Health Law — The literature on severe psychopathology focusing on diagnosis, nature, and effects of treatment, predictions of dangerousness to self and others, and assessment of grave disability and competence. Effects of diagnostic stereotyping, current modes of treatment, and our technical ability to predict social behavior are assessed for their legal implications. Law and practice in commitment and conservatorship, issues and case law in right to treatment, patients' rights, informed consent, assessment of malpractice, and psychosurgery.

3 term units (Rosenhan) not given 1995-96

345. Psychology and Law Proseminar — (Same as Psychology 300.) Legal, psychological, and popular views of morality, responsibility, equity, intention, insanity, evidence, crime and punishment; the police; psychological processes in jury deliberation; homicide and aggression; treatment of accused persons.

3 term units, Aut (Rosenhan) T 3:20-6:20

380. Gender, Law, and Public Policy — The way legal norms and social policies affect and are affected by gender. Topics: employment, reproductive rights, sexual violence, feminist legal theory, and the family. Long paper or short written assignments.

3 term units (Rhode)

381. Health Law — (Same as Health Research and Policy 210.) Integrates legal issues in delivery financing of medical care with historical, economic, sociological, and political science data and theory. Core issues of financing and quality of care. Case studies focus on long-term care, HIV, and reproductive health. Themes: the conflict for control of medicine among professionals, the state, financial markets, and individual and organized patients and consumers; the respective roles of legislatures, administrators, courts, and private actors in determining the shape of medical care services; issues of federalism that have arisen from reform at the federal level, the impulse to give the states substantial discretion, and the contrary desire of large corporations to block state authority through federal deregulation of health benefit plans.

3 term units, Spr semester (Law)

464. Advanced Issues in Health Law and Policy — (Same as Health Research and Policy 211.) Open to second- and third-year law students, graduate or professional students, and, with consent of instructor, qualified undergraduates. Writing seminar on issues in health law and policy. The doctor-patient relationship, e.g., informed consent, assisted suicide, and medical “futility;” and issues of the ethical, legal, and social implications of the genetics revolution.

2 term units, Aut semester (Greely)

604. Biotechnology: Legal and Policy Issues — Open to graduate and professional students; qualified undergraduates by consent of the instructors. Interdisciplinary exploration of legal and policy issues raised by the biotechnology industry. Patenting, corporate organization and financing, conflicts of interest, regulatory approvals, health care financing issues, tort liability, and the prospects for and implications of the biotechnology revolution.

3 term units (Barton, Botstein, Greely) not given 1995-96

605. Law and Society — Surveys sociological approaches to the study of law and legal institutions. Lectures/discussions on theoretical perspectives, examples from legal settings. Topics: central theoretical debates in the sociology of law; social-psychological foundations of legal behavior; legal institutions and the legal profession; relations between law and the economy, stratification, culture, ideology, and social change. Contemporary legal issues (crime, litigation, civil rights, etc.) Opportunities to link sociological theories with current events.

3 term units, Spr semester (Suchman)

NONPROFESSIONAL

The following course is open to juniors, seniors, and graduate students in other departments, and may be counted toward the A.B. degree but not toward professional degrees in law.

106. Introduction to American Law — (Same as American Studies 179, Political Science 182F.) American law for undergraduates. The structure of the American legal system including the courts, American legal culture, the legal profession and its social role, the scope and reach of the legal system, the background and impact of legal regulation, the relationship between the American legal system and American society in general. DR:9(S)

5 units, Aut (Friedman)
SCHOOL OF MEDICINE

Dean: Eugene Bauer
Senior Associate Dean for Education and Student Affairs: Charlotte D. Jacobs

The School of Medicine offers courses of study leading to the M.S., Ph.D., and M.D. degrees.

UNDERGRADUATE PROGRAMS

At the undergraduate level, a number of the school’s courses are open to any registered Stanford student who has fulfilled the prerequisites, subject to the usual limits of course enrollment and faculty approval. Details on admission into undergraduate programs are described in the “Undergraduate Degrees” section of this bulletin.

GRADUATE PROGRAMS

M.S. AND Ph.D. PROGRAMS

Departments offer programs leading to the Ph.D. degree. Except for the Departments of Biochemistry and Cell Biology, applications and information for all graduate programs may be obtained from Graduate Admissions, Registrar’s Office, Stanford University, Stanford, California 94305-3005.

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 twofold 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.

Completion of the M.D. degree must be achieved within six years, unless a petition is granted to extend this time frame.

There are a variety of opportunities for in-depth study of subject areas in the basic sciences. Students with strong interests in medical research as a career are urged to investigate opportunities available under the auspices of the Medical Scientist Training Program (MSTP). This program provides a limited number of students the opportunity to pursue an individualized program of research and course work leading to both the M.D. and Ph.D. degrees. The estimated time for completion of the program is seven years. Students interested in participating in the MSTP are asked to provide supplemental information relevant to their research background and are considered for entry into the MSTP at the time of their application to the School of Medicine.

The admissions process recognizes that some minorities and women are under-represented in the medical profession, and especially in academic medicine; the school has a strong commitment to identify, recruit, and educate such students. Provided an applicant to the school has completed the basic courses in physics, chemistry, and biology, the choice of an undergraduate major may reflect other interests, including the arts and humanities. Course work in mathematics and the behavioral sciences is highly recommended because of its importance in understanding medicine. Extracurricular activities and breadth of interests and experiences play an important role in the selection of students from among those applicants having superior records.

Further details on the M.D. degree, including admission requirements, are in the Stanford University catalog School of Medicine. For application materials write: Committee on Admissions, Stanford University, School of Medicine, 851 Welch Road, Room 154, Palo Alto, CA 94304-1677.

BIOCHEMISTRY

Emeritus: (Professor) Arthur Kornberg
Chair: James A. Spudich
Associate Professors: Patrick O. Brown, Douglas L. Brutlag, Gilbert Chu, Mark A. Krasnow, Suzanne R. Pfteffer
Assistant Professor: Daniel Herschlag
Courteous Professor: Sharon Long
Biochemistry is a department within the School of Medicine. Department offices and labs are located in the Beckman Center for Molecular and Genetic Medicine at the Stanford Medical Center. Courses offered by the department may be taken by undergraduate, graduate, and medical school students. Postdoctoral fellows, as well as house staff members, are also welcome to attend.

A basic series in biochemistry (200, 201) is taught by the entire staff. Biochemistry 202 is designed for medical students and can be taken in lieu of 201. Students who elect to enroll in any of the above courses should have a good background in organic chemistry and cell biology.

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 physical and chemical principles of biochemistry, enzyme reaction mechanisms, membrane trafficking and biochemistry, molecular motors and the cytoskeleton, mechanisms and regulation of nucleic acid replication and recombination, the biochemistry of bacterial and animal viruses, the molecular basis of morphogenesis, molecular and cell biology of yeasts, and the structure and function of both eukaryotic and prokaryotic chromosomes.

Opportunities exist for directed reading and research in biochemistry and molecular biology, utilizing a small but excellent departmental library as well as the most advanced research facilities, including those for light and electron microscopy, chromatography and electrophoresis, protein and nucleic acid purification, synthesis and analysis, single molecule analyses using laser light traps, and computer graphic workstation facilities for protein and nucleic acid structural analysis. Ongoing research utilizes a variety of organisms, ranging from bacteria to animal cells.

**GRADUATE PROGRAM**

**DOCTOR OF PHILOSOPHY**

The Department of Biochemistry offers a Ph.D. program which begins in the Autumn Quarter of each year. The program of study is designed to prepare students for productive careers in biochemistry; its emphasis is training in research, and each student works closely with members of the staff. In addition to the requirement for a Ph.D. dissertation based on original research, students are required to complete six advanced courses in biochemistry and related areas, and at least three of these courses must be taken in the Department of Biochemistry. Selection of these courses is tailored to fit the background and interests of each student. A second requirement involves the submission of three research proposals which are presented by the student to a small advisory committee of departmental faculty members, who are also responsible for monitoring the progress of student curricular and research programs. All Ph.D. students are expected to participate actively in the department's seminar program and journal club, and students are encouraged to attend and to present papers at regional and national meetings in cellular biochemistry and molecular biology. Teaching experience is an integral part of the Ph.D. curriculum and is required for the degree.

The Department of Biochemistry offers a M.S. degree only to students already enrolled in the Ph.D. program. Students should contact the Graduate Studies adviser for more details.

General University regulations concerning the M.S. and Ph.D. degrees are summarized in the "Graduate Degrees" section of this bulletin. The department does not offer undergraduate degrees.

The Departments of Structural Biology and Biochemistry have a joint training program and prospective students may apply to either department. Admitted students gain research experience through lab rotations in both departments. The eventual choice of a research adviser determines the department from which the Ph.D. degree is earned. Those applying should have at least a baccalaureate degree and should have completed work in cell and developmental biology, basic biochemistry and molecular biology, and genetics. Also required are: at least one year of university physics; differential and integral calculus; and analytical, organic, inorganic, and physical chemistry. The department is especially interested in those applicants who have research experience in biology or chemistry. Students must submit an application, including transcripts and letters of recommendation, by December 15.

Applications are available from Bioscience Graduate Admissions, P.O. Box F, Stanford CA, 94309-3100, beginning September 1. Applicants are notified by April 1 of decisions on their applications. Stanford University requires scores from the Graduate Record Examination (GRE) (verbal, quantitative, and analytical), and in addition applicants must submit scores from the GRE Subject Test in either biochemistry, biology, or chemistry. Applicants should take the October GRE exam.

All applicants are urged to compete for non-Stanford fellowships or scholarships, and U.S. citizens should complete an application for a National Science Foundation and a Howard Hughes Medical Institute Predoctoral Traineeship. Students are provided with financial support to cover normal living expenses; Stanford tuition costs are paid.

All applicants for admission to the department are considered without regard to race, color, creed, religion, sex, age, national origin, or marital status.
Postdoctoral research training is available to graduates who hold a Ph.D. or an M.D. degree. Qualified individuals may write to individual faculty members for further information.

At present, the primary research interests of the department are the structure and function of proteins and nucleic acids, the biochemistry and control of developmental processes, molecular motors and the cytoskeleton, the trafficking of proteins between membrane-bound organelles, and the control and regulation of gene expression.

**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 (Pfeffer, Kaiser, Spudich) MTWThF 11

201. **Advanced Molecular Biology** — Lectures on rapidly developing frontiers in DNA structure and metabolism, chromosome structure and function, gene expression and its control, regulation of transcription, protein structure and function, RNA processing, and translation. Prerequisite: course in basic molecular biology.

- 5 units, Aut (Baldwin, Brown, Brutlag, Chu, Davis, Herschlag, Kornberg, Krasnow) MTWThF 11

202. **Genes and Genomes** — Structure and function of DNA and RNA molecules, methodologies for molecular genetic analysis, maintenance of genomes, regulated gene expression and comparative genetic strategies in development of yeast, *Drosophila*, nematodes, and mice genes and genomes. Three lectures and one optional discussion period per week. Enrollment limited to medical students or by consent of instructors. Prerequisite: 200 or equivalent.

- 4 units, Spr (Berg, Brown, Krasnow, Lehman) MWF 12

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 1995-96

211. **Development in Microorganisms** — (Same as Developmental Biology 211.) Cell differentiation and multicellular development in microorganisms. Microbes are attractive subjects for molecular studies of the regulation of development because they can be manipulated easily by genetic and biochemical techniques, handled in large numbers, and because their genomes are relatively small. Topics: regulation of cell division; sporulation in *B. Subtilis*; flagella and pil 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/reading in current literature.

- 5 units (Kaiser, Shapiro) not given 1995-96

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, 201 (or equivalent), and consent of the instructors.

- 3 units (Botstein, Davis)

213. **Biological Signaling during Development** — (Same as Developmental Biology 213.) Biochemical and genetic analysis of the developmental response of cells, or cell clusters, to specific molecular signals. Signals vary from complex proteins to simple molecules (steroid hormones), and the responding cells vary from those in close proximity to signal-generating cells to all cells in the organism. Focus is on hormonal signals that regulate the development of cells, emphasizing the metamorphosis of insects and certain vertebrates, and on the evolutionary conservation of these systems. Prerequisites: knowledge of basic biochemistry and genetics.

- 3 units, Win (Hogness)

214. **Physical and Chemical Principles of Biochemistry** — Physical chemistry of proteins, nucleic acids and their complexes, and the chemistry underlying biological reactions; principles of enzymatic catalysis. The physical and chemical concepts that are fundamental to biological processes. Appraisal of experimental and conceptual approaches and analysis of classic and current papers in the literature. Areas: interactions involved in protein and nucleic acid structure and folding; energetic, chemical, and structural principles of enzymatic catalysis and control. Prerequisites: 200 and 201 (or equivalent), a course in physical chemistry, and a course in organic chemistry.

- 4 units, Win (Baldwin, Herschlag)

217. **Advanced Tutorial in Special Topics** — Readings and tutorial in membrane biochemistry, enzyme mechanisms, chromosome structure, bio-
chemical genetics, bacterial and animal viruses, and nucleic acid enzymology. Conducted under the guidance of advanced graduate students and postdoctoral fellows.

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

218. Computer Applications in Molecular Biology — (Same as Medical Information Sciences 231.) For molecular biologists and computer scientists desiring to understand the representation and analysis of biological sequences and structures. New and various existing methods and the strengths and limitations are evaluated. Practical assignments utilizing the tools described. Topics: introduction to the Internet, accessing molecular databases, pattern search, classification of sequence and structure, alignment of sequences, rapid similarity searching, phylogenies, consensus sequencing, physical mapping of DNA and genomes, representing protein structure, and modeling protein structure by homology. Final project utilizes or analyzes the methods presented. Lecture/lab. Enrollment limited to 40. Prerequisite: introductory molecular biology at the level of Biology 31 or consent of instructor. Recommended: prior exposure to personal computers, electronic mail, and typing skills.

3 units, Spr (Brutlag) TTh 9-10:50

221. The Teaching of Biochemistry — To be taken by all teaching assistants in 200, 201, or 217. Emphasizes practical experience in teaching on a one-to-one basis, and problem set design and analysis. Familiarization with current lecture and text material expected, along with evaluations of class papers and examinations. Prerequisite: enrollment in the Biochemistry Ph.D. program or consent of instructor.

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

225. Molecular Motor Proteins and the Cytoskeleton — (Same as Developmental Biology 225.) The molecular basis of energy transduction that leads to movements generated by microfilament-based and microtubule-based motors. Molecular motors include forms of myosin, dynein, and kinesin. Topics: structure of the molecular motors and their accessory proteins; regulation of the function of motile assemblies; functions of molecular motors in cells; spatial and temporal controls on the formation of motile assemblies in cells. Experimental approaches: genetic analysis, DNA cloning and expression, reconstitution of functional assemblies from purified proteins, x-ray diffraction, three-dimensional reconstruction of electron microscope images, spectroscopic methods, and high-resolution light microscopy. Focuses on how a complex cellular process is analyzed at the molecular level by a multifaceted approach using biochemical, biophysical, and genetic techniques. Prerequisites: knowledge of basic biochemistry and cell biology.

3 units, Aut (Spudich, Fuller)

237. Introduction to Biotechnology — (Same as Biology 237, Biophysics 237, Chemistry 237, Chemical Engineering 237, Civil Engineering 237, Developmental Biology 237, Structural Biology 237.) Faculty from the Departments of Biochemistry, Biological Sciences, Chemical Engineering, Chemistry, Civil Engineering, Developmental Biology, Structural Biology, and invited industrial speakers review the interrelated elements of modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering.

3-5 units, Spr (Robertson) TTh 2:15-3:30 F 3:15-4:30

294. DNA Repair, Recombination, and Replication — Enzymes and molecular mechanisms and how some physiological aspects of DNA transactions may be explained at the molecular level. Prerequisites: 200, 201.

2 units (Kornberg, Lehman) not given 1995-96

299. Research

1-15 units, any quarter (Staff) by arrangement

399. Research and Special Advanced Work — Register by section numbers by arrangement with faculty. Prerequisite: consent of instructor.

1-18 units, any quarter

CENTER FOR BIOMEDICAL ETHICS

Co-Directors: Thomas A. Raffin, Ernle W. D. Young
Executive Director: Barbara A. Koenig
Steering Committee: Kenneth Arrow (Economics, emeritus), Rachel Cohon (Philosophy), Ronald Davis (Biochemistry), Alain Enthoven (Business), Victor Fuchs (Economics, Health Research and Policy, emeritus), Linda Giudice (In Vitro Fertilization and Reproductive Endocrinology Laboratories), Henry Greely (Law), Susan Okin (Ethics in Society Program, Political Science)

The Stanford University Center for Biomedical Ethics is an interdisciplinary center devoted to teaching and research in scientific and biomedical ethics. Its mission is to: apply ethical reasoning to actual moral problems in the practice of medicine and science; contribute to the national and international discussion of biomedical and scientific issues through research, public symposia, and published papers and monographs; convene scholars, professionals, and
policy-makers to debate and propose policy solutions regarding biomedical and scientific ethical issues; serve as a scholarly resource for the University, the Medical Center, and the community at large on emerging ethical issues in medicine and science; and build a community of individuals dedicated to formulating fresh responses to contemporary ethical issues.

COURSES

For further information, see the University bulletin, School of Medicine.

MEDICINE

87. Seminar in Biomedical Ethics — Sophomore seminar. In-depth exposure to ethical theory and moral reasoning and to three major texts on important issues in biomedical ethics (abortion, the new reproductive technologies, and the “right to die”).

3 units, Aut (Young) T 2:15-4:45

214. Literature and Medicine — Reading/discussion on the uses of literature as a guide to the humanistic aspects of patient care. Essays, stories, and poems by physicians, patients, and family members on medical training, the patient’s perspective, and medical ethics.

1 unit, Win (Shafer, Koenig) Th 72-7

250A. Medical Ethics I — Theories of ethical and moral decision-making. Emphasis is on the dilemmas confronting medical practitioners. Seminar/discussion groups. Objectives: developing and applying a methodology for decision-making; delineating key issues in biomedical ethics (the nature of the relationship between physician and patient, informed consent, determination of “quality of life,” and who should participate in the decision-making process); and addressing dilemmas and topics in biomedical ethics.

3 units, Win (Young) T 2:15-5:05

250B. Medical Ethics II — Advanced examination of a narrower range of topics at greater depth for those who have acquaintance with biomedical ethics. Objectives: examine the fundamental ethical principles underlying medicine and the life sciences and the relationships between them, correlate these principles with ethical issues in the practice of medicine, and suggest areas where conceptual clarity and methodological finesse is required to meet emerging new challenges in the field.

3 units, Spr (Young) T 2:15-5:05

255. The Responsible Conduct of Research — A forum for scientists to familiarize themselves with institutional policies/practices and professional standards that define scientific integrity. Overview of ethics in research, authorship, patents, and human interest at the academic-commercial interface, and small group sessions for more extended discourse between students and faculty. Completion fulfills NIH/ADAMHA requirement for instruction in the ethical conduct of research.

Win (Young, McGuire)

CANCER BIOLOGY PROGRAM

Committee on Cancer Biology: Martin Brown, (Professor of Radiation Oncology) Chair and Program Director; Michelle Calos (Associate Professor of Genetics), Martha Cyert (Assistant Professor of Biological Sciences), Joseph Lipsick (Associate Professor of Pathology), James Nelson (Professor of Molecular and Cellular Physiology), Frank Stockdale (Professor of Medicine)

The Cancer Biology Program is designed to provide a framework for students with an interest in the understanding and control of neoplastic growth and to build a curriculum in varied biomedical areas relevant to that subject. Students in this program are based in departments appropriate to their specialty and are subject to the core requirements specified below. A Ph.D. is offered in Cancer Biology. Basic University requirements for the Ph.D. are described under the “Graduate Degrees” section of this bulletin.

GRADUATE PROGRAM

DOCTOR OF PHILOSOPHY

A few well-qualified applicants are admitted to the program each year. Applicants should have completed an undergraduate major in the biological sciences; applicants with undergraduate majors in physics, chemistry, or mathematics may be admitted if they complete background training in biology during the first two years of study. During the first year, each student is required to constitute a three-person advising committee which assists with the development of an appropriate program of courses and provides advice and consultation on thesis-related research. The appointment of this committee is normally carried out in consultation with the student’s research preceptor, who chairs the advising committee.

The requirements for the Ph.D. degree are as follows:

1. Training in biology equivalent to that of an undergraduate biology major at Stanford.

2. Completion of the following courses (or their equivalents, except for the Cancer Biology course):
   a) Biochemistry 200, 201, General Biochemistry and Advanced Molecular Biology
   b) Molecular and Cellular Physiology 221, Cell Biology of Physiological Processes
   c) Health Research and Policy 202, Biostatistics

   ...
d) Cancer Biology 241, 242, 243, Molecular and Cellular Biology of Cancer
3. At least 12 units of additional courses given by four or more different Stanford faculty members. Course work taken is determined in consultation with the student's Advising Committee.
4. Attendance at Medical School Bioethics Series.
5. Presentation of research results at Cancer Biology annual retreat on at least three occasions.
6. Successful completion of a comprehensive qualifying examination in Cancer Biology is required for admission to Ph.D. candidacy. This examination must be completed prior to the end of the second full year of study in the program. The examination is set by the advising committee and consists of two parts. The first is a written proposal modeled on an NIH grant application and describing a current area of research interest with proposed experiments in a field of relevance to cancer biology. The subject of the proposal is chosen by the student in consultation with his/her advising committee. The second is an oral presentation to the Advising Committee of dissertation research or proposed dissertation research. The advising committee is presented with a brief written description of this research prior to the oral examination.
7. The presentation of a Ph.D. dissertation as the result of independent investigation and constituting a contribution to knowledge in the area of cancer biology.
8. The successful passing of the University oral examination which is taken only after the student has substantially completed his or her research. The examination is preceded by a public seminar in which the research is presented by the candidate. The oral examination is conducted by a dissertation reading committee.

COURSES
Course work and lab instruction in the Cancer Biology Program conforms to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

3 units (Staff) alternate years, not given 1996-97

251, 252, 253. Special Topics in Cancer Biology — Full-quarter courses or half-quarter minicourses given by different lecturers on topics of major importance in cancer research.
251. 1-3 units, Aut (Staff) TTh 4:15-5:35
252. 1-3 units, Win (Staff) TTh 4:15-5:35
253. 1-3 units, Spr (Staff) TTh 4:15-5:35

299. Research — Students registered for the Ph.D. must register for this course as soon as they begin dissertation-related research work.

DEVELOPMENTAL BIOLOGY

Chair: Lucy Shapiro
Professors: Bruce Baker, David Clayton, Gerald Crabtree, David Hogness, Dale Kaiser, Roeland Nusse, Matthew Scott, Lucy Shapiro, James Spudich, Irving Weissman
Associate Professor: Margaret Fuller
Assistant Professors: Stuart Kim, David Kingsley, Anne Villeneuve

A fundamental problem in biology is how the complex set of multicellular structures that characterize the adult animal is generated from the fertilized egg. Advances at the molecular level, particularly with respect to the genetic control of development, have been explosive. These advances represent the beginning of a major movement in the biological sciences toward the understanding of the molecular mechanisms underlying developmental decisions and the resulting morphogenetic processes. This new thrust in developmental biology derives from the extraordinary methodological advances of the past decade in molecular genetics, immunology, and biochemistry. However, it also derives from groundwork laid by the classical developmental studies, the rapid advances in cell biology and animal virology, and from models borrowed from prokaryotic systems. Increasingly, the work is directly related to human diseases, including oncogene function and inherited genetic disease.

The Department of Developmental Biology includes a critical mass of scientists who are leading the thrust in developmental biology and who can train new leaders in the attack on fundamental problems of development. Department labs work on a wide variety of organisms from microbes to worms, flies, and mice. The dramatic evolutionary conservation of genes that regulate development makes the comparative approach of the research particularly effective. Scientists in the department labs have a very high level of interaction and collaboration. The discipline of developmental biology draws on biochemistry, cell biology, genetics, and molecular biology.

The department is located in the Beckman Center for Molecular and Genetic Medicine within the Stanford University Medical Center.
Course work and lab instruction in the Department of Developmental Biology conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

GRADUATE PROGRAM
MASTER OF SCIENCE

Students in the Ph.D. program in Developmental Biology may apply for an M.S. degree, assuming completion of their course requirements and preparation of a written proposal. The master's degree awarded by the Department of Developmental Biology does not include the possibility of minors for graduate students enrolled in other departments or programs.

Students are required to take, and satisfactorily complete, at least three lecture courses offered by the department, including Developmental Biology. In addition, students are required to take three courses outside the department. Students are also expected to attend Developmental Biology seminars and journal clubs. In addition, the candidate must complete a research paper proposing a specific experimental approach and background in an area of science relative to developmental biology.

DOCTOR OF PHILOSOPHY

The graduate program in Developmental Biology leads to the Ph.D. degree. The department also participates in the Medical Scientists Training Program in which individuals are candidates for both the M.D. and Ph.D. degrees.

Students are required to take, and satisfactorily complete, at least three lecture courses offered by the department, including Developmental Biology. In addition, students are required to take three courses outside the department. Students are also expected to attend Developmental Biology seminars and journal clubs. Successful completion of a qualifying examination is required for admission to Ph.D. candidature. The examination consists of two parts. One proposal is on a subject different from the dissertation research and the other proposal is on the planned subject of the thesis. The final requirements of the program include the presentation of a Ph.D. dissertation as the result of independent investigation and constituting a contribution to knowledge in the area of developmental biology. The student must then successfully pass the University oral examination which is taken only after the student has substantially completed his or her research. The examination is preceded by a public seminar in which the research is presented by the candidate. The oral examination is conducted by a dissertation reading committee.

COURSES

210. Developmental Biology — (Same as Biological Sciences 208.) Goal: to discover unifying themes in how organismic complexity is generated during embryonic and post-embryonic development. The roles of genetic hierarchies, induction events, cell lineage, maternal inheritance, cell-cell communication, and hormonal control in developmental processes in well-studied organisms (mammals, insects, and nematodes). Acquaints graduate students and upper-level undergraduates with advances in current developmental biology. Small groups of students and faculty discuss current papers in depth. Team taught by department faculty. Undergraduate prerequisite: consent of instructor. Recommended: familiarity with basic techniques and experimental rationales of molecular biology, biochemistry, and genetics.

5 units, Spr (Baker, Clayton, Crabtree, Fuller, Hogness, Kaiser, Kim, Kingsley, Nusse, Scott, Shapiro, Spudich, Villeneuve, Weissman)

211. Development in Microorganisms — (Same as Biochemistry 211.) Cell differentiation and multicellular development in microorganisms. Microbes are attractive subjects for molecular studies of the regulation of development because they can be manipulated easily by genetic and biochemical techniques, handled in large numbers, and because their genomes are relatively small. Topics: regulation of cell division; sporulation in B. Subtilis; flagella and pili morphogenesis in Caulobacter, E. coli and Salmonella; bacteriophage assembly; genome rearrangements and positional information; cell-cell communication and multicellular development in Myxococcus and Dictyostelium; signal transduction pathways. Lectures/readings in current literature.

5 units (Kaiser, Shapiro) not given 1995-96

213. Biological Signaling during Development — (Same as Biochemistry 213.) Biochemical and genetic analysis of the developmental response of cells, or cell clusters, to specific molecular signals. Signals vary from complex proteins to simple molecules (steroid hormones), and the responding cells vary from those in close proximity to signal-generating cells to all cells in the organism. Focus is on hormonal signals that regulate the development of cells, emphasizing the metamorphosis of insects and certain vertebrates, and on the evolutionary conservation of these systems. Prerequisites: knowledge of basic biochemistry and genetics.

3 units, Win (Hogness)

215. Frontiers in Developmental Biology — Seminar series presents the latest advances in understanding the genetic control of development. Every other week, distinguished scientists from the national and international community visit Stanford to present a seminar and review future directions of
their work. Background material is presented by reviewing relevant scientific papers in the week prior to the seminar. Topics: developmental genetics in *Drosophila* and *C. elegans*, early development in the mouse, muscle development, neural development, microbial and fungal development, and the function of the immune system.

1 unit, Aut, Win, Spr (Kim, Kingsley)

217. Mammalian Developmental Genetics—(Same as Genetics 217.) Topics: imprinting, early development and implantation, germ cell allotment, phenotypic consequences of targeted knockouts of developmental genes, hox genes and other developmental genes in mammals, tumorigenesis, coat color mutations, classical mutations and positional cloning, mutagenesis and insertional and gene traps, growth controls and lgs, muscle and limb development, sex determination, classical genetics and gene mapping and inbred strains, segregation and T locus, and germ and embryonic stem cells and teratocarcinomas. One lecture per week, plus one guest lecture or a literature discussion.

2 units, Win (Barsh, Nusse) given every 3rd year

225. Molecular Motor Proteins and the Cytoskeleton—(Same as Biochemistry 225.) The molecular basis of energy transduction that leads to movements generated by microfilament-based and microtubule-based motors, including forms of myosin, dynein, and kinesin. Structure of molecular motors and their accessory proteins. Regulation of the assembly and function of motor complexes. Functions of molecular motors in cells and in development. Topics: structure of the molecular motors and their accessory proteins, regulation of the function of motile assemblies, functions of molecular motors 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, Aut (Spudich, Fuller) given every 3rd year

237. Introduction to Biotechnology—(Same as Biology 237, Biophysics 237, Chemical Engineering 237, Chemistry 237, Civil Engineering 237, Genetics 237, Molecular Pharmacology 237, Neurobiology 237, Structural Biology 237.) Faculty from the Departments of Biochemistry, Biological Sciences, Chemical Engineering, Chemistry, Civil Engineering, Developmental Biology, Structural Biology, and invited industrial speakers review the interrelated elements of modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering.

3-5 units, Spr (Robertson) TTh 2:15-3:30 F 3:15-4:30

399. Research—Must register by section numbers. 1-18 units, any quarter (Staff) by arrangement

**Epidemiology Program**

**Director:** Jennifer L. Kelsey (Professor of Health and Research Policy)

**Steering Committee:** (Professors) J. Martin Brown (Radiation Oncology), Byron W. Brown, Jr. (Health Research and Policy, Division of Biostatistics), Jennifer L. Kelsey (Health Research and Policy, Division of Epidemiology), Helena Kraemer (Psychiatry and Medicine), Robert Marcus (Medicine, Divisions of Endocrinology, Gerontology, and Metabolism), Neil Risch (Genetics), Alice S. Whittemore (Health Research and Policy, Division of Epidemiology)

**Cancer Biology, Program in:** J. Martin Brown (Professor)

**Gynecology and Obstetrics:** Emmet Lamb (Professor), Mary L. Polan (Professor)

**Health Research and Policy:** Paul Basch (Professor), Rodney Beard (emeritus), Byron W. Brown, Jr. (Professor), John Farquhar (Professor), Jennifer Kelsey (Professor), Abby King (Assistant Professor), Lorene Nelson (Assistant Professor), Ralph Paffenbarger, Jr. (emeritus), Julie Parsonnet (Assistant Professor), Atsuko Shibata (Assistant Professor), Alice Whittemore (Professor)

**Medicine:** John Farquhar (Professor), Stephen Fortmann (Associate Professor), James Fries (Professor), William Haskell (Professor), Halstead Holman (Professor), Helena Kraemer (Professor), Robert Marcus (Professor), Gordon Matheson (Associate Professor), Julie Parsonnet (Assistant Professor), Gary Schoolnik (Professor), Marcia Stefanik (Research Associate), David Thom (Assistant Professor), Lucy Tompkins (Associate Professor), Marilyn Winkleby (Senior Research Scientist)

**Microbiology and Immunology:** Gary Schoolnik (Professor), Lucy Tompkins (Associate Professor)

**Neurology and Neurological Sciences:** Leslie Dorfman (Professor)

**Neurobiology:** Denis Baylor (Professor)

**Pediatrics:** Laura Bachrach (Associate Professor)

**Stanford Center for Research in Disease Prevention:** John Farquhar (Professor), Stephen Fort-
manner (Associate Professor), William Haskell (Professor), Abby King (Assistant Professor), Helena Kraemer (Professor), Marcia Stefanik (Research Associate), Marilyn Winkleby (Senior Research Scientist)

GRADUATE PROGRAMS

The Epidemiology Program offers interdisciplinary instruction and research opportunities leading to M.S. and Ph.D. degrees in Epidemiology. The program has strengths in the following areas of epidemiology: cancer; cardiovascular, infectious, musculoskeletal and neurological diseases; genetics; some aspects of epidemiologic methods; and reproductive, environmental, and occupational epidemiology.

MASTER OF SCIENCE

The M.S. program is designed to provide training in epidemiologic methods to professionals in a variety of related fields and to serve as an introduction to those with bachelor’s degrees who are considering careers in epidemiology. Applicants to the M.S. program should have previous course work in biology and statistics or mathematics. To receive the degree students are expected to obtain a thorough grounding in epidemiologic methods and applied biostatistics, and to demonstrate research skills through the completion of a master’s thesis. A total of 45 units of course work, including a 12-credit master’s thesis, must be successfully completed. Required courses are Health Research and Policy (HRP) 203 (Intermediate Biostatistics), 225 (Design and Conduct of Epidemiologic Studies), 226 (Advanced Epidemiologic Methods), and 238 (Seminar/Journal Club in Epidemiology); Statistics 190 (Statistics for Social Scientists), and 161 (Introduction to Statistical Methods II); and a master’s thesis of 12 units or more. In addition, M.S. students are required to select two other courses in epidemiology. The master’s thesis must be read and approved by two faculty members.

DOCTOR OF PHILOSOPHY

The Ph.D. program in Epidemiology is designed to prepare individuals for careers in research and teaching in epidemiology. It is recommended that applicants have previous course work in biology and statistics or mathematics. Normally, successful applicants will have a master’s degree in a relevant field or at least two years of relevant research experience.

Candidates for the Ph.D. degree must complete 72 units of graduate course work and research. Course requirements include all those listed for master’s students (unless taken previously), and also HRP 224 (Statistical Issues in Epidemiology), a course in genetic epidemiology or genetics, and an additional course in epidemiology. A student must select a specialty area (for example, cardiovascular diseases, cancer, genetics, infectious diseases, musculoskeletal diseases, neurological diseases, reproductive disorders). Additional courses are required in each specialty area. Requirements for the specific specialty areas may be obtained from the Office of the Faculty Coordinator, and depending on the specialty area, include one or more of the following courses: Pathology 230A (General and Special Pathology), Cancer Biology 241 (Molecular and Cellular Biology of Cancer), Genetics 344A (Genetic Epidemiology), HRP 233 (Physiologic Basis of Cardiovascular Disease Prevention and Epidemiology), Human Biology 166 (Cardiovascular Disease Prevention and Epidemiology), HRP 204 (Medical Microbiology), Microbiology and Immunology 202 (Medical Microbiology), Neuroscience 200 (The Nervous System), and Human Biology 156 (Human Development).

Successful completion of three written qualifying examinations is required for admission to Ph.D. candidacy. The qualifying examination covers: (1) epidemiologic methods, (2) biostatistics, and (3) a specialty area (for example, epidemiology and pathobiology of cancer, cardiovascular diseases). Requirements also include the presentation of a Ph.D. dissertation as the result of independent investigation and constituting a contribution to knowledge in epidemiology. The candidate must then successfully pass the University oral examination, which is taken only after the student has substantially completed his or her research. The examination is preceded by a public seminar in which the research is presented by the candidate. The oral examination is conducted by a dissertation reading committee.

COURSES

Course work and laboratory instruction in the Epidemiology Program conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog. The course listings of individual departments participating in the Program in Epidemiology should be consulted for complete descriptions.

GENETICS

Emeritus: (Professor) L. L. Cavalli-Sforza
Chair: David Botstein
Associate Professors: Michele P. Calos, Margaret T. Fuller, Richard M. Myers
Assistant Professors: Gregory S. Barsh, Douglas E. Vollrath
Professor (Research): Leonore A. Herzenberg
GRADUATE PROGRAMS

The Ph.D. program in the Department of Genetics offers graduate students the opportunity to study in all the major areas of modern genetics research, including many aspects of human genetics (linkage mapping, physical mapping, cytogenetics, genetic epidemiology and population genetics), bacterial and yeast genetics, Drosophila developmental genetics, mouse genetics, immunogenetics, and mathematical biology. The department also includes two Genome Centers, the Stanford Human Genome Mapping Center, and the Stanford DNA Sequence and Technology Center which are engaged in state-of-the-art mapping and sequencing of human and model organism genomes.

The department believes genetics should be viewed as a discipline that encompasses not just a set of tools but a coherent and fruitful way of thinking about biology and medicine. It emphasizes, in the teaching of doctoral students and physician-scientists, the broad scope of genetic thinking, including not just molecular genetics, but also classical, medical, and population genetics. The department provides training through laboratory rotations, dissertation research, a series of advanced courses in genetics and other areas of biomedical science, several seminar series and colloquia, journal clubs, and an annual three-day retreat that includes faculty, students, postdoctoral fellows, and staff scientists. A strong emphasis is placed on interactions among students, postdoctoral students, and faculty within the department and throughout the campus.

The Department of Genetics is located in the School of Medicine and includes modern, well-equipped laboratories. Extensive computer support and advanced instrumentation are available for research projects. The department has 25 to 30 graduate students and 30 to 35 postdoctoral fellows. In addition to interacting with the faculty and laboratories in the department, students have contacts with a much larger number of students, fellows, and faculty in other biological and biomedical programs throughout the University.

During their first year, graduate students in the department take advanced graduate courses and sample several areas of research by doing laboratory rotations in three or four labs in the department. At the end of the first year, students select a lab in which to do their dissertation research. While the dissertation research is generally performed in one lab, collaborative projects with more than one faculty member are encouraged. In addition to interacting with their faculty preceptor, graduate students receive input regularly from other faculty members who serve as advisers on their dissertation committee. Study for the Ph.D. generally requires between four and five years of graduate work, most of which is spent on the dissertation research.

Graduate students are generally enrolled in the Ph.D. program, although a limited number of M.D. candidates can combine research training in genetics with their medical studies. Ph.D. candidates who have passed the qualifying exam in the second year can opt to receive the M.S. degree.

There are opportunities for graduate students to teach in graduate level and professional school courses, although there is no formal teaching requirement. In addition, students are encouraged to participate in an education outreach program that is administered through the department and which involves numerous opportunities to interact with secondary school students and teachers, lay groups, and local science museums.

Students who have recently received a bachelor's, master's, M.D., or Ph.D. degree in related fields may apply for graduate study in the Department of Genetics. Prospective students must have a background in general biology, mathematics, physics, and chemistry. Decisions for admission are based on a comparison of the relative merits of all the candidates' academic abilities and potential for research. Students who wish to pursue a combined M.D./Ph.D. degree are considered for admission into the graduate program in the Department of Genetics after they have been admitted to the M.D. program in the School of Medicine. All applicants are considered equally regardless of race, color, creed, religion, national origin, sex, sexual preference, age, or gender.

Students are admitted to the graduate program in the Autumn Quarter. Prospective students are encouraged to begin the application process early enough to ensure that they are able to submit a complete application by the previous December 15, and are able to apply for fellowships by the previous November 15. All students accepted into the Ph.D. program are provided with full tuition and a stipend to cover costs of living. Two training grants from the U.S. National Institutes of Health provide major support for the graduate training program in the department. Other student support is provided by department funds and from the research grants, both federal and private, of the faculty. In addition, a number of graduate students are funded by fellowships from the National Science Foundation or the Howard Hughes Medical Institute. Prospective students are encouraged to apply for fellowships from these institutes by requesting applications from the National Science Foundation, Oakridge Associated Universities, P.O. Box 3010, Oak Ridge, TN 37831-3010, telephone 615-483-3344; Howard Hughes Medical Institute, Fellowship Office, National Research Council, 2101 Constitution Avenue, NW, Washington, D.C. 20418, telephone 202-334-2872. Applications are due on November 1 of each year.
For basic University requirements for the Ph.D. degree, see the “Graduate Degrees” section of this bulletin.

COURSES

For further information on the availability of courses, consult the quarterly Time Schedule, or inquire at the department office. Additional courses in or related to genetics are included in the listings of the Departments of Biological Sciences, Biochemistry, Developmental Biology, and Microbiology and Immunology, and Structural Biology.

201. Human Genetics—Theoretical and experimental basis for human genetics. Lectures/reading in molecular, chromosomal, cellular, developmental, population, and medical genetics, emphasizing the latter. Prerequisites: knowledge of biochemistry and basic genetics.

4 units, Spr (Cox, Francke, Barsh)
T 10 WTh 9

203. Advanced Genetics—(Same as Biological Sciences 203.) Explores the genetic toolbox. Analytic methods and modern synthetic genetic manipulation, including original papers. Emphasis is on use of genetic tools in dissecting complex biological pathways, developmental processes, and regulatory systems. Graduate students in any one of the biological sciences are welcome, but those with minimal experience in genetics should prepare themselves by working through problems in Suzuki, et al, or Hart, et al.

3 units, Aut (Botstein, Baker) TTh 9

206. Evolution of Chromosomes—How chromosomes evolved into complex structures and how these structures carry out the functions required of them, reviewed in phylogenetic sequence, from bacteria to mammalian cells. At each level of organization, the form and function of the genetic material is considered, with emphasis on how the genome codes for replication, centromeres, and telomeres. The evolution and function of repeat sequences.

3 units (Calos)
alternate years, given 1996-97

209. Genetics of Vision and Vision Disorders—Background information about the developmental biology of the eye, the physiology of vision, and the biology of vision disorders that have a genetic basis. Examples of genetically-related research problems involving study of vision and/or vision disorders.

1 unit (Cohen)
alternate years, not given 1996-97

210. Advanced Human Genetics—For students in the Genetics Ph.D. program; other graduate students by arrangement. Companion course for 201. Advanced principles of human and medical genetics. In-depth discussion of human genetics; examples from recent literature. Emphasis on molecular genetics and on experimental approaches.

4 units, Spr (Cox) by arrangement

217. Mammalian Developmental Genetics—(Same as Developmental Biology 217.) Topics: imprinting, early development and implantation, germ cell allotment, phenotypic consequences of targeted knockouts of developmental genes, hox genes and other developmental genes in mammals, tumorigenesis, coat color mutations, classical mutations and positional cloning, mutagenesis and insertional and gene traps, growth controls and IGFs, muscle and limb development, sex determination, classical genetics and gene mapping and inbred strains, segregation and T locus, and germ and embryonic stem cells and teratocarcinomas. Lecture, plus one guest lecture or a literature discussion weekly.

2 units, Win (Barsh, Nusse) given every 3rd year

222. Method and Logic in Experimental Genetics—For graduate students only. Experimental design. Weekly topics central to research in genetics, biochemistry, and molecular biology: protein subunit equilibrium, domain structure of proteins, cooperativity, precursor/product relationships, and macromolecular interactions. Emphasis is placed on student participation and analysis of the logical principles underlying experiments in these areas. Papers, classic and contemporary, from primary literature relevant to the weekly topic.

3 units, Win (Myers, Vollrath) M 2:30

260. Supervised Study—Prerequisite: consent of instructor.
any quarter (Staff) by arrangement

299. Directed Reading—Prerequisite: consent of instructor.
any quarter (Staff) by arrangement

399. Individual Research—Prerequisite: consent of instructor.
any quarter (Staff) by arrangement

HEALTH RESEARCH AND POLICY

Emeriti: (Professors) Rodney R. Beard, Victor R. Fuchs, Count D. Gibson, Jr., Lincoln E. Moses, Ralph S. Paffenbarger, Jr.
Chair: Byron Wm. Brown, Jr.
Assistant Professors: Laurence Baker, John C. Hornberger, Lorene M. Nelson, Julie Parsonnet, Atsuko Shibata
Professor (Research): Philip W. Lavori
Associate Professor (Research): Dan Bloch
viruses, bacteria, fungi, and medical parasites, including protozoans and helminths. Classification to the spectrum of human illness induced by Microbiology and Immunology 201.)

Introduction to the spectrum of human illness induced by Microbiology and Immunology 201.)

Infectious Basis of Disease — (Same as Microbiology and Immunology 201.) Introduction to the spectrum of human illness induced by viruses, bacteria, fungi, and medical parasites, including protozoans and helminths. Classification to the spectrum of human illness induced by Microbiology and Immunology 201.)

Biostatistics and Epidemiology — Required for medical students. Introduces epidemiological concepts, techniques, and studies: statistical reasoning and the application of common statistical procedures used in lab and clinical investigations. Lectures, group discussions, and assigned problems.

202. Biostatistics and Epidemiology — Required for medical students. Introduces epidemiological concepts, techniques, and studies: statistical reasoning and the application of common statistical procedures used in lab and clinical investigations. Lectures, group discussions, and assigned problems.

Consulting Professors: Wilbur Hoff, David S. P. Hopkins

Participating Faculty: Alain C. Enthoven (Business), Stephen P. Fortmann (Medicine), James F. Fries (Medicine), Alan M. Garber (Medicine), Henry T. Greely (Law), Peter Gregory (Medicine), Halsted R. Holman (Medicine), Rudolf H. Moos (Psychiatry), Douglas Owens (Medicine), W. Richard Scott (Sociology), Edward H. Shortliffe (Medicine and Computer Science), David Thom (Medicine), Amos Tversky (Psychology)

The Department of Health Research and Policy has three divisions:

1. Biostatistics deals with scientific methodology in the medical sciences, emphasizing the use of statistical techniques.

2. Epidemiology provides training and experience in the application of epidemiologic methods to the study of disease etiology and control. It is also concerned with problems of health and disease in human populations in all parts of the world and with efforts toward improving levels of health.

3. Health Services Research is concerned with many aspects of health policy analysis in the public and private sectors.

The department, and each division, offers courses in its areas of specialization. These are described fully in the Stanford University bulletin, School of Medicine.

Course work and instruction in the Department of Health Research and Policy conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this bulletin.

GRADUATE PROGRAMS

The Program in Epidemiology and the Program in Health Services Research are housed in the Department of Health Research and Policy. These programs are described separately within the School of Medicine listings of this bulletin.

COURSES

201. Infectious Basis of Disease — (Same as Microbiology and Immunology 201.) Introduction to the spectrum of human illness induced by viruses, bacteria, fungi, and medical parasites, including protozoans and helminths. Classification to the spectrum of human illness induced by Microbiology and Immunology 201.)

202. Biostatistics and Epidemiology — Required for medical students. Introduces epidemiological concepts, techniques, and studies: statistical reasoning and the application of common statistical procedures used in lab and clinical investigations. Lectures, group discussions, and assigned problems.

203. Intermediate Biostatistics — (Same as Medical Information Sciences 203.) Introduction to advanced statistical procedures commonly used in health services and epidemiological research, e.g., multiple linear regression, multiple logistic regression, actuarial analysis of observations on time to event with censoring, and the analysis of frequency data by Poisson and chi-square methods. Examples presented and problems assigned. Prerequisite: 202, Statistics 201A, or consent of the instructor.

206. Methodology Seminar: Meta-Analysis — Statistical Methods for Combining Information — (Same as Statistics 211, Education 493B.) Meta-analysis is a quantitative method for combining results of independent studies, enabling researchers to synthesize the results of related studies so that the combined weight of evidence can be considered and applied. Examples from the medical, behavioral, and social sciences. Topics: literature search, publication and selection bias, statistical methods (contingency tables, cumulative methods, sensitivity analyses, non-parametric methods). Project required. Prerequisites: basic sequence in statistics and consent of instructor.

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.

210. Health Law and Policy — (Same as Law 381.) Non-law students admitted with consent of instructor. Integrates legal issues in delivery financing of medical care with historical, economic, sociological, and political science data and theory. Core
224. Statistical Issues in Epidemiology — Selected advanced problems in the design and analysis of epidemiological studies, motivated by published investigations. Possible topics: issues in matching controls to cases in case-control studies, methods for analyzing data from cohort studies, and methods for the design and analysis of family and genetic studies. Prerequisites: 203, 225, 226, or equivalents.

3 units (Whittemore) not given 1995-96

225. Design and Conduct of Epidemiologic Studies — Intermediate-level. Provides students with the knowledge and skills to design, carry out, and interpret epidemiologic studies, particularly of chronic diseases. Topics: epidemiologic concepts, sources of data, cohort studies, case-control studies, cross-sectional studies, sampling, estimating sample size, questionnaire design, and effects of measurement error. Lectures/discussion, required reading, and assigned problems for each session. Prerequisite: 202 or equivalent, or consent of instructor.

3-4 units, Aut (Kelsey) MW 3:30-5

226. Advanced Epidemiologic Methods — Emphasis is on principles of measurement, measures of effect, confounding, effect modification, and strategies for minimizing bias in epidemiologic studies. Lectures, readings, and problem sets. Prerequisite: 225 or consent of instructor.

3-4 units, Win (Nelson) TTh 10:30-12 alternate years, not given 1996-97

227. Epidemiology of Musculoskeletal and Neurologic Disorders — Epidemiologic contributions to understanding the etiology of conditions such as osteoporosis and fractures, congenital and developmental bone malformations, arthritic disorders, disability, Alzheimer’s disease and dementia, stroke, epilepsy, headache, chronic neurologic diseases, and head and back injuries. Methodologic issues important to the study of musculoskeletal and neurologic disorders are emphasized. Prerequisite: 225 or consent of instructors.

3 units, Spr (Kelsey, Nelson, Hubert) alternate years, not given 1996-97

228. Molecular Epidemiology — Genetic and biochemical markers of exposure and risk. Topics: DNA fingerprinting to determine transmission pathways, vaccine design based on pathogen genetics, host genetic characteristics as determinants of disease risk and their potential use in screening, and biochemical markers of environmental exposures. Evaluation of techniques as applied to infectious diseases, oncology, and occupational health. Prerequisites: 223 or 225 and Medicine 229, or consent of instructors.

3 units, Spr (Parsonnet, Basch, Shibata) T 10:11:50 alternate years, not given 1996-97

231. Epidemiology of Infectious Diseases — Principles of transmission of infectious agents (viruses, bacteria, rickettsiae, mycoplasma, fungi, and protozoa and helminth parasites). The role of vectors, reservoirs, and environmental factors. Pathogen and host characteristics that determine the spectrum of infection and disease. Endemicity, outbreaks, and epidemics of selected infectious diseases. Principles of control and surveillance.

3 units (Basch, Parsonnet) alternate years, given 1996-97

238. Seminar/Journal Club in Epidemiology — On-going research is presented by faculty, staff, students, and guests, and recent journal articles are discussed.

1 unit, Aut, Win, Spr (Staff) T 2:30-4
256. Economics of Health and Medical Care—
(Same as Medical Information Sciences 256, Economics 156/256; undergraduates register for 156.)
Open to graduate students and advanced undergraduates with training in microeconomics and some background in statistics or mathematics. Empirical, institutional, and theoretical analysis of problems of health and medical care. Topics: measurement, valuation, and determinants of health; physicians, hospitals, and the drug industry; financing and organization of medical care; public policy issues. Prerequisite: Economics 51 or consent of instructor.
5 units, Aut (McClellan) TTh 1:15-3:05

260A,B,C. Workshop in Biostatistics—(Same as Statistics 260A,B,C.) Informal seminars and discussions of diverse problems in medical science, especially those for which statistical reasoning and techniques are crucial to their solutions.
1-5 units, Aut, Win, Spr (Olshen, Efron) Th 1:15-3:05

270. International Health—Discussion of world distribution of selected diseases and health problems; international organizations and control programs; environmental, social, and economic factors in relation to health, particularly in developing countries; and comparative health care systems in poor and wealthy countries. Preparation for work and experience abroad. Prerequisite: consent of instructor.
2-4 units, Spr (Basch) Th 1:15-3:05

272. International Health Special Studies—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 (Staff) by arrangement

280. Spanish for Medical Students—(Same as Spanish 121M.) Teaches students useful conversational Spanish. Topics: the human body, hospital procedures, diagnostics, food, and essential phrases for on-the-spot reference when dealing with Spanish-speaking patients.
3 units, Aut (I. Corso) T or Th 7-9 p.m.

281. Spanish II for Medical Students—(Same as Spanish 122M.) Continuation of 280. Prerequisites: 280 or equivalent.
3 units, Win (I. Corso) T or Th 7-9 p.m.

282. Spanish III for Medical Students—(Same as Spanish 123M.) Continuation of 281. Prerequisite: 281 or equivalent.
3 units, Spr (I. Corso) Th 7-9 p.m.

283. Core Seminar—Presentation of research in progress and tutorials in the field of health services research.
1 unit, Aut, Win, Spr, Sum (Garber, Hlatky, Owens) W 1:30-3

299. Directed Reading—Aspects of preventive medicine, public health, social aspects of disease and health, economics of medical care, occupational or environmental medicine, epidemiology, international health, or related fields. Prerequisite: consent of the instructor.
1-18 units, any quarter (Staff) by arrangement

390. Quality Management in Health Care—(Same as Business E333.) Topics: What do modern industrial quality theories have to offer health care? How can quality be measured? What are the tools of quality improvement? What are the costs of poor quality in health care? How can high quality lower costs? Students read recent literature and meet with local professionals concerned with health care quality. Prerequisite: consent of the instructor.
4 units, Aut (Enthoven) MTh 1:20-3:05

391. Political Economy of Health Care in the U.S.A.—(Same as Business E331.) The financial and public policy context in which the health care system operates, and the issues in public policy controlling it in the public expenditure. Issues: financing and organization for delivery of health care in the U.S., how various existing and proposed financing and organizational arrangements affect the allocation of resources, fee-for-service practice and health maintenance organizations, hospital investment decisions and regional planning, health care costs, and national health insurance. Prerequisite: graduate student.
4 units, Spr (Enthoven) MTh 8-9:50

392. Analysis of Costs, Risks, and Benefits in Health Care—(Same as Business E332, Medical Information Sciences 432.) For graduate students. How do you do cost-benefit analysis when the “output” is difficult or impossible to measure? How do M.B.A. analytic tools apply in health services? Study/discussion of the main literature on the principles of cost-benefit analysis applied to health care. A critical review of actual studies. Emphasis is on the art of practical application.
4 units, Aut (Enthoven, Garber) MTh 8-9:50

399. Research—Qualified students to undertake investigations sponsored by individual faculty members. Prerequisite: consent of the instructor.
1-18 units, any quarter (Staff) by arrangement

HEALTH SERVICES RESEARCH PROGRAM

Director: Mark Hlatky (Associate Professor of Health Research and Policy, and Medicine)
Executive Committee: Alan Garber (Associate Professor of Medicine), Mark Hlatky (Associate Professor of Health Research and Policy, and Medicine), John Hornberger (Assistant Professor of Health Research and Policy),
SCHOOL OF MEDICINE

Douglas Owens (Assistant Professor of Medicine)

Participating Departments and Faculty:

Economics: Thomas MaCurdy (Professor), Mark McClellan (Assistant Professor)
Business, Graduate School of: Alain Enthoven (Professor)
Health Research and Policy: Laurence Baker (Assistant Professor), Paul Barnett (Consulting Assistant Professor), Donald Holloway (Lecturer), John Hornberger (Assistant Professor), Jennifer Kelsey (Professor), Philip Lavori (Professor, Research), Ciaran Phibbs (Consulting Assistant Professor), Anita Stewart (Visiting Scholar)
Industrial Engineering: Margaret Brandeau (Associate Professor)
Law: Henry Greely (Professor)
Medicine: Alan Garber (Associate Professor), Mary Goldstein (Assistant Professor), Leslie Lenert (Assistant Professor), Douglas Owens (Assistant Professor)
Psychiatry: Rudolph Moss (Professor)
Psychology: Amos Tversky (Professor)
Sociology: Richard Scott (Professor)

GRADUATE PROGRAM

MASTER OF SCIENCE

The master's degree program in Health Services Research (M.S. in HSR) is designed to complement training in the medical and social sciences in preparation for careers in health services or health policy; for example, careers in medicine and nursing, in which responsibilities in administration and health policy are anticipated, and careers in health policy analysis in government, consulting firms, health planning agencies, education, business, or the law. The program provides specialized training in selected areas of health care policy and other health-related topics, in research methodology, and in the application of these skills to a specific research problem. Course work requirements, based on an individually-designed multidisciplinary curriculum, allow students to design a program of study suited to their individual backgrounds and interests.

Students who intend to pursue careers involving administration may wish to consider course work in the Graduate School of Business.

To receive the degree, students are expected to demonstrate knowledge of issues in health services research and the quantitative skills necessary for research in this area. Students must take at least 45 units of course work (9 of the units may be double-counted to meet other degree requirements) and write a University thesis. The course work requirements are:

1. At least 8 units from the following group of HRP core courses: 256, Economics of Health; 391, Political Economy of Health Care; 392, Cost-Benefit Analysis in Health Care.
2. At least 6 units of graduate-level statistics courses (that is, at the 200 level or above). The sequence of Statistics 201A, Data Analysis I; and HRP 203, Intermediate Biostatistics, is strongly recommended.
3. At least 3 units of HRP 283, Core Seminar.
4. At least 15 units of HRP research credit from 299, Directed Reading; 399, Research.
5. An additional set of approved elective courses to complete the program total of at least 45 units. The HRP courses level 203 and above listed in this catalog, as well as the following courses from other departments, have been approved as electives: Economics 150, Economics and Public Policy; Engineering Economic Systems 231, Decision Analysis; Medical Information Sciences 210, Computer Applications in Medicine and 211A, Computer-Assisted Medical Decision Making; Psychology 256, Decision and Judgment; Sociology 163, Organizational Decision Making; Sociology 166, Organizations and Public Policy. Other courses may be used as electives subject to the approval of the faculty adviser and program director.
6. Background in health sciences equivalent to Human Biology 111, Human Physiology, or the Clinical Physiology series (Physiology 200-204), as well as experience equivalent to Medical Information Sciences 205, Introduction to Clinical Environments.

For additional information, address inquiries to the Program Administrator, Department of Health Research and Policy, Stanford University School of Medicine, HRP Redwood Building, Room T264, Stanford, California 94305-5092.

COURSES

Course work and lab instruction in the Health Services Research Program conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog. The course listings of individual departments participating in the Health Services Research Program should be consulted for complete descriptions.

IMMUNOLOGY PROGRAM

Director: Mark M. Davis (Professor of Microbiology and Immunology)
Predoctoral Committee: Yuch-hsiu Chien (Associate Professor of Microbiology and Immunology), Phyllis Gardner (Associate Professor of
Molecular Pharmacology and Medicine), Alan Krensky (Professor of Pediatrics), Garry Nolan (Assistant Professor of Molecular Pharmacology), Jane R. Parnes (Associate Professor of Medicine/Immunology and Rheumatology), Irving Weissman (Professor of Pathology and of Developmental Biology)

Participating Departments and Faculty:
Biochemistry: Gilbert Chu (Associate Professor)
Biological Sciences: Patricia P. Jones (Professor)
Cardiovascular Surgery: Carol Clayberger (Assistant Professor)
Chemistry: Harden M. McConnell (Professor)
Developmental Biology: Gerald Crabtree (Professor), Irving Weissman (Professor)
Genetics: Leonard A. Herzenberg (Professor), Lenore Herzenberg (Professor, Research)
Medicine/Hematology/Bone Marrow Transplantation Program: Robert Negrin (Assistant Professor)
Medicine/Immunology and Rheumatology: C. Garrison Fathman (Professor), Jane R. Parnes (Associate Professor), Samuel Strober (Professor)
Medicine/Oncology: Gilbert Chu (Associate Professor), Ronald Levy (Professor), Shoshana Levy (Professor, Research)
Microbiology and Immunology: Yueh-Hsiu Chien (Associate Professor), Mark M. Davis (Professor), Christopher Goodnow (Assistant Professor), Hugh O. McDevitt (Professor), Garry Nolan (Assistant Professor), Peter Parham (Professor)
Molecular and Cellular Physiology: Richard S. Lewis (Assistant Professor)
Molecular Pharmacology: Garry P. Nolan (Assistant Professor)
Molecular Pharmacology and Medical/Clinical Pharmacology/Cardiovascular Medicine: Phyllis Gardner (Associate Professor)
Pathology: Eugene C. Butcher (Associate Professor), Michael Cleary (Associate Professor), Gerald R. Crabtree (Professor), Edgar G. Engleman (Professor of Pathology and Medicine), Joseph S. Lipsick (Associate Professor), Sara Michie (Assistant Professor), Raymond A. Sobel (Associate Professor), Irving L. Weissman (Professor)
Pediatrics: Alan M. Krensky (Professor), Dale T. Umetsu (Associate Professor)
Structural Biology: Peter Parham (Professor)
Surgery: John E. Niederhuber (Professor of Surgery and of Microbiology and Immunology)

GRADUATE PROGRAMS
MASTER OF SCIENCE

Students in the Ph.D. program in Immunology may apply for an M.S. degree in Immunology, assuming completion of appropriate requirements. Interested students should contact the Immunology Program office. Students must complete:
1. Three full-tuition quarters of residency as a graduate student at Stanford.
2. At least 45 units of academic work, all of which must be in courses at or above the 100 level, 36 units of which must be at or above the 200 level.
3. Three quarters of graduate research (Immunology 300), consisting of rotations in the labs of three faculty members.
4. Course work in Immunology as follows: one course in basic immunology (Biology 230, Microbiology/Immunology 200 or equivalent); two-course sequence in Advanced Immunology (Immunology 200, 210); Principles of Biological Technologies (Microbiology/Immunology 215).
5. Graduate-level biochemistry and molecular biology (Biochemistry 200, 201, or equivalents).
6. Course work in Immunology 311 (Seminar in Immunology).
7. Participation in journal clubs, and attendance at the weekly Immunology seminar and at the annual Stanford Immunology Retreat.
8. Two written proposals and an exam before candidacy.

DOCTOR OF PHILOSOPHY

The interdepartmental Immunology Program offers instruction and research opportunities leading to a Ph.D. in Immunology. The goal of the program is to develop young investigators who have a solid foundation in immunology as well as related sciences and who can carry out innovative research. The program features a flexible selection of courses and seminars to enrich students' backgrounds, combined with extensive research training in the laboratories of the participating immunology faculty.

Students applying to the program typically have an undergraduate major in biological sciences, but majors in other areas are acceptable if the applicants have had sufficient course work in biology and chemistry. Formal application should be made by December 15. Applications are evaluated by the Immunology Predoctoral Committee based on scores on the GRE exams (including the subject test in either biology, biochemistry, or chemistry), which should be taken by the October test date; grades; evidence of prior research experience; letters of recommendation, including letters from research 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 Predoctoral Committee who assists in selecting courses and lab rotations in the first year and in choosing a lab for the dissertation research. Once a dissertation adviser has been selected, a dissertation committee consisting of at least three Immunology faculty, including the dissertation adviser and a member of the Immunology Predoctoral Committee, is constituted to guide the student during the dissertation research. The student must meet with the dissertation committee at least once a year.

Candidates for Ph.D. degrees at Stanford must satisfactorily complete a three-year program of study that includes 72 units of graduate course work and research and nine full-tuition quarters of residency. At least 3 units must be taken with each of four different Stanford faculty members. For further information on University requirements, see the “Graduate Degrees” section of this bulletin.

The requirements for the Ph.D. degree in Immunology include the following:

1. Training in biology and cognate disciplines equivalent to that provided by the undergraduate Biology major at Stanford.

2. Completion of the following courses (or their equivalents from undergraduate work):
   a) Basic immunology (Biology 230 or Microbiology and Immunology 200)
   b) Advanced immunology (Immunology 201, 202)
   c) Biochemistry and Molecular biology, graduate level (Biochemistry 200, 201)
   d) Cell biology, graduate level (Molecular and Cellular Physiology 221)
   f) Statistics (Biology 141 or Health Research and Policy 202)
   g) Principles of Biological Technologies (Microbiology/Immunology 215)

3. Students in their second year and above must participate in the Seminar in Immunology (Immunology 311); students who have not yet achieved TGR status must register for 1 unit. Students attend the weekly Immunology Seminar Series (usually 5-6 p.m. Wednesdays). Students read the papers of and have dinner with visiting seminar speakers two or three times each quarter, and meet with a faculty member to discuss the material.

4. Elective courses as agreed upon by the student, adviser, and advisory committee. Electives may be chosen from graduate courses and seminars in any of the biomedical science departments and programs.

5. Completion in the first year of three one-quarter rotations of research in immunology labs.

6. Teaching assistantship in two immunology courses.

7. For admission to candidacy, completion of three requirements by the end of the second year. A comprehensive written examination in immunology and related biomedical sciences must be completed satisfactorily by the end of Autumn Quarter of the second year. A research proposal on a subject other than the student’s own research must be written by the end of Winter Quarter. Finally, students must prepare and defend a research proposal on their dissertation research by the end of the second year. Administration and evaluation of these requirements is the responsibility of the student’s dissertation committee.

8. Participation (through regular attendance and oral presentation) in one of the faculty-sponsored immunology journal clubs for at least the first two years. Students are also expected to attend the graduate students’ journal club, the Wednesday afternoon immunology seminars, and the annual Stanford Immunology Retreat.

9. Passing of the University oral examination on the dissertation research, which is to be taken only after the student has substantially completed the research. The examination is preceded by a public seminar in which the candidate presents his/her research.

10. Completion of a Ph.D. dissertation, resulting from independent investigation and constituting a contribution to knowledge in the area of immunology.

**COURSES**

Course work and lab instruction in the Immunology Program conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

**201,202. Advanced Immunology** — (Same as Microbiology and Immunology 211, 212) For graduate and advanced undergraduate students. Lecture/discussion featuring current problems in immunology. Topics: genetics and structure/function relationships of antibodies, T-cell receptors, MHC antigens; accessory molecules; lymphocyte differentiation and activation; cellular regulation of immune responses; autoimmunity and other problems in clinical immunology. Prerequisites: biochemistry, basic immunology, consent of instructor (for undergraduates); 201 is a prerequisite for 202.
MEDICAL INFORMATION SCIENCES PROGRAM

201. 3 units, Win (Chien, Staff) MWF 1:15
202. 3 units, Spr (Parham, Staff) MWF 11

290. Teaching of Immunology — Practical experience in teaching by serving as a teaching assistant in an immunology course.
(Staff) by arrangement

300. Research — Research for graduate students in the Ph.D. program in Immunology.
1-15 units (Staff) by arrangement

311. Seminar in Immunology — Enrollment limited to graduate students (second-year and above) in the Ph.D. Program in Immunology. Discussion of current research topics in immunology. Students read and discuss papers of speakers in the Immunology Seminar Series and meet with the speakers to discuss their research.
1 unit, Aut, Win, Spr (Goodnow)

BIOLOGICAL SCIENCES

230. Molecular and Cellular Immunology — For graduate students and advanced undergraduates. Basic components of the immune system: structure and functions of antibody molecules; cellular basis of immunity and its regulation; molecular biology of antigen recognition structures, genetics of immunity and disease susceptibility. Prerequisites for undergraduates: Biology core or consent of instructor.
4 units, Aut (Jones) MWF 10

335. Seminar in Immunobiology and Immunogenetics — Literature review of current topics in immunology. Prerequisites: introductory immunology course and consent of instructor (for undergraduates).
1-2 units, Aut, Win, Spr (Jones) M 12

MICROBIOLOGY AND IMMUNOLOGY

200. Immunology — (Same as Pathology 220.) Principally for medical, graduate, and advanced undergraduate students. Immunology as related to medicine is emphasized. Prerequisites: basic principles of genetics and introductory courses in biochemistry (equivalent to 200-201) and histology.
3 units, Spr (McDevitt, Weissman, Goodnow) MWF 10

200A. Problem Solving in Immunology — (Same as Pathology 220A.) Direct experience in understanding immunology using problems. Three to five problems are corrected and discussed weekly. Corequisite: Microbiology and Immunology 200.
1 unit, Spr (McDevitt, Weissman, Goodnow) by arrangement

215. Principles of Biological Technologies — Required of first-year graduate students in Microbiology and Immunology. The principles underlying commonly utilized technical procedures in biological research. Lectures on gel electrophoresis, nucleic acid hybridization, protein purification and stabilization, light microscopy and computer search algorithms for protein and nucleic acid databases. Prerequisites: biochemistry, organic chemistry, and physics.
2 units, Aut (Davis, Staff) T 2:30-4:30

MEDICAL INFORMATION SCIENCES PROGRAM

Committee: (Chair and Program Director) Edward H. Shortliffe (Professor of Medicine and by courtesy, Computer Science); Lawrence M. Fagan, Co-Director (Medical Informatics); Russ B. Altman (Assistant Professor of Medicine and by courtesy, Computer Science); Douglas L. Brutlag (Associate Professor, Biochemistry), Parvati Dev (Senior Research Scientist, Surgery), Alan M. Garber (Associate Professor of Medicine and, by courtesy, Economics and Health Research and Policy), Leslie Lenert (Assistant Professor of Medicine and, by courtesy, Molecular Pharmacology), Mark A. Musen (Associate Professor of Medicine and by courtesy, Computer Science), Thomas C. Rindfleisch (Senior Research Scientist, Medicine), Yuval Shahar (Senior Research Scientist, Medicine), Gio Wiederhold (Professor of Computer Science, Research, and, by courtesy, Electrical Engineering and Medicine, Research)

Participating Faculty by Department:
Anesthesia: David M. Gaba (Associate Professor)
Biochemistry: Douglas L. Brutlag (Associate Professor)
Biostatistics: Byron W. Brown, Jr. (Professor)
Business, School of: Alain C. Enthoven (Professor)
Computer Science: Russ B. Altman (Assistant Professor, by courtesy), Thomas O. Binford (Professor, Research), Edward A. Feigenbaum (Professor), Richard E. Fikes (Professor, Research), Michael L. Genesereth (Associate Professor), Marc Levoy (Assistant Professor), Mark A. Musen (Associate Professor, by courtesy), Edward H. Shortliffe (Professor, by courtesy), Gio Wiederhold (Professor, Research)
Economics: Alan M. Garber (Associate Professor, by courtesy)
Education, School of: Lee S. Shulman (Professor), Richard E. Snow (Professor)
Electrical Engineering: Marc Levoy (Assistant Professor), Gio Wiederhold (Professor)
who fail to maintain a 3.0 letter grade indicator curriculum requirements outlined below. Students All students are required to complete the core degrees in Medical Information Sciences (MIS).

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. Stanford University's extensive computing facilities are described in the "Computer Science" section of this bulletin. In addition, the Medical Information Sciences Program has a network of Macintosh, NeXT, SUN, and Hewlett-Packard workstations. These machines are available for course work and research projects by trainees in the program.

GRADUATE PROGRAMS

The Medical Information Sciences Program is interdepartmental and offers instruction and research opportunities leading to M.S. and Ph.D. degrees in Medical Information Sciences (MIS). All students are required to complete the core curriculum requirements outlined below. Students who fail to maintain a 3.0 letter grade indicator (LGI) in a category of the core curriculum are expected to pass a comprehensive exam in that area before the graduate degree is granted. In addition, all degree candidates must pass an oral examination that tests the student's ability to integrate the various components of the curriculum and to relate them to the overall field of medical information sciences.

The core curriculum is common to all degrees offered by the program but is adapted or augmented depending on the interests and prior experience of the student. Deviations from the core curriculum outlined below must be justified in writing and approved by the student's MIS academic adviser and the chair of the MIS Committee. It should be noted, however, that the program is intended to provide flexibility and to complement other opportunities in applied medical research that exist at Stanford (for example, the Program on Engineering in Biology and Medicine, and Graduate Special Programs). Although most students are expected to comply with the basic program of study outlined here, special arrangements can be made for those with unusual needs or those simultaneously enrolled in other degree programs within the University. Similarly, students with prior training in the health professions (for example, degrees in medicine, nursing, dentistry, veterinary medicine, or pharmacy), or in medical librarianship, will have the curriculum adjusted to eliminate requirements that were met as part of their prior training. For example, through a special arrangement with Case Western Reserve School of Nursing (Cleveland, Ohio), there are opportunities to coordinate two years of nursing training at Case Western with two subsequent years of M.S. training at Stanford.

CORE CURRICULUM

All students are expected to participate regularly in the MIS Journal Club (201) and Colloquia (200). In addition, all students are expected to fulfill requirements in the following five categories:

1. Medical Informatics (12 units): students are expected to understand current applications of computers in medicine and to develop a broad appreciation for research in the management of biomedical information. Required courses are MIS 210 (Computer Applications in Medicine), 211 (Computer-Assisted Medical Decision Making), 212 (Project Course), and 214 (Algorithms and Representations for Molecular Biology).

2. Computer Science (10 units): the student is expected to acquire a knowledge of the use of computers, computer organization, programming, and symbolic systems. It is assumed that students have had prior computing experience at least equivalent to Computer Science (CS)
All students are required to take a minimum of 10 units of courses in the Department of Computer Science. If similar courses have not been taken previously, these units must be CS 110 or 193U, and additional units taken among CS 145 or 245, 161, 221 or 228A. With the exception of CS 110, all other courses applied to the degree requirements must be numbered 137 or higher.

3. Decision Theory and Statistics (10-12 units): students are expected to learn basic probability theory, Bayesian statistics, decision analysis techniques, and experimental design techniques. Prior courses in statistics at least equivalent to Statistics 60, and calculus equivalent to Math. 42 are prerequisites. A prior course in linear algebra equivalent to Math. 113 is recommended. Required courses are Statistics 116 (Theory of Probability) or Engineering-Economic Systems (EES) 221 (Probabilistic Analysis); Statistics 200 (Introduction to Statistical Inference) or Statistics 201 (Statistical Methods) or MIS 203 (Intermediate Biostatistics); and EES 231A (Decision Analysis).

4. Biomedicine (6-10 units): students are expected to acquire a basic knowledge of human physiology, anatomy, and disease. Prior courses in biology at least equivalent to Biology 31 and 32 are prerequisites. Required are MIS 204, or 6 units of the Clinical Physiology series (Physiology 200-204), or Surgery 101 (Human Structure). Also required are Clinical Diagnosis (MIS 202) and Introduction to Clinical Environments (MIS 205).

5. Health Policy/Social Issues (5-7 units): candidates are expected to be familiar with key issues regarding public health policy, financing, ethics, and legal topics. Students are expected to take MIS 250 (Health and Society). A second course may be selected from among MIS 256, MIS 432, Health Research and Policy (HRP) 220/Human Biology 40 (Social Controversy and Policy Analysis in Medicine), Symbolic Systems 100 (Computers and Ethics), HRP 390 (Quality Assurance in Health Care), HRP 391 (Political Economy of Health Care), HRP 392 (Cost-Benefit Analysis in Health Care), or any other advanced course in health policy/social issues proposed by the student and approved by the MIS academic adviser.

Note that the core curriculum generally entails a minimum of 43 units of course work but can require substantially more or less depending upon the courses selected and the previous training of the student. The varying backgrounds of students are well recognized and no one is required to take courses in an area in which he or she has already been adequately trained; under such circumstances, students are permitted to skip courses or substitute more advanced work. Students design appropriate programs for their interests with the assistance and approval of their MIS academic adviser.

**MASTER OF SCIENCE**

This degree is designed for individuals who wish to undertake in-depth study of medical informatics. The University’s basic requirements for the master’s degree are discussed in the “Graduate Degrees” section of this bulletin. Normally, a student spends two years in the program and will implement and document a substantial project during the second year. The first year involves acquiring the fundamental concepts and tools through course work and research project involvement. Graduates of this program are prepared to contribute creatively to basic or applied projects in medical informatics.

**PROGRAM REQUIREMENTS**

Programs of at least 54 units that meet the following guidelines are normally approved:

1. Completion of the core curriculum.
2. A minimum of 6 additional units composed of courses in Medical Information Sciences numbered 228 or higher, courses in Computer Science numbered 137 or higher, courses in Engineering Economic Systems or Statistics numbered 200 or higher, courses in Operations Research numbered 150 or higher, Psychology 256 or 267, or relevant courses in other departments approved by the student’s academic adviser.
3. Electives: additional courses to bring the total to 54 or more units.

**MASTER OF SCIENCE (SPECIAL PROGRAM)**

This special program is designed as post-doctoral training for individuals with established research credentials who may wish to acquaint themselves broadly with the field of medical information sciences, emphasizing formal course work. Candidates are required to complete the core curriculum and to supplement course work with approved electives to obtain a total of 42 units. A research project is encouraged but not required. Candidates are permitted to complete the program in no less than four quarters. Students in this program are drawn from applicants with doctoral degrees in medicine, computer science, decision theory, or related fields; for example, an academic physician on sabbatical might wish to undertake this program of study. The degree is designed to allow its graduates to complement their area of primary academic or research activity by providing them with a heightened
ability to work effectively in collaborative research projects.

DOCTOR OF PHILOSOPHY

Individuals wishing to prepare themselves for careers as independent researchers in medical informatics should apply for admission to the doctoral program. The University’s basic requirements for the doctorate (residence, dissertation, examination, etc.) are discussed in the “Graduate Degrees” section of this bulletin. The following are additional requirements imposed by the MIS Interdisciplinary Committee:

1. A student should plan and successfully complete a coherent program of study including the core curriculum, oral examination, and additional requirements for the master’s program. In addition, doctoral candidates are expected to complete two additional courses totaling at least 6 additional units of advanced coursework (see categories under item ‘2’ of the master’s program requirements). The master’s requirements, including the oral examination, should be completed by the end of the second year in the program (six quarters of study, excluding summers). Doctoral students are generally advanced to Ph.D. candidacy after completing the oral examination. A student’s academic adviser has primary responsibility for the adequacy of the program, which is regularly reviewed by the Graduate Study Committee of the MIS program.

2. To remain in the Ph.D. program, each student must attain a letter grade indicator (LGI) as outlined in the master’s programs above, and must pass a comprehensive examination covering introductory level graduate material in any curriculum category in which he or she fails to attain an LGI of 3.0. The student must fulfill these requirements and apply for candidacy for the Ph.D. by the end of six quarters of study (excluding summers).

3. By the end of nine quarters (excluding summers), each student must orally present a thesis proposal to a dissertation committee that generally includes at least one member of the Graduate Study Committee of the MIS program. The committee determines whether the student’s general knowledge of the field, and the details of the planned thesis, are sufficient to justify proceeding with the dissertation.

4. As part of the training for the Ph.D., each student is required to complete 2 units of teaching assistant service in MIS courses, 1 unit (10 hours per week for one quarter) being required during the first two years as evidence of satisfactory progress toward the degree.

5. The most important requirement for the Ph.D. degree is the dissertation. Prior to the oral dissertation proposal and defense, each student must secure the agreement of a member of the program faculty to act as dissertation adviser. In some cases, the adviser need not be an active member of the MIS program faculty.

6. No oral examination is required upon completion of the dissertation. The oral defense of the dissertation proposal satisfies the University oral examination requirement.

7. The student is expected to demonstrate an ability to present scholarly material orally and presents his or her research in a lecture at a formal seminar.

8. The student is expected to demonstrate an ability to present scholarly material in concise written form. Each student is required to write a paper suitable for publication, usually discussing his or her doctoral research project. This paper must be approved by the student’s academic adviser as suitable for submission to a refereed journal before the doctoral degree is conferred.

9. The dissertation must be accepted by a reading committee composed of the principal dissertation adviser, a second member of the program faculty, and a third member chosen from anywhere within the University. The principal adviser and at least one of the other committee members must be Academic Council members.

COURSES

200. Medical Information Sciences Colloquium — Series of colloquia, offered by program faculty, students, and occasional guest lecturers. Credit available only to students in an MIS degree program. (May be taken no more than three times for credit.)

1 unit, Aut, Win, Spr, Th 3-4

201. Medical Information Sciences Journal Club—Journal club for all students and several faculty. Participants report on recent relevant articles from the MIS literature. Credit available only to students in an MIS degree program. (May be taken no more than three times for credit.)

1 unit, Aut, Win, Spr, T 3-4

202. Clinical Diagnosis — Open only to students in an MIS degree program. Designed for learning 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
214. Algorithms and Representations for Molecular Biology — Introduction to basic computational issues and methods in molecular biology. Use of biological data sources on World-Wide-Web and CD-ROM. Topics: basic algorithms for alignment of biological sequences and structures and advanced representational and algorithmic issues in structure and sequence computation (e.g., dynamic programming algorithms for alignment, structural superposition algorithms, simplified representations, probabilistic representations of structural uncertainty, hidden Markov models, Bayesian networks, statistical feature detection, genetic algorithms, constraint satisfaction, and minimum description length encoding.) Guest lectures on computational approaches pursued by research groups at Stanford. Prerequisites: Computer Science 109B, Math. 103, or equivalents. Recommended: familiarity with biology.

3 units, Spr (Altman, Koza) TTh 1:15-2:45


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

230. Seminar on Knowledge Acquisition for Expert Systems — For graduate students. Discussion of experimental approaches to the construction of expert-system knowledge bases. Topics: interviewing techniques, formal and informal approaches to modeling expert knowledge, and automated tools that facilitate knowledge acquisition. Enrollment limited to 20. Prerequisite: Computer Science 228A or equivalent.

2 units, Spr (Musen) W 3:30-5

231. Computer Applications in Molecular Biology — (Same as Biochemistry 218.) For molecular biologists and computer scientists desiring to understand the representation and analysis of biological sequences and structures. New and various existing methods and the strengths and limitations are evaluated. Assignments utilizing the tools described. Topics: introduction to the Internet, accessing molecular databases, pattern search, classification of sequence and structure, alignment of sequences, rapid similarity searching, phylogenies, consensus
sequencing, physical mapping of DNA and genomes, representing protein structure, and modeling protein structure by homology. Final project utilizes or analyzes the methods presented. Lecture/lab. Enrollment limited to 40. Prerequisite: introductory molecular biology at the level of Biology 31 or consent of instructor. Recommended: prior exposure to personal computers, electronic mail, and typing skills.

3 units, Spr (Brutlag) TTh 9-10:50

239. Computer-Based Medical Education — Directed reading and research for graduate-level students in the use of modern hypermedia techniques in education. Possible topics: replacement of a lecture or a lab session; primary learning material (an electronic book); review material (question banks); and clinical cases from summaries to simulations.

1-6 units, any quarter (Dev) by arrangement

250. Health and Society — (Enroll in Health Research and Policy 200.) Introduction to epidemiology, preventive medicine, and health care organization through lectures, panel discussions, and student projects. Prerequisite: consent of instructor.

3 units, Win (Hlatky, Staff) M 9-10:50 T 10

256. Economics of Health and Medical Care — (Same as Economics 156/256, Health Research and Policy 256.) Open to graduate students and undergraduates with training in microeconomics and some background in statistics or mathematics. Empirical, institutional, and theoretical analysis of problems of health and medical care. Topics: measurement, valuation, and determinants of health; physicians, hospitals, and the drug industry; financing and organization of medical care; public policy issues. Prerequisite: Economics 51 or consent of instructor.

5 units, Aut (McClennan)

299. Directed Reading and Research — For students wishing to receive credit for directed reading or research time.

any quarter, by arrangement

301. Special Topics in Medical Informatics

1-6 units, any quarter (Staff)

354. Probabilistic Reasoning in Computing — (Enroll in Computer Science 354.)

3 units, Aut (Buntine, Cheeseman) TTh 2:45-4 alternate years, not given 1996-97

432. Analysis of Costs, Risks, and Benefits in Health Care — (Same as Business E332, Health Research and Policy 392.) How do you do cost-benefit analysis when the “output” is difficult or impossible to measure? How do the M.B.A. analytic tools apply in health services? Study/discussion of the main literature on the principles of cost-benefit analysis as applied to health care. Critical review of a number of actual case studies. Emphasis on the art of practical application.

4 units, Aut (Enthoven, Garber) MTh 8-9:50

MICROBIOLOGY AND IMMUNOLOGY

Emeriti: (Professors) Sidney Raffel, Leon T. Rosenberg, John P. Steward, Bruce A. D. Stocker*; (Research Professor) Esther M. Lederberg

Chair: Edward S. Mocarski

Professors: Ann Arvin (jointly with Pediatrics), John C. Boothroyd, Mark M. Davis, Stanley Falkow, Harry B. Greenberg (jointly with Gastroenterology), Abdul Matin, Hugh O. McDevitt, Edward S. Mocarski, John Niederhuber (jointly with Surgery/Oncology), Peter Parham (jointly with Structural Biology), Charles Prober (jointly with Pediatrics), Gary K. Schoolnik (jointly with Infectious Diseases and Geographic Medicine)

Associate Professors: Yueh-hsiu Chien, Kasturi Haldar, Edward S. Mocarski, Lucy S. Tompkins (jointly with Infectious Diseases and Geographic Medicine)

Assistant Professors: Christopher Goodnow, Garry Nolan (jointly with Molecular Pharmacology), David Relman (jointly with Infectious Diseases and Geographic Medicine)

Courtesy Associate Professor: Peter O’Hanley

* Recalled to active duty.

The Department of Microbiology and Immunology offers a program leading to the Ph.D. degree. In addition, research experience, courses, and seminars are offered to postdoctoral trainees and medical students. Current research interests include genetics, molecular and cell biology of host/parasite interactions; pathogenesis of bacterial and viral interactions; microbial physiology with emphasis on energetics and regulation; and molecular genetic studies of the immune system, animal viruses, and parasites.

GRADUATE PROGRAMS

MASTER OF SCIENCE

The department does not offer a regular M.S. program, but the degree is awarded under special circumstances. Candidates for master’s degrees are expected to have completed the preliminary requirements for the B.S. degree, or the equivalent. In addition, the candidate is expected to complete 45 quarter units of work related to microbiology; at least 25 of these units should concern research devoted to a thesis. The thesis must be approved by at least two members of the department faculty. There is also an oral examination, which may cover the general fields of the department’s offerings.
DOCTOR OF PHILOSOPHY

Application, Admission, and Financial Aid — Prospective Ph.D. candidates should possess a bachelor’s degree in a discipline of biology or chemistry, including course work in biochemistry, molecular biology, chemistry, and genetics. The deadline for receipt of applications with all supporting materials is December 15.

Applicants must file a report of scores on the general subject tests (normally in cellular and molecular biology, chemistry, or biochemistry) of the Graduate Record Examination (GRE). It is strongly recommended that the GRE be taken before October so that scores are available when applications are evaluated.

In the absence of independent fellowship support, entering predoctoral students are fully supported with a stipend and tuition award. Successful applicants have been competitive for predoctoral fellowships such as those from the National Science Foundation and Howard Hughes Medical Institute.

Program for Graduate Study — The Ph.D. degree requires course work and independent research demonstrating an individual’s creative, scholastic, and intellectual abilities. On entering the department, students meet with their designated adviser and together they design the basic timetable for completion of the degree requirements. Typically, this consists of first identifying gaps in the student’s undergraduate education and determining which courses should be taken. Then, a tentative plan is made for two to four lab rotations (each usually one quarter). During the first year of graduate study in the department, each student also takes six upper-level (200-series) courses. Three, including Microbiology and Immunology 215 and 209, must be from this department. The other three may be in one of the many departments at Stanford with overlapping interests, for example, Biochemistry, Biological Sciences, Chemistry, Computer Science, Developmental Biology, Genetics, Health Research and Policy, Pathology, and Structural Biology.

In 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 Winter Quarter of the second year, a written research proposal is prepared by the student and submitted and defended in an oral exam to a faculty committee. The subject of this proposal is other than the intended thesis project. Based on successful performance on these two exams, the student is admitted to candidacy. Teaching experience and training are part of the graduate curriculum. All graduate students are required to act as teaching assistants for two quarters as part of their training.

COURSES

3 units (Matin) not given 1995-96

198A-F. Undergraduate Directed Reading — Prerequisite: consent of instructor.
15 units maximum, any quarter (Staff) by arrangement

199. Undergraduate Research — Individual study or research in microbiology by arrangement with a faculty member. Possible fields: microbial molecular biology and physiology, microbial pathogenicity, immunology, virology, and molecular parasitology. Prerequisites: appropriate backgrounds for various areas, consent of instructors.
1-15 units, any quarter (Staff) by arrangement

200. Immunology — (Same as Pathology 220.) Principally for medical and graduate students but may be taken by advanced undergraduates. Immunology as related to medicine is emphasized. Prerequisites: basic principles of genetics and introductory courses in biochemistry (equivalent to 200-201) and histology.
3 units, Spr (Goodnow, McDevitt, Weissman)
MWF 10

200A. Problem Solving in Immunology — (Same as Pathology 220A.) Direct experience in understanding immunology, using problems. Three to five problems are corrected and discussed weekly. Corequisite: 200.
1 unit, Spr (Goodnow, McDevitt, Weissman) by arrangement

201. Infectious Basis of Disease — (Same as Health Research and Policy 201.) Introduction to the spectrum of human illness induced by viruses, bacteria, fungi, and medical parasites, including protozoans and helminths. Classification, epidemiology, transmission, pathogenesis, diagnosis, treatment, control, vaccination, and other preventative measures. Emphasis is on syndromic approach to disease. Lectures, demonstrations, lab sessions, and small group evaluation of clinical correlates. Use of interactive multimedia instructional program, Microbe. Prerequisite: medical student status or consent of instructor.
10 units, Aut (Siegel, Basch, Staff)
MT 1:15-4:05, ThF 1:15-3:05

203. Biological Stress Response — Biological stress responses to heat, radiation, osmotic changes, nutrient death, etc., have common features preserved in evolution. Seminar deals with regulation and function of stress proteins, including role in development, teratogenesis, immunity, the pathogenic process, and cancer treatment, drawing on literature on bacteria, lower eukaryotes, and mammalian cells.
Enrollment limited to 15. Prerequisite: consent of instructor.
3 units, Spr (Matin, Staff) MWF 4
alternate years, not given 1996-97

4 units, Win (Mocarski) MWF 3:15-4:05

207. Pathogenesis of Infectious Diseases — Emphasis: an understanding of the molecular mechanisms employed by microorganisms to bring about the infection of animal and human hosts. Formal instruction plus class discussion of recent literature pertaining to microbial pathogenicity and normal and acquired host surface mechanisms. Sign-up list requested. Prerequisite: consent of instructor.
3 units, Spr (Relman, Falkow) W 2:15-4:05

209. Molecular Parasitology — Advanced seminar on the molecular biology of parasites, especially protozoa. Topics: trypanosome antigenic variation, transsplicing, RNA editing, malaria vaccines, intracellular parasitism and ultrastructure, viruses, genetics, and cell biology of parasitic protozoa. Prerequisite: Biochemistry 201 or consent of instructor. Recommended: a background in parasitology, e.g., 201.
2 units (Boothroyd, Haldar) alternate years, given 1996-97

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 (Chien, Staff) MWF 1:15
212. 3 units, Spr (Parham, Staff) MWF 11

215. Principles of Biological Technologies — Required of first-year graduate students in Microbiology and Immunology. The principles underlying commonly utilized technical procedures in biological research. Lectures on gel electrophoresis, nucleic acid hybridization, protein purification and stabilization, light microscopy and computer search algorithms for protein and nucleic acid databases. Prerequisites: biochemistry, organic chemistry, and physics.
2 units, Aut (Davis) T 2:30-4:30

299. Directed Reading — Prerequisite: consent of instructor.
18 units maximum, any quarter (Staff) by arrangement

399. Graduate Research — Students who have satisfactorily completed the necessary foundation courses may elect research work in general bacteriology, bacterial physiology and ecology, bacterial genetics, microbial pathogenicity, immunology, parasitology, and virology.
18 units maximum, any quarter (Staff) by arrangement

MOLECULAR AND CELLULAR PHYSIOLOGY

Emeriti: (Professor) Julian M. Davidson
Chair: W. James Nelson
Associate Professor: V. Daniel Madison
Courtesy Professor: Jeffrey J. Wine
Courtesy Associate Professors: Andrew R. Hoffman, Ron R. Kopito, Timothy Meyer, Thomas A. Raffin
Courtesy Assistant Professors: Anson W. Lowe, William Weis

The Department of Molecular and Cellular Physiology is located in the Beckman Center for Molecular and Genetic Medicine.

The creation and growth of the department is a reflection of the rapid development of the field of cellular signaling as it relates to intracellular, intercellular, and interorgan communication. The department has developed a special focus on molecular mechanisms controlling excitability, contraction, secretion, neurotransmission, membrane and axonal transport, and other key physiological processes. The research programs draw on a wide range of techniques including biochemistry, cell biology, electrophysiology, imaging with light or electron microscopy, and molecular genetics. The department teaches physiology to medical and graduate students.

GRADUATE PROGRAMS

The department offers required and elective courses for students in the School of Medicine.
and is also open to other qualified students with the consent of the instructor. Training of medical, graduate, and postdoctoral students is available. The program offers a course of study leading to the Ph.D. degree. No B.S. is offered, and an M.S. is offered only in the unusual circumstance where a student completes the course work, rotation, and the written section of the qualifying exam, but is unable to complete the requirements for the Ph.D.

DOCTOR OF PHILOSOPHY

Students with undergraduate or master's degrees who have completed a year each of college chemistry (including lectures in organic and physical chemistry), physics, calculus, and biology are considered for admission to graduate study. Applicants submit a report of scores from the Graduate Record Examination (verbal, quantitative, analytical, and an advanced subject test in one of the sciences) as part of the application.

Students who do not speak English as their native language must submit scores from TOEFL unless waived by Graduate Admissions, the Registrar's Office.

Study toward the Ph.D. is expected to occupy four to five years, including summers. A minimum of seven quarter-long courses are required. Students take Biochemistry 200 and 201, Molecular and Cellular Physiology 201, and a choice of two out of these three: Neurobiology 200, Biochemistry 200-201, or Structural Biology 200. Students are also required to take a minimum of four advanced seminar courses and the Molecular and Cellular Physiology seminar series. At least three of the student's required courses are more focused advanced graduate-level courses in areas such as molecular and cellular physiology, cellular signaling, cell biology, or pharmacology. Each student presents a journal club to undergraduates, hours and units arranged in consultation. Fields of research open to students are decided in consultation with sponsoring faculty member.

Qualifying Examination—At the end of the second year in residence as a graduate student, each Ph.D. candidate presents a written thesis proposal and a minor proposal to be defended at an oral comprehensive examination. General knowledge of relevant physiology is also tested orally during this examination. The examination may be taken only after all course work has been completed to the required standard. Students undertake individual research studies as early as possible after consultation with their preceptor. Upon passing this exam, the student is advanced to candidacy for the Ph.D.

Dissertation and University Oral Examination—The results of independent, original work by the students are presented in a dissertation. The oral examination is largely a defense of the dissertation.

Advisers and Advisory Committees—A graduate advisory committee, currently Professors Madison, Schwarz, and Smith, advises students during the period before the formation of their qualifying committees.

FINANCIAL AID

Students may be funded by their advisers' research grants, by future training grants, by department funds, or by extramural funds. Students are encouraged to obtain funding from outside sources (for example, NIH, NSF, Hughes, etc.).

COURSES

Course work and lab instruction in the Department of Molecular and Cellular Physiology conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

199. Undergraduate Research—Investigation sponsored by individual faculty members, available to undergraduates, hours and units arranged in consultation. Fields of research open to students are decided in consultation with sponsoring faculty member.

any quarter (Staff) by arrangement

200. Physiology: Cardiovascular—Offered jointly with the Department of Medicine. Lectures, clinical presentations, and lab demonstrations of normal and disordered human cardiovascular physiology. Prerequisite: understanding of general biochemistry.

6 units, Spr (Staff) MTF 8-9:50

201. Physiology: Endocrine—Offered jointly with the Department of Medicine. Lectures, clinical presentations, and demonstrations on normal and disordered human endocrine physiology. Prerequisite: understanding of general biochemistry.

4 units, Win (Hoffman, Scheller) MWF 9-10:50

202, 203, 204. Physiology: Gastrointestinal; 203-Renal; 204-Respiratory—Offered jointly with the Department of Medicine. Lectures, clinical presentations, and demonstrations on normal and disordered function in the gastrointestinal system. Prerequisite: understanding of general biochemistry.

6 units, Aut (202, 1 unit; 203, 3 units; 204, 2 units) (Gastrointestinal: Lowe; Renal: Meyer, Respiratory: Raffin) MW 10-11:50, TTh 11

206. Pathophysiology—Offered jointly with the Department of Medicine. Physiology of disease, emphasizing clinical situations where two or more...
organ systems come together at the molecular, cellular, and organ level. The physiology of individual organ systems and the genetics and physiology of diseases such as cystic fibrosis, muscular dystrophy, and hypertension.

2 units, Win (Tsien) MWF 9-10:50

210. Molecular and Cellular Physiology — Required for all MCP graduate students. Core course for the principles of molecular and cellular physiology. Organized under: single cell physiologic properties, chemical and mechanical transduction, cellular colonization and polarization, and integrative physiology and homeostasis. Each general topic examines the cellular and molecular underpinnings of physiological principles leading to a greater understanding of appropriate systems physiology. Pre-requisite for undergraduates, graduate students not in department, and medical students: consent of instructor.

4 units, Aut (Lewis, Smith) MWF 2:15-4:05 by arrangement

213. Special Topics in Molecular and Cellular Physiology — Seminar of guided reading/discussion in introductory and advanced physiological topics agreed on by an individual instructor and interested students. Prerequisite: consent of instructor. (Staff) by arrangement

215. Synaptic Transmission — Primarily for graduate students with an interest in synaptic function; interested medical students and advanced undergraduates may also enroll. The anatomical, physiological, and biochemical basis of synaptic function in the peripheral and central nervous system. Lectures by the faculty and intensive discussions of relevant research papers.

5 units, Aut (Smith, Schwarz, Madison) T 3:15-4:05, Th 3:15-5:05

216. Ion Channels and Membrane Physiology — (Same as Neurobiology 216.) For students with some background in neurobiology who wish to learn basic mechanisms of signaling in nerve cells. Reading/discussion of original research papers, emphasizing concepts, quantitative analysis of experimental results, and critical evaluation of evidence. Topics: gating mechanisms in voltage sensitive and chemosensitive ion channels and ionic mechanisms in sensory transduction. Student presentations and small group discussions.

3 units (Aldrich, Baylor) alternate years, given 1996-97

218. Transmembrane Signal Transduction — The molecular mechanisms of signal transduction for a variety of structurally and functionally different plasma membrane receptors. Topics: the structure of receptors and the interaction of the receptor protein with the lipid bilayer; ligand binding and ligand mediated changes in receptor structure; and cytosolic, cytoskeletal, and membrane proteins that interact with receptors. Seminar/discussion empha-

sizes recent research developments and examines the value of various experimental approaches for the study of receptors.

2 units, Win (Kobilka) alternate years, not given 1996-97

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 152.) Survey of instruments which use light and other radiation for analysis of cells in biological and medical research. Topics: basic light microscopy through confocal fluorescence and video/digital image processing. Lectures on physical principles; involves partial assembly and extensive use of lab instruments. Prerequisites: some college physics, Biology core.

3 units, Spr (Green, S. Smith) TTh 1:15 plus lab by arrangement

299. Directed Reading — Prerequisite: consent of instructor.

any quarter (Staff) by arrangement

399. Advanced Research — Investigation sponsored by individual faculty members undertaken by interested, qualified medical or graduate students. Research fields include endocrinology, neuroendocrinology, and topics in molecular and cellular physiology.

any quarter (Staff) by arrangement

MOLECULAR PHARMACOLOGY

Emeriti: (Professors) Robert H. Dreisbach, Avram Goldstein, Dora B. Goldstein
Chair: James P. Whitlock, Jr.
Professors: Terrence Blaschke (jointly with Medicine), Helen M. Blau, Oleg Jartdetzky, Tag E. Mansour, Richard A. Roth, James P. Whitlock, Jr.
Associate Professors: Phyllis Gardner (jointly with Medicine), Daria Mochly-Rosen
Assistant Professors: James E. Ferrell, Jr., Garry P. Nolan
Courtesy Professors: Brian Hoffman, Kenneth Melmon
Courtesy Assistant Professor: Leslie Lenert
Consulting Professors: Gordon Ringold, Alejandro Zaffaroni
GRADUATE PROGRAMS

The Department of Molecular Pharmacology offers interdisciplinary training in molecular and cellular biology, genetics, and biochemistry in preparing students for independent careers in biomedical science. Research and training in the department focuses on the mechanisms by which hormones, drugs, and toxic compounds alter cell function. At the heart of these issues lies the analysis of cell signaling and gene expression.

The program leading to the Ph.D. degree includes formal and informal study in pharmacology, biochemistry, genetics, physiology, neuroscience, and computer science. First-year students spend one quarter in each of three different laboratories, working closely with other graduate students, a professor, and postdoctoral fellows on various research projects. During the fourth quarter, the student chooses a faculty mentor with whom to undertake thesis research, based on available positions and the student's interest. During or before the eighth quarter of study, students must pass a qualifying exam which consists of an oral exam on general knowledge and a defense of a research proposal. Course requirements are fulfilled during the first two years of study; the later years of the four- to six-year program are devoted to full-time dissertation research. Close tutorial contact between students and faculty is stressed throughout the program.

Students in the Ph.D. program may apply for an M.S. degree, having satisfactorily completed the course and laboratory requirements of the first two years. The degree also requires a written thesis based on literature or laboratory research. Postdoctoral research training is available to graduates having the Ph.D. or M.D. degree. Research opportunities also exist for medical students and a limited number of undergraduate students. The limited size of the labs in the department allows for close tutorial contact between students, postdoctoral fellows, and faculty.

The department presents two basic courses in medical pharmacology (201 and 202) and advanced courses open to qualified medical and other graduate students. Consult the Time Schedule for additional advanced courses.

COURSES

Course work and lab instruction in the Department of Molecular Pharmacology conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

BASIC

201 and 202 provide a broad exposure to the principles of pharmacology and the properties of the major drug groups.

201. Pharmacology — Topics: receptors, pharmacokinetics, and autonomic, CNS, and cardiovascular pharmacology. Emphasis is on the mechanisms of drug action in humans. Prerequisite: biochemistry.

5 units, Aut (Staff) MTWTh 8 F 11


5 units, Win (Staff) MTWTh 8 F 11

ADVANCED

Open to all University students; instructor's consent required prior to registration. These courses require a good knowledge of physiology and biochemistry and sometimes of microbiology or genetics. Students should consult with the instructor about the adequacy of their preparation.


4 units (Ferrell, Staff) alternate years, given 1996-97

225. Frontiers of Pharmacology: Principles of Action of Chemotherapeutic Agents against Infection — Chemistry and biotechnology students with consent of instructor, auditors welcome. Emphasis is on the selective effect of these agents against bacteria, viruses, parasitic protozoa, helminths, and cancer; how advances in the study of the biochemistry and molecular biology of invading organisms and cancer cells revolutionized our understanding of the chemotherapeutic effects of these agents. Topics: major metabolic differences between invading organisms and the mammalian host, targets that are unique to these organisms or are significantly different from their homologues in the host, neurobiology of parasitic helminths and selective effect of chemical agents against parasite neuromuscular functions, resistant strategies developed by these organisms and cancer cells to evade the effect of chemotherapeutic agents. Lectures, discussions, readings in current literature. Prerequisite: Biochemistry 200 or Biology 31 or equivalent.

2 units, Win (Mansour) T 3:15

231. Gene Therapy — Cell mediated gene therapy as a novel form of drug delivery. Vectors, cell types, and relevant genetic and acquired diseases are discussed in a series of lectures, and student and guest
presentations. Prerequisites: biochemistry and molecular biology.

2 units (Blau)
alternate years, given 1996-97

240. Drug Discovery — The scientific principles and technologies involved in making the transition from a basic biological observation to the creation of a new drug, with emphasis on molecular and genetic issues.

3 units, Spr (Mochly-Rosen, Staff)

270. Research Seminar — Weekly seminars on current research in pharmacology. Seminars are reviewed and discussed in a separate conference with a member of the faculty.

2 units, Aut Win, Spr (Staff) ThF 12

280. Tutorial Program — Primarily for graduate students in pharmacology. Guided readings in the literature of any area of pharmacology. A critical review paper may be required.

any quarter (Staff) by arrangement

299. Directed Reading
any quarter (Staff) by arrangement

399. Research
any quarter (Staff) by arrangement

NEUROBIOLOGY

Chair: Denis A. Baylor

Professors: Denis A. Baylor, Eric I. Knudsen,
Uel J. McMahan, William T. Newsome, Howard Schulman, Eric M. Shooter, Lubert Stryer

Graduate Program

Graduate students in the Department of Neurobiology obtain the Ph.D. degree through the interdepartmental Neuroscience 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 conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

COURSES

The department offers a one-quarter course (Neurobiology 200) on the structure and function of the nervous system, which is open to medical and graduate students, and advanced undergraduates. Advanced courses are open to students who have completed the basic course.

199. Directed Reading (Undergraduate) — Pre-requisite: consent of instructor.

1-18 units, any quarter (Staff) by arrangement

200. The Nervous System — Introduction to the structure and function of the nervous system, including neuroanatomy, neurophysiology, and neurochemistry. Topics range from the properties of neurons to the mechanisms and organization underlying higher functions. Coherent framework prepares for general work in neurology, neuropathology, clinical medicine, and for more advanced work in neurobiology. Lecture and lab components must be taken together.

9 units, Win (Barres, Baylor, Knudsen, McMahan, Newsome, Schulman, Shooter, Stryer) MF 1:15-3:05
TTh 9 W 1:15-5:05

211. Molecular Basis of Learning and Memory — Modulation of signal transduction in the nervous system. Model systems used in the study of neuronal plasticity include Aplysia, Drosophila, and mammalian hippocampus. Lectures/discussion. Prerequisites: Biochemistry 200, Biological Sciences 254, or equivalent.

4 units (Schulman)
alternate years, given 1996-97

216. Ion Channels and Membrane Physiology — (Same as Molecular and Cellular Physiology 216.) For students with some background in neurobiology who wish to learn basic mechanisms of signaling in nerve cells. Reading/discussion of original research papers, emphasizing concepts, quantitative analysis of experimental results, and critical evaluation of evidence. Topics: gating mechanisms in voltage sensitive and chemosensitive ion channels and ionic mechanisms in sensory transduction. Student presentations and small group discussions.

3 units (Aldrich, Baylor)
alternate years, given 1996-97

217. Synaptogenesis and Synaptogen — Seminar evaluating current views on the sequence of steps and mechanisms involved in synapse formation. Emphasis is on the neuromuscular synapse; its development in the embryo and its regeneration in
the adult. Students read original articles, write summaries, and present them for discussion.

4 units (McMahan)
alternate years, given 1996-97

218. Neural Basis of Behavior — Advanced seminar exploring principles of information processing by the central nervous system of vertebrates, and the relationship of functional properties of neural systems with perception and behavior. Emphasis is on visual and auditory systems. Study of original papers, directed group discussions, and student presentations. Prerequisite: 200 or consent of instructor.

4 units (Knudsen, Newsome)
alternate years, given 1996-97

230. Signal Transduction Mechanisms — Molecular mechanisms of transduction of sensory and hormonal stimuli by prokaryotes and eukaryotes. Topics: bacterial chemotaxis and phototaxis; vision in invertebrates and vertebrates; olfaction; and hormonal actions mediated by G-proteins, e.g., adenylate cyclase cascade and the phosphoinositide cascade; molecular evolution of transducing proteins. The structure and interplay of receptors, enzymes, and ion channels mediating these processes. Experimental approaches include gene cloning and site-specific mutagenesis, isolation and reconstitution of functional transducing assemblies, and patch clamping and other electrophysiological methods. Emphasis is on recurring motifs of excitation and adaptation, and transduction and their evolution.

4 units (Stryer)
alternate years, given 1996-97

299. Directed Reading — Prerequisite: consent of instructor.
1-18 units, any quarter (Staff) by arrangement

300. Professional Development and Integrity in Neuroscience — Required of Neurosciences Ph.D. students every quarter. Develops professional skills in critical assessment and oral presentation of findings from current neuroscience literature in visual presentation of quantitative data and writing research grants. The role of animals in lab research, fraud in science, responsibility of authors and reviewers, science in a multicultural environment, and the relationship between student and mentor. Student and faculty presentations and discussions.

2 units, Aut, Win, Spr (Schulman) T12

399. Individual Research — Prerequisite: consent of instructor.
1-18 units, any quarter (Staff) by arrangement
Psychiatry and Behavioral Sciences: William C. Dement (Professor), Judith Ford (Associate Professor, Research), Edith Sullivan (Associate Professor, Research)

Psychology: Russell D. Fernald (Professor), John Gabrieli (Assistant Professor), David Heeger (Assistant Professor), David E. Rumelhart (Professor), Brian Wandell (Professor), Jeffrey J. Wine (Professor)

GRADUATE PROGRAM

DOCTOR OF PHILOSOPHY

The interdepartmental Neurosciences Program offers instruction and research opportunities leading to a Ph.D. in Neurosciences. The requirements for a Ph.D. degree follow those of the University and in addition are tailored to fit the background and interests of the student. Accepted students receive an award covering tuition and a living stipend. Qualified applicants should, where possible, apply for the predoctoral fellowships in open competition, especially those from the National Science Foundation and the Howard Hughes Medical Institute. December 15 is the deadline for receipt in the Neurosciences Program Office of applications with all supporting material.

Applicants should familiarize themselves with the research interests of the faculty and indicate their preferences clearly on the application form. Since students enter with differing backgrounds and the labs in which they may elect to work cover several different disciplines, the specific program for each student is 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. At least one course must be taken in five of the following six categories: Clinical Neurosciences, Computational Neuroscience, Developmental Neuroscience, Integrative and Behavioral Neurosciences, Membrane Excitability, and Neuronal Communication.

Students usually rotate through several labs during their first year, although they may choose to begin thesis research on entry. Required course work should be completed by the end of the second year. Passing of a comprehensive oral preliminary examination given by the student’s advisory committee is required for admission to Ph.D. candidacy. This examination is usually taken by the end of the second year. The student is required to present a Ph.D. dissertation which is the result of independent investigation contributing to knowledge in an area of neuroscience and to defend his or her dissertation in a University oral examination, which includes a public seminar.

Medical students may participate in this program provided they meet the prerequisites and satisfy all the requirements of the graduate program as listed above. The timing of the program may be adjusted to fit their special circumstances.

COURSES

Course work and lab instruction in the Neurosciences Program conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

The course selections of individual departments participating in the Neurosciences Program should also be consulted for complete offerings.

399. Research — Prerequisite: consent of instructor.
1-18 units, any quarter (Staff)
by arrangement

BIOLOGICAL SCIENCES

158/258. Developmental Neurobiology — (Graduate students register for 258.)
4 units (McConnell)
alternate years, given 1996-97

209. Advanced Neurosciences Laboratory
4 units, Win (Heller, Grahn) W 1:15-5:05

333H. Molecular Approaches to Ion Channels
6 units, Sum (Gilly) by arrangement

358. Seminar in Developmental Neurobiology
1 unit, Aut, Win, Spr (McConnell) F 4

MOLECULAR AND CELLULAR PHYSIOLOGY

215. Synaptic Transmission
5 units, Aut (Smith, Schwarz, Madison)
T 3:15-4:05, Th 3:15-5:05

218. Transmembrane Signal Transduction
2 units, Win (Kobilka) Th 2:15-4:05

MOLECULAR PHARMACOLOGY

201. Pharmacology
5 units, Aut (Staff) MTWTh 8 F 11

NEUROBIOLOGY

200. The Nervous System
9 units, Win (Barres, Baylor, Knudsen, McMahan, Newmose, Schulman, Shooter, Stryer) MF 1:15-3:05, TTh 9, W 1:15-5:05

211. Molecular Basis of Learning and Memory
4 units (Schulman)
alternate years, given 1996-97

216. Ion Channels and Membrane Physiology — (Same as Molecular and Cellular Physiology 216.)
3 units (Aldrich, Baylor)
alternate years, given 1996-97

217. Synaptogenesis and Synaptogen
4 units (McMahan)
alternate years, given 1996-97
218. Neural Basis of Behavior  
4 units (Knudsen, Newsome)  
alternate years, given 1996-97

230. Signal Transduction Mechanisms  
4 units (Stryer)  
alternate years, given 1996-97

300. Professional Development and Integrity in Neuroscience  
2 units, Aut, Win, Spr (Schulman) T12

NEUROLOGY AND NEUROLOGICAL SCIENCES

205. Clinical Neuroscience — Case demonstrations of selected disorders, discussion of the pathophysiological basis of the disorder, presentation of the basic principles underlying the modern diagnostic and therapeutic management, and a discussion of recent research advances for each disease entity.  
2 units, Win (Staff)

PSYCHOLOGY

201. Cognitive Neuropsychology  
1-3 units, Win (Gabrieli) WF 1:15-2:15  
alternate years, not given 1996-97

203. Foundations of Vision  
1-3 units, Win (Wandell) MW 11-12:15  
alternate years, not given 1996-97

206. Behavioral Neuroscience  
1-3 units (Wandell, Wine)  
alternate years, given 1996-97

228. Ion Transport and Intracellular Messengers  
1-3 units, Spr (Wine) M 7-9:30 p.m.

262. Memory Systems  
1-3 units, Spr (Gabrieli) TTh 2:15-3:30  
alternate years, not given 1996-97

265. Parallel Distributed Processing: Explorations in the Microstructure of Cognition  
1-3 units (Rumelhart)  
alternate years, given 1996-97

266. Topics in Perception  
1-2 units (Heeger) not given 1995-96

276. Computational Neuroscience  
1-3 units, Win (Heeger, Rumelhart)  
TTh 11-12:15  
alternate years, not given 1996-97

PATHOLOGY

Emeriti: (Professors): Margaret E. Billingham, Ronald F. Dorfman, Lysia K. Forno, David Glick  
Chair: Klaus G. Bensch  

Associate Professors: Eugene C. Butcher, Michael L. Cleary, P. Joanne Cornbleet, Steven K. H. Fong, Joseph S. Lipsick, Robert V. Rouse, Bruce R. Smoller, Raymond A. Sobel, Alan Ting  
Assistant Professors: Gerald J. Berry, R. Eric Davis, Susan A. Gale, Sharon M. Geaghan, Onsi W. Kamel, Teri A. Longacre, Sara A. Michie, Kent W. Nowels, Donald P. Regula, James L. Zehnder

Professor (Research): Lawrence F. Eng  
Professors (Clinical): Dikran S. Horoupian, Jon C. Kosek

Courtesy Assistant Professor: Julie A. Neidich  
Lecturer: Glen B. Haydon  
Acting Assistant Professor: Jeffrey L. Twiss  
Visiting Associate Professor: Albert C. Yu

Clinical Professors: James L. Bennington, John T. Differding, Seth L. Haber, Paul L. Herrmann, John E. McNeal, Mahendra Ranchod  
Clinical Associate Professors: Robert W. R. Archibald, Stephen S. Chen, Barbara M. Egbert, Steven Levine, Charles M. Lombard

Staff Physician and Clinical Associate Professor: Maie E. Herrick

Clinical Assistant Professors: Stephen Bell, Robert M. Cardelli, Meredith Halks-Miller, James E. Meeker, William C. Pitts, Thomas W. Rogers, Jon C. Ross, William W. Ruehl, Charles T. Uyeda, Sharon H. Van Meter

Staff Physicians and Clinical Assistant Professors: Maritza Gonzalez, J. Matt van de Rijn

PROGRAMS OF STUDY

The Department of Pathology offers a sequence of basic courses in general pathology and special pathology, including neuropathology, which is open to medical students only. Interested and qualified graduate students may petition the course director to audit the lecture portion of these courses. In addition, there are a number of advanced courses in selected aspects of pathology. The department does not offer advanced degrees in pathology, but qualified graduate students who are admitted to the Biophysics Program, the Cancer Biology Program, or other interdepartmental programs may elect to pursue their thesis requirements in the research laboratories of the Department of Pathology. The discipline of pathology has traditionally served as a bridge between the preclinical and clinical sciences and is concerned with the application of advances in the basic biological sciences, both to the diagnosis of disease in man and to the elucidation of the mechanisms of normal molecular, cellular, and organ structure and function that manifest
in the electron microscope image. At present, investigation in the department includes basic studies in different areas utilizing molecular biological, biochemical, and cell biological techniques: DNA replication in yeast and cultured eukaryotic cells, identification and pathogenetic role of chromosomal aberrations in human malignancies and mechanisms of activation of oncogenes in human and animal cells, lymphocyte and neutrophil-interactions with endothelial cells, cell type specification and signal transduction pathways leading to specific gene expression; cytoskeletal architecture, cell-matrix interaction, developmental biology of hematopoietic stem cells and thymus, regulation of the immune system, mechanisms of immune and other responses in the central nervous system. In addition, a variety of studies focus on the development of novel diagnostic and immunotherapeutic treatment modalities and techniques for solid tumors, lymphomas, HIV, and genetic diseases. Research training in all of these areas is available for qualified medical and graduate students by individual arrangement with the appropriate faculty member. A summary of the research interests of the department faculty in available on request.

COURSES

Course work and lab instruction in the Department of Pathology conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

205. Clinical-Pathological Correlations — Correlation of clinical histories with surgical and autopsy material, including microscopy. Maximum enrollment 12, minimum 5.
   2 units, Win (Kosek, Fajardo, Forno, Chen, Rouse) MF 3:15-5:15

207. Principles of Electron Microscopy — Seminar on basic optics, specimen as an optical device, nature of image contrast, image detection and interpretation, related photographic principles, specimen preparation and requirements, fixation, embedding, micrometry, staining, and some special techniques.
   1 unit, Aut, Win, Spr (Haydon) by arrangement

208. Interpretation of Electron Micrographs — Seminar on principles of electron optical image formation as applied to the interpretation of biological ultrastructure. Development of the wave mechanical description of the various sources of contrast in the electron microscope image.
   1 unit, Spr (Haydon) by arrangement

213. Gross Autopsy Pathology Laboratory — Students examine and discuss unfixed dissected organs from current autopsies and correlate morphologic findings with the clinical history. Students may view postmortem examinations and (alone or in a small group), for an extra unit participate in one postmortem examination with the assistance of residents and staff, and present the case to class. Class time scheduled by consensus at first meeting (listed below). Prerequisite: currently taking or previously completed 230B or C.
   2-3 units, Aut, Win (Regula, Staff) F 12:30

220. Immunology — (Same as Microbiology and Immunology 200.) Principally for medical and graduate students but may be taken by advanced undergraduates. Immunology as related to medicine is emphasized. Prerequisites: basic principles of genetics and introductory courses in biochemistry (equivalent to 200-201) and histology.
   3 units, Spr (Weissman, McDevitt, Goodnow) MWF 10

220A. Problem Solving in Immunology — (Same as Microbiology and Immunology 200A.) Direct experience in understanding immunology using problems. Three to five problems are corrected and discussed weekly. Corequisite: 220 or Microbiology and Immunology 200.
   1 unit, Spr (Weissman, McDevitt, Goodnow) by arrangement

230A,B,C. General and Special Pathology — Three-quarter introduction to principles in general pathology and a detailed pathology of human disease based on disordered structure and function of individual organ systems (special pathology). Lecture and lab discussion groups. Course Director: Regula.
   230A. General and Special Pathology
      6 units, Spr (Regula, Rouse, Staff) MWF 1:15-3:15
   230B. Special Pathology
      6 units, Aut (Regula, Lombard, Staff) MW 11-12, TTh 9-11
   230C. Special Pathology
      6 units, Win (Regula, Hendrickson, Horoupian, Staff) MW 11-12, TTh 9-11

281. Practical Introduction to Electron Microscopic Techniques — Lab providing, through tutorial direction in the completion of two products, basic familiarity with the major technical problems encountered in the preparation of biological material for electron microscopy. Prerequisite: basic understanding of electron microscopy.
   1-4 units, Aut, Win, Spr (Haydon) by arrangement

290. Research in Experimental Neuropathology — Introduction to research methods in experimental neuropathology for students interested in a long-term project in this area. Participation in research under the close supervision of a staff member
in neuropathology. Facilities available include electron microscopy, tissue culture, neurochemistry and immunocytochemistry with antibody and molecular probes. Prerequisite: consent of instructor.

1-18 units, Spr (Eng, Forno)

292. DNA Repair and Mutagenesis — (Enroll in Biology 205.)

3 units (Hanawalt) alternate years, given 1996-97

299. Directed Reading — Prerequisite: consent of faculty member.

1-18 units, any quarter (Staff) by arrangement

399. Research — Department faculty are involved in active research programs at the Stanford Medical Center. Students interested in research at the molecular, cellular, and clinical-pathologic levels are encouraged to seek out faculty advisers. The department is equipped for modern research and maintains an active and vigorous postdoctoral research training program. Prerequisite: consent of the instructor.

1-18 units, any quarter (Staff) by arrangement

RADIATION ONCOLOGY

Emeriti: Malcolm A. Bagshaw, Peter Fessenden, George M. Hahn, Robert F. Kallman, Clarence J. Karzmark, Kendric Smith

Chair: Richard T. Hoppe


Associate Professors: Steven L. Hancock

Assistant Professors: Susan J. Knox, Joseph C. Poen, Melanie C. Smit

Assistant Professor (Research): Amato J. Giaccia

PROGRAMS OF STUDY

Radiation Oncology is a discipline focused around the use of radiation for both cancer therapy and research. The fundamental and applied research within the department reflects this spectrum in radiation therapy and clinical oncology, and in radiation and tumor biology.

The department does not offer degrees; however, its faculty teach a variety of courses open to medical students, graduate students, and undergraduates. The department also accepts students in other curricula as advisees for study and research. Graduate students in the Biophysics Program and in the Cancer Biology Program may perform their thesis research in the department. Undergraduate students may also arrange individual research projects under the supervision of the faculty.

At the present time, the major areas of basic research investigation in the department include: DNA repair in mammalian cells after ionizing irradiation; effects of heat, drugs, and radiation on the killing and repair of mammalian cells both in vitro and in vivo; studies of genes induced by ionizing radiation and by hypoxia; studies of the mechanism of tumor hypoxia in animal tumors; development of new anti-cancer drugs to exploit tumor hypoxia; cytogenetic and molecular methods of predicting the sensitivity of individual tumors to cancer therapy; radiolabeled monoclonal antibodies for cancer detection and treatment; studies of oxygen levels in human tumors using polarographic electrodes: clinical trials of new hypoxic cytotoxic agent (tirapazamine).

COURSES

Course work and lab instruction in the Department of Radiation Oncology conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog. The following are open to undergraduate and postgraduate students.

101. Selected Readings in Radiation Biology

Aut, Win, Spr (Staff) by arrangement

202. The Basic Science of Radiation Therapy — Primarily for residents or fellows in the Radiation Therapy division training program; open to medical or graduate students. Focus is on the basic biological processes underlying the treatment of malignant disease by radiation. Prerequisites: some familiarity with cell biology and physiology, and consent of instructor.

1 unit, Aut, Win, Spr (Brown) Th 8


3 units (Staff) alternate years, not given 1996-97

299. Directed Reading

any quarter (Staff) by arrangement

399. Research

any quarter (Staff) by arrangement

RADIOLOGY


Chair: Gary M. Glazer


Associate Professors: Richard A. Barth, Robert J. Herfkens, Barton Lane, Robert E. Mindelzun, Michael E. Moseley, Matilde Nino-Murcia, Norbert J. Pelc, George Segall, F. Graham Sommer
Assistant Professors: A. Gabrielle Bergman, Robyn L. Birdwell, Francis Blankenberg, Michael Dake, John Drace, Debra M. Ikeda, Ann N. C. Leung, King C. P. Li, Michael Marks, Sandy A. Napel, Alexander Norbash, Eric Olcott, Geoffrey D. Rubin, Charles P. Semba, Daniel M. Spielman

**Courtesy Assistant Professor:** Dwight G. Nishimura

The Department of Radiology does not offer degrees; however, its faculty teach a variety of courses open to medical students, graduate students, and undergraduates. The department also accepts students in other curricula as advisees for study and research. Undergraduate students may also arrange individual research projects under the supervision of the department’s faculty.

This discipline focuses on the use of radiation, ultrasound, and magnetic resonance as diagnostic, therapeutic, and research tools. The fundamental and applied research within the department reflects this broad spectrum as it relates to anatomy, pathology, physiology, and interventional procedures. Original research and development of new clinical applications in medical imaging is supported within the Radiological Sciences Laboratory.

Courses open to undergraduate and postgraduate students are listed below.

**COURSES**

**101. Selected Readings in Radiology Research**
Aut, Win, Spr (Staff) by arrangement

**208. Experimental Nuclear Medicine** — Computer applications in medicine, particularly use of radioisotopes as tracers. Recommended: some knowledge of physiology and calculus.

Spr (Strauss) by arrangement

**237. Medical and Societal Aspects of Modern War and the Arms Race** — One-day course covers nuclear weapons and the nuclear arsenal; chemical and biological weapons; medical consequences including radiation, blast and burn injuries, and psychological effects; the economic and societal effects of the arms race.

1 unit (Jones, Staff)

**299. Research**
any quarter (Staff) by arrangement

---

**STRUCTURAL BIOLOGY**

Chair: Michael Levitt
Professors: Roger D. Kornberg, Michael Levitt, David B. McKay, Peter Parham
Assistant Professor: William Weis
Associate Professor (Teaching): Patricia Cross

The department offers opportunities for course work and research in cell biology. Courses fall in two categories: (1) a series of one-quarter courses that treat special topics of current interest in cell biology at an advanced level; and (2) Structure of Cells and Tissues, a one-quarter course tailored to the needs of medical students that includes both lectures on structure-function relationships of mammalian cells and tissues, and a lab on medical histology.

The emphasis of research in the department is on understanding fundamental cellular processes in terms of the structure and function of organelles and molecular assemblies. Techniques used include standard methods of biochemistry, genetic engineering, and cell culture, as well as image processing and three-dimensional reconstruction from electron micrographs, x-ray and electron diffraction, fluorescence microscopy, nanosecond fluorescence spectroscopy, and microinjection of cells and nuclei. The department owns and operates a computing center equipped with advanced time-sharing and color graphics systems for data analysis and molecular modeling.

The graduate program in Structural Biology leads to the Ph.D. degree. The department also participates in the Medical Scientists Training Program in which individuals are candidates for both the Ph.D. and M.D. degrees.

The graduate program is intended to prepare students for careers as independent investigators in cell and molecular biology. The principal requirement of a Ph.D. degree is the completion of research constituting an original and significant contribution to the advancement of knowledge. In addition, students are required to enroll in the series of special topics courses taught by the faculty of the department. Finally, students gain teaching experience by assisting in the one-quarter courses offered by all faculty in the department.

Applicants to the program should have a bachelor’s degree and should have completed at least a year of course work in mathematics, physics, organic chemistry, physical chemistry, and biochemistry. Application forms must be received by the department before January 1 for notification by April 15. Application to the National Science Foundation for fellowship support is also encouraged. Remission of fees and a personal stipend are available to graduate students in the department. Prospective applicants should write to the Department of Structural Biology for further information.

Current topics of research in the department lie in the areas of gene expression; theoretical, crystallographic, and genetic analysis of protein structure; signal transduction; and cell-cell interaction.

Course work and lab instruction in the Department of Structural Biology conform to the Policy
on the Use of Vertebrate Animals in Teaching Activities as stated in the back of this catalog.

**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)

**228. Protein and Nucleic Acid Structure, Dynamics, and Engineering** — The availability of three-dimensional atomic structures of proteins and nucleic acids allows interpretation of biological processes based on the physical and chemical properties of these molecules. Crystallographic studies: structural themes exemplified by local chain conformation, secondary structure, domains, families of folds, protein folding and thermodynamic stability. How these structures move is considered by combining results of experiment with theoretical molecular dynamics simulations. Enzyme catalysis is described in these terms. How these structures can be changed to engineer novel molecules from the experimental and predictive aspects; use of interactive computer graphics programs to illustrate problems. Systems include protein-nucleic acid complexes and antibody-antigen interactions. Prerequisites: knowledge of basic biochemistry and cell biology.

- 3 units, Win (Levitt)

**229. The Eukaryote Chromosome** — Principles of chromosome structure and function. Topics: structure, dynamics, and topological forms of DNA; units and hierarchies of DNA coiling in chromosomes; centromeres, telomeres, and the basis of chromosome maintenance and sorting in mitosis; the mechanism of gene activation, with regard to enhancer, promoter, and terminator sequences; basis of sequence-specific protein-DNA interaction; organization and assembly of the cell nucleus. Prerequisites: knowledge of basic biochemistry and cell biology.

- 3 units, Spr (Kornberg)

**232. Macromolecular Structure: Diffraction Methods and Diffraction Results** — General methods and notable accomplishments of x-ray crystallography and solution scattering. Methodology topics: small-angle scattering, fiber diffraction, and x-ray crystallography at a level that makes current literature in the field understandable to the non-practitioner. Protein folding patterns, enzymology, receptor-effector systems, proteins of the immune system, and membrane proteins. Prerequisite: knowledge of basic biochemistry.

- 3 units, Win (Weis, McKay)

**237. Introduction to Biotechnology** — (Same as Biochemistry 237, Biology 237, Biophysics 237, Chemical Engineering 237, Chemistry 237, Civil Engineering 237, Developmental Biology 237.) Faculty from the Departments of Biochemistry, Biological Sciences, Chemical Engineering, Chemistry, Civil Engineering, Developmental Biology, Structural Biology, and invited industrial speakers review the interrelated elements of modern biotechnology. Topics: protein structure and dynamics, protein engineering, biocatalysis, gene expression, cellular metabolism and metabolic engineering, fermentation technology, and purification of biomolecules. Prerequisite: graduate student or upper-division undergraduate in the sciences or engineering.

- 3-5 units, Spr (Robertson) TTh 2:15-3:30 F 3:15-4:30

**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)

---

**SURGERY**

The following Anatomy courses are open to undergraduates. For graduate and Medical School course offerings, see the Stanford University bulletin *School of Medicine.*

**COURSES**

**101. A Regional Study of Human Structure** — The morphology of the trunk and extremities. Lectures in regional anatomy, dissection of the human body, and student presentations. Goal is to learn the anatomy of the area through the dissection process, and to present this information to each other during the presentation period. Enrollment limited to 32.

- 7 units, Win (Dolph, Glasgow) MWF 1:15-5:05

**101A. A Regional Study of Human Structure** — Covers the head and neck portion of the cadaver. Lectures followed by head and neck dissection. Enrollment limited to 32.

- 5 units, Spr (Dolph) TTh 1:15-5:05
INDEPENDENT RESEARCH LABORATORIES, CENTERS, AND INSTITUTES

Vice Provost and Dean of Research and Graduate Policy: Charles H. Kruger
Associate Dean of Research: H. Craig Heller
Associate Dean of Graduate Policy: George G. Dekker

Independent Research Laboratories, Centers, and Institutes perform multidisciplinary research that extends beyond the scope of any one of the organized schools of the University.

The following report to the Vice Provost and Dean of Research and Graduate Policy:
Center for Economic Policy Research
Center for Materials Research
Center for the Study of Language and Information
Edward L. Ginzton Laboratory
W. W. Hansen Experimental Physics Laboratory
Institute for Research on Women and Gender
Stanford Center for Chicano Research
Stanford Center for Organizations Research
Stanford Humanities Center

The Hoover Institution on War, Revolution and Peace and the Stanford Linear Accelerator Center report to the President and Provost. SLAC is independently operated under a contract with the Department of Energy.

Following is a description of the activities of each of these organizations including the research activities and, where applicable, courses offered.

STANFORD CENTER FOR CHICANO RESEARCH

Director: Luis R. Fraga
Associate Director: Charlene Aguilar
Fellows: 26 affiliated faculty

The Stanford Center for Chicano Research (SCCR) is a research unit at the University and a member of the Inter-University Program (IUP) supported by the Ford Foundation. The IUP includes eight national research centers.

The purpose of the center is to examine information and provide perspectives on a variety of critical issues to enhance dialogue between the research community and the public.

SCCR Faculty Fellows from disciplines such as anthropology, business, education, engineering, history, literature, medicine, and political science collaborate on interdisciplinary research projects. Associate Fellows linked to other academic or community institutions in the United States, Mexico, and Puerto Rico are affiliated with the center and contribute additional expertise and perspective to projects. The research examines a variety of projects issues such as child development, poverty, health, cultural identity, and voting rights. The common thread that draws researchers to the center is a focus on issues and policy that affect Chicanos and other Latinos in American society.

CENTER FOR ECONOMIC POLICY RESEARCH

Director: Gavin Wright
Deputy Director: Ed Steinmueller

The primary mission of the Center for Economic Policy Research (CEPR) is to encourage and support research on economic policy issues of lasting importance. CEPR pursues four interrelated goals in support of this mission: (1) stimulating graduate student and faculty research on economic policy issues of continuing importance; (2) communicating its findings broadly; (3) building a community of scholars conducting research on policy issues; and (4) linking the policy community at Stanford with decision makers in business, government, and academia.

CEPR is a University-wide research center, involving individuals from most schools and many departments. Affiliated faculty and students maintain appointments in their home departments while working on CEPR projects. In addition, scholars visiting from other institutions may apply for affiliation with CEPR.

CEPR conducts workshops, conferences, and other events designed to improve the flow of economic policy information among people with diverse institutional and professional backgrounds. It also publishes a newsletter available to members of the Stanford community on request.

CEPR does not offer courses for academic credit, admit students, or award degrees.
EDWARD L. GINZTON LABORATORY

Director: Gordon S. Kino
Associate Director: Marilyn A. Elverson
Emeriti: (Professors) Bertram A. Auld, Marvin Chodorow, C. Chapin Cutler, T. H. Geballe, Conyers Herring, Richard H. Pantell, H. John Shaw
Associate Professor: Constance Chang-Hasnain (Electrical Engineering)
Professors (Research): B. T. Khuri-Yakub (Electrical Engineering), Calvin F Quate (Electrical Engineering)
Associate Professor (Research): Martin M. Fejer (Applied Physics)
Visiting Associate Professor: Byoung Y. Kim (Electrical Engineering)

The Ginzton Laboratory houses the research activities of a number of faculty members from the Departments of Applied Physics, Electrical Engineering, Materials Science and Engineering, and Physics. The multidisciplinary foundations of faculty, students, and research provide a dynamic academic environment for a broad spectrum of scientific research including acoustic and optical techniques for semiconductor measurements, fiber optics, high temperature superconductors, laser physics, mesoscopic devices, picosecond optical electronics, squeezed light, scanning optical microscopy, and tunneling and force microscopy.

W. W. HANSEN
EXPERIMENTAL PHYSICS LABORATORY (HEPL)

Director: Mason R. Yearian
Associate Director: Robert A. Farnsworth
Assistant Director: Robin J. Maslin
Associated Faculty: B. Cabrera (Physics), C. W. F. Everitt (HEPL), J. Lipa (Physics), P. Michelson (Physics), B. Parkinson (Aeronautics and Astronautics), P. Scherrer (Applied Physics), H. A. Schwettman (Physics), T. Smith (Physics), J. Turneautre (Physics), A. Walker (Physics and Applied Physics), M. Yearian (Physics)

HEPL is engaged in basic research in high energy physics, astrophysics, accelerator physics, and low temperature physics, which currently includes experiments involving superconducting accelerators and free electron lasers, detection of gravity waves and experiments in space for tests of relativity, gamma-ray and x-ray astronomy, and low temperature physics.

STANFORD HUMANITIES CENTER

Director: Keith M. Baker
Associate Director: to be announced

The Stanford Humanities Center promotes humanistic research and education at Stanford and nationally. Its programs include (1) fellowships for advanced research by faculty (from Stanford and other institutions); (2) fellowships for advanced Stanford graduate students; and (3) public presentation, through lectures, colloquia, conferences, and publications, of new work in the humanities, especially work of an interdisciplinary nature.

The center provides fellowships for Stanford faculty (internal fellows), faculty from other universities (external fellows), and advanced Stanford graduate students. All fellows are in residence during the academic year and meet regularly.

Faculty fellows, selected on the basis of an open competition, pursue their own research and contribute to the intellectual life of the Stanford community by giving department courses or by leading other activities. The courses given by fellows in 1995-96 are shown below:

COURSES
CLASSICS
411. Ancient Literary Criticism
4-5 units, Win (Porter)

COMPARATIVE LITERATURE
262. Colloquium: Dissident Sexualities
5 units, Aut (Bristow)

DRAMA
151. Performance and the Body Politic
4 units, Aut (Elam, Rehm)
153. Performance and the Mind
4 units, Spr (Lyons, Rehm)
ENGLISH
163M. The Literature and Culture of the Crusades
5 units, Win (Heng)

HISTORY
498. Japanese Historical Texts
4-5 units, Win (Mass)

PHILOSOPHY
288. The Concept of Objectivity
3 units, Spr (Kraut)

RELIGIOUS STUDIES
231. The Bible in Fiction, Fiction in the Bible
4-5 units, Aut (Bach)

THE INSTITUTE FOR INTERNATIONAL STUDIES (IIS)

Director: Walter P. Falcon
Deputy Director: Nancy Okimoto
Associate Director: Brigitt Carnochan (External Affairs)

The Institute for International Studies coordinates research on contemporary, policy-relevant issues that are international and interschool in character. Working in partnership with the seven schools at Stanford (Business, Earth Sciences, Education, Engineering, Humanities and Sciences, Law, and Medicine) and with the Hoover Institution, IIS fosters excellence in research and teaching across disciplinary, school, and national boundaries. The priority areas of research are in the fields of international security, international political economy, and the global environment. Projects organized by IIS programs often have a regional or global focus; geographic strengths are the Americas, East and Southeast Asia, the New Europe, and Russia.

Research programs within IIS include the Asia/Pacific Research Center, the Center for European Studies, the Center for International Security and Arms Control, the Forum on Sovereignty and Governance, the Global Environment Forum, and the North America Forum. IIS also administers overseas research centers in Kyoto, Japan, and Chiapas, Mexico, and, on behalf of two consortia of major universities, administers advanced language study programs in Taipei, Taiwan, and Yokohama, Japan.

In the areas of public service and outreach, IIS administers three interrelated programs which develop internationally oriented curricula for use by public school teachers and provide staff development opportunities for precolligate educators interested in other cultures, world regions, international systems, and foreign languages. Curricular development projects on Africa, China, Japan, Latin America, the former Soviet Union and Eastern Europe, and Western Europe are organized within the Stanford Program on International and Cross-Cultural Education (SPICE). The Bay Area Global Education Project (BAGEP) and the Bay Area Foreign Language Project (BAFLP) provide staff development activities for precolligate teachers in the Bay Area.

Although IIS shares a number of faculty appointments with departments and schools, it neither offers courses nor confers degrees. These academic functions are performed within the schools, departments, and programs associated with the institute. IIS is responsible, however, for the Interschool Honors Program in Environmental Science, Technology, and Policy. The institute also offers several fellowship opportunities for faculty and graduate students research.

The IIS central office is located at 200 Encina Hall, telephone 415-723-4581. For more information about particular IIS programs, contact the programs directly (area code 415):

Asia/Pacific Research Center, 723-9741
Bay Area Global Educators Project (BAGEP)/Bay Area Foreign Language Project (BAFLP), 725-1482
Center for European Studies, 723-9593
Center for International Security and Arms Control, 723-1625
Forum on Sovereignty and Governance, 723-4581
Global Environment Forum, 725-9888
Inter-university Center for Japanese Language Studies, 725-1490
Inter-university Program for Chinese Language Studies in Taipei, 725-2575
North America Forum, 723-3096
Stanford Japan Center — Research, 725-1491
Stanford Program on International and Cross-Cultural Education (SPICE), 725-1485

UNDERGRADUATE PROGRAM

INTERSCHOOL HONORS PROGRAM IN ENVIRONMENTAL SCIENCE, TECHNOLOGY, AND POLICY

The institute coordinates a university-wide interschool honors program in environmental science, technology, and policy. Undergraduates planning to participate in the honors program are required to pursue studies in environmental sciences, technology, and policy, with a concentration in a single discipline. After completion of the prerequisite units, students join small group honors seminars to work with specific faculty
members in the environmental field on an honors thesis that incorporates both scientific principles and policy aspects of selected environmental issues.

Courses in environmental studies appear under the course listings of the Schools of Earth Sciences, Engineering, and Humanities and Sciences. Information about and applications to this program may be obtained from the Global Environment Forum, 200 Encina Hall, telephone 415-725-9888.

CENTER FOR THE STUDY OF LANGUAGE AND INFORMATION (CSLI)

Director: John Perry
Associate Director: Betsy Macken
Associated Faculty: Michael Bratman (Philosophy), Joan Bratman (Linguistics), Eve V. Clark (Linguistics), Herbert Clark (Psychology), Fred Dretske (Philosophy), John Etchemendy (Philosophy), James Greeno (Education), Barbara Hayes-Roth (Computer Science), Martin Kay (Linguistics), Paul Kiparsky (Linguistics), John McCarthy (Computer Science), Grigori Mints (Philosophy), John Mitchell (Computer Science), Julius Moravcsik (Philosophy), Clifford Nass (Communication), Nils Nilsson (Computer Science), John Perry (Philosophy), Stanley Peters (Linguistics), Byron Reeves (Communication), David Rumelhart (Psychology), Ivan Sag (Linguistics), Peter Sells (Linguistics), Yoav Shoham (Computer Science), Barbara Tversky (Psychology), Thomas Wasow (Linguistics and Philosophy), Terry Winograd (Computer Science)

Associated Consulting Faculty: Philip Cohen (Linguistics), Per-Kristian Halvorsen (Linguistics), Patrick J. Hayes (Computer Science), David Israel (Philosophy), Ronald Kaplon (Linguistics), Lauri Karttunen (Linguistics), Geoffrey Nunberg (Linguistics), C. Raymond Perrault (Philosophy), Stanley J. Rosenschein (Computer Science), Brian Cantwell Smith (Philosophy), Annie Zaenen (Linguistics)

CSLI is devoted to research in the emerging science of information, computing, and cognition. It is an interdisciplinary endeavor, bringing researchers together from academia and industry in the fields of artificial intelligence, computer science, linguistics, logic, philosophy, and psychology. CSLI's researchers are united by their common interest in the communication and information processing that ties together people and machines. They are pursuing a wide variety of topics, including robotics design, planning and reasoning, speech recognition, machine-aided translation, language acquisition, text understanding, computer languages, and software design strategies, among others. Roughly half the projects at CSLI deal with languages (natural and computer) and the vehicles by which information is communicated between agents. The others deal with a variety of questions involving the acquisition and manipulation of information: how agents acquire and use information to guide action; what information processing architectures are best suited to various tasks; how representational format affects information processing and human comprehension, and so on.

Course work related to the research at CSLI can be found in the "Program in Symbolic Systems" section of this bulletin.

CSLI is located at the corner of Campus Drive West and Panama Street, in Ventura Hall and Cordura Hall, telephone 415-723-3084.

CENTER FOR MATERIALS RESEARCH (CMR)

Director: M. R. Beasley
Deputy Director: H. C. Andersen
Technical Director: T. M. Gur
Affiliated Faculty: (currently 78 members from the following departments and laboratories): Aeronautics and Astronautics, Applied Physics, Chemical Engineering, Chemistry, Civil Engineering, Electrical Engineering, Geological and Environmental Sciences, 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 Science and Engineering Center (MRSEC) program.

The purpose of MRSEC is to support major central research facilities, to provide seed money for funding junior faculty and initial funding for established faculty who are changing research fields, and to support interdisciplinary research groups (IRGs) requiring expertise in two or more materials-related disciplines.

To fulfill these goals, CMR operates extensive materials characterization facilities and, at the present time, sponsors eleven summer programs for undergraduates; nine programs for women; eight seed programs; eight programs for minorities; and five multi-investigator, multi-discipline IRG programs. CMR's professional staff also conduct research in areas related to advanced materials synthesis and characterization.
STANFORD CENTER FOR ORGANIZATIONS RESEARCH (SCOR)

Director: W. Richard Scott (Professor, Sociology)
Administrator: Lisa Hellrich

The purpose of the Stanford Center for Organizations Research (SCOR) is to advance knowledge of the structure and functioning of organizations in modern society through support of both basic and applied research; and to provide education and training opportunities for students at all levels — undergraduate, graduate, postgraduate, and visiting scholars.

SCOR was formally established by the University in 1988 and became an independent research center in 1993. Approximately 85 faculty members, drawn from six schools (Business, Education, Engineering, Humanities and Science, Law, and Medicine) serve as faculty affiliates to the center. SCOR is governed by a faculty steering committee and is also guided by a graduate student steering committee.

SCOR’s main emphasis to date has been on developing programs to stimulate and strengthen interdisciplinary and interuniversity research and research training on organizations. Specific activities in service of these objectives include:

Developing forums for the discussion of research issues and methods (for example, conferences, colloquia, seminars).
Devising and sponsoring new approaches to research training (for example, intensive workshops focused on specific research skills).
Developing more effective ties with other organization research centers (for example, the creation in 1990 of the Consortium of Centers for Organizations Research).
Providing support for visiting scholars from other universities, over half of whom have been scholars drawn from foreign countries.

SCOR does not offer courses for academic credit, admit students, or award degrees. Rather, it functions to supplement and support activities of existing schools and departments.

SCOR is located in the Graduate School of Business, room 314, telephone 415-725-2130, e-mail fscor@gsb.stanford.edu.

INSTITUTE FOR RESEARCH ON WOMEN AND GENDER

Director: Iris F. Litt (Professor, Pediatrics)
Deputy Director: Sherri Matteo

During the last decade, research on women and gender has had a profound effect on the social sciences and the humanities. Since its founding, the Institute for Research on Women and Gender has been a leading force in this conceptual revolution.

The institute’s primary mission is to support scholarship on subjects related to women and gender and to organize educational programs that communicate these findings to a broader public. Stanford faculty, staff, graduate students, and members of the community work together to stimulate a more informed analysis of issues concerning gender.

Institute projects span a wide range of disciplines but rest on certain shared premises: that gender is a vital category of analysis for contemporary scholarship and policymaking and that the experiences of women as individuals and as a group can best be understood within their historical, social, and cultural contexts. The institute sponsors interdisciplinary research seminars and conferences that examine gender issues in areas such as art, education, employment, family structures, health care, history, law, literature, and psychology. A number of scholarly publications have resulted from these activities.

HOOVER INSTITUTION ON WAR, REVOLUTION AND PEACE

Director: John Raisian
Deputy Director: Charles G. Palm
Associate Directors: Gerald A. Dorfman, John C. Hays, Thomas H. Henriksen, Richard Sousa
Budget and Finance Officer: Claudia Hubbard
Public Affairs Manager: Gloria J. Walker
Staff Affairs Officer: Helen M. Corrales
Honorary Fellows: Ronald W. Reagan, Alexander Solzhenitsyn, Margaret Thatcher
Distinguished Fellow: George P. Shultz
Senior Fellows: Martin Anderson, Dennis L. Bark, Robert J. Barro, Gary S. Becker, Michael J. Boskin, Bruce Bueno de Mesquita, Richard T. Burress (emeritus), John F. Cogan, Gerald A. Dorfman, Milorad M. Drachkovitch (emeritus), Peter J. Duignan (emeritus), John B. Dunlop, John A. Ferejohn, Lewis H. Gann (emeritus), Robert E. Hall, Thomas H. Henriksen, Alex Inkeles (emeritus), Kenneth L. Judd, Melvyn B. Krauss, Edward P. Lazear, Seymour Martin Lipset, Thomas E. MaCurdy, Charles E. McLure, Jr., Thomas A. Metzger, Terry M. Moe, Thomas G. Moore, Ramon H. Myers, Alvin Rabushka, John Raisian, Rita Ricardo-Campbell (emeritus), Henry S. Rowen (emeritus), Thomas J. Sargent, Abraham D.
Notable long-term research in international studies includes the study of transitions to democracy and free markets, as regimes in Africa, Asia, Central and Eastern Europe, the Commonwealth of Independent States, and Latin America experiment with democratic institutions and processes and economic reforms. Research examines the conditions that promote democracy’s development—open economies, civil liberties, political freedom—as well as conditions that threaten it.

A second major area of research is the study of international rivalries and global cooperation, including questions of war and peace, and all types of rivalries and cooperation: economic, political, military, religious, cultural, and so on. This includes work on the causes and consequences of international conflict, global security policy, the principles of statecraft, and the emergence of global trading blocs.

In the area of domestic affairs, a major focus of research is on improving American institutions and economic performance. Theoretical work on economic efficiency and effective government is combined with empirical work on specific areas of public policy, including taxation, the federal budget, government accountability, regulatory burden, education, race relations, the environment, crime, health care, aging, and social security.
universities and research centers throughout the country and world, as well as those at Stanford, may participate in the high energy physics research program of the center. Stanford graduate students may, with the approval of their departments, carry out research for the Ph.D. degree with members of the SLAC faculty. Graduate students from other universities also participate in the research programs of visiting groups.

Research assistantships are available for qualified students by arrangement with individual faculty members. There are also opportunities for summer employment in the research groups at the center. Interested students should contact Professor Elliott Bloom, Graduate Student Adviser.

STANFORD SYNCHROTRON RADIATION LABORATORY (SSRL)

Director: Arthur I. Bienenstock
Deputy Associate Director: Herman Winick
Assistant Directors: Massimo Cornacchia, Ronald A. Gould, Keith O. Hodgson, Piero A. Pianetta

Professors: Arthur I. Bienenstock, Gordon E. Brown, Jr., Sebastian Doniach, Alice P. Gast, Keith O. Hodgson, William E. Spicer, Helmut Wiedemann, Herman Winick
Professors (Research): R. Paul Phizackerley, Piero A. Pianetta
Assistant Professor: Zhi-Xun Shen

SSRL is a national research facility supported by the Department of Energy for the utilization of synchrotron radiation for research in the natural sciences, medicine, and engineering. SSRL is a division of the Stanford Linear Accelerator Center.

SSRL has research programs in accelerator physics and development of advanced sources of synchrotron radiation, including short-wavelength free electron lasers. The lab is interdisciplinary with students from the following Stanford departments actively pursuing degrees: Applied Physics, Chemical Engineering, Chemistry, Electrical Engineering, Geology, Material Science and Engineering, and Physics.

Students interested in working at the facility should contact a member of the SSRL faculty, one of the Assistant Directors, or other members of the Stanford faculty who use SSRL in their research programs.
Vice Provost and Dean, Libraries and Information Resources: Robert L. Street

Libraries and Information Resources (L&IR) is responsible for the University Libraries, for campus wide academic and administrative computing, and for computer networking and telecommunications. Under the Vice Provost’s guidance, L&IR provides the support services necessary to maintain and promote Stanford’s leadership in these areas. L&IR also provides library services, facilitates the acquisition and availability of computing hardware and software, supplies communications paths and links, and develops computing and communications expertise. It also offers consultation and advice for planning, development, and use of both library information and information technology. It furnishes training and support for faculty, staff, and students who use information technology and/or the libraries.

L&IR has two divisions: Information Technology Systems and Services (ITSS), and Stanford University Libraries and Academic Information Resources.

INFORMATION TECHNOLOGY SYSTEMS AND SERVICES (ITSS)

Chief Information Officer: Glen Mueller
Director, Distributed Computing and Communications Systems: Raman Khanna
Director, Operations, Systems, and Services: Paul Beirne
Director, Information Systems: Dave Koehler
Director, Architecture, Planning, and Standards: Aida Scott
Director, Finance: Bob Phillips
Manager, Application Support: Ced Bennett
Manager, Application Support: Tim Flood
Manager, Human Resources: Regina Machado-Schmidt
Manager, Customer Assistance: Chris Lundin

ITSS encompasses Stanford’s core information technology resources, providing distributed computing information technology resources and support services to Stanford’s faculty, students, and staff. It provides the leadership and support services necessary to maintain and promote Stanford’s use of information technology by managing the acquisition and availability of computing hardware and software, supplying communications paths and lines, and developing computing and communications expertise. ITSS also furnishes training and support for faculty, students, and staff who use information technology.

COMPUTING SERVICES

ITSS operates a 24-hour, seven-day-a-week UNIX Computer Cluster for Stanford faculty, students, and staff. Located on the second floor of Sweet Hall, this cluster of UNIX workstations is part of the Leland Systems. The workstations run UNIX and include computers from DEC, IBM, and Sun. The cluster gets additional power from five UNIX computer servers: Cardinal, Tree, and Junior are available to all users of the cluster; Power and Wisdom are available only to eligible members of the social sciences. Software in the cluster includes major public domain packages such as EMACS and perl, commercial statistical packages such as SAS and SPSS, and most major programming languages. A central mail hub receives and handles electronic mail (e-mail) for all of the cluster machines, providing users with one e-mail address regardless of the machine they use. Access to SUNet and laser quality printing is provided. Computers in this cluster can be used for instruction, nonsponsored research, and electronic mail; commercial use is prohibited. Users must have a current Stanford ID. For more information, call Sweet Hall Consulting, (415)725-2101, or send e-mail to consult@leland.

In Forsythe Hall, ITSS operates an IBM ES-9000 running the IBM MVS-ESA operating system, and provides machine and staff services to the Stanford community. ITSS also operates all of Stanford’s connections to national networks such as the Internet, BITNET, etc. Computer based services include screen-text editing (WYLBUR) and formatting (SCRIPT) for preparing reports, data, and theses; SPIRES, the Stanford-developed database management system; Prism, the on-line collection of Stanford administrative files and services; and Folio, the on-line collection of Stanford’s academic and institutional data resources, including a large number of index and citation databases (ERIC, GeoREF, Lexis/Nexis, Merck, Federal Register), and Socrates, Stanford’s on-line library catalog. The Forsythe Operations Center has an extensive master library of application-specific computer routines encompassing statistical, data analysis, and other data processing functions, including SAS and SPSS-X. Programming languages for use in interactive and/
or batch mode include Assembler H, COBOL, FORTRAN, Pascal, and PL/1. Other services include high-speed laser printers; support for local laser printers; e-mail (EMS and Wylibur, two Stanford-developed e-mail packages); and microcomputer-mainframe linking using the Stanford-developed Samson terminal emulation and file transfer software. ITSS also supports the University’s dial-in modem pool, for remote access to SU host computers. For more information, call ITSS Customer Assistance, 415-725-8181, or send e-mail to consult@forsythe.

COURSES
UNIX and Macintosh Computer Systems — Short, non-credit classes during the first weeks of the quarter do not require registration and provide introductory information about UNIX on the Leland Systems, the EMACS text editor, electronic mail, and the Tresidder and Meyer Computer Clusters. See the UNIX Introductory Classes Schedule for dates, times, and locations in the document racks, second floor, Sweet Hall, and in the Tresidder and Meyer Computer Clusters, call Sweet Hall Consulting, 415-725-2101, or e-mail consult@lreland.

Forsythe Minframe (IBM ES/9000), Apple Macintosh, and IBM-Compatible Computers — Open to faculty, students, and staff at no charge; microcomputer classes generally require a fee. Short, non-credit classes on word processing and text formatting, database management, statistical and programming applications, desktop publishing, spreadsheets, and communications. Registration information and course descriptions are on-line in the Prism file “Training Schedule” and in the Training Opportunities for the Stanford Community in the Campus Report; or call ITSS Customer Assistance, 415-725-8181, or e-mail consult@forsythe.

Stanford University Libraries and Academic Information Resources

University Librarian and Director of Academic Information Resources: Michael A. Keller
Deputy University Librarian and Director of Academic Information Services: Karen Nagy
Assistant University Librarian, Library Collections: Anthony Anglella
Assistant University Librarian, Technical Services: Catherine Tierney
Assistant University Librarian, Finance and Administration: Jeff Padwell
Director, Human Resources: Carol Olsen
Director, Facilities Services: Sarah Williamson

Head, Library Systems: Jerry C. Persons
Department Heads: Constance Brooks (Preservation), Barbara Celone (Social Sciences Resource Group), Wilma Cromwell (Catalog Research and Development), Charlotte Derks (Science and Engineering Resource Group), Joan K. Krasner (Access Services), Barbara Maliska (Academic Software Development Group), Ed McGuigan (Research and Instructional Technologies Support Group), Miriam Palm (Acquisitions), Jerry C. Persons (Systems), Sharon Propas (Serials and Ordering), Mia Rode (Cataloging Services), Vickie Seymour (Library Services), Roberto Trujillo (Humanities and Area Studies Resource Group)

Library Service Units: Grace Baysinger (Swain Chemistry and Chemical Engineering), Barbara Celone (Cubberley Education), Carol Chatfield (Physics), Charlotte Derks (Braner Earth Sciences), Chuck Eckman (Government Documents), Richard Fitchen (Green Library Reference), Steven Gass (Engineering), Margaret Kimball (Special Collections), Rebecca Lasher (Mathematical and Computer Sciences), Michael Newman (Falconer Biology), Victoria Reich (Information Access Analysis), Alexander Ross (Art and Architecture), Barbara Sawka (Music), Joseph G. Wible (Miller Marine Biology)

Curators — Collection Development Program: Anthony M. Anglella (Social Science Collections), James Coleman (Academic Computing for Humanities and Area Studies/Academic Text Service), Roger Kohn (Judica/Hebraica Collections), Henry Lowood (German Collections), Katharine Martinez (American and British History Collections), William McPherson (English and American Literature Collections), Mary Jane Parrine (Romance Language and Humanities Collections), Alexander Ross (Art and Architecture Collections), Roberto Trujillo (Mexican American and Latin American Collections), 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), Charles J. Tanenbaum (Exhibits)

Stanford University Libraries and Academic Information Resources develops and implements
services within the University libraries that support research and instruction including academic computing functions. These services include acquiring and making available library collections and academic computing hardware and software, establishing policies and standards to guide the utilization of academic information resources, and developing training and support programs for academic uses of computers. All the major library units provide some educational activities; the J. Henry Meyer Memorial Library places particular emphasis on media and services in support of the curriculum of the University and of the Continuing Studies Program.

In each library unit, reference staff provide general advice on locating and using both print and on-line information sources. Subject specialists and reference librarians offer assistance in specific disciplines either individually or in groups, by lecture to classes on request, tours, demonstrations, or special workshops. The libraries provide workshops each quarter that instruct patrons on the use of Socrates, the on-line catalog. Instructional support is provided at the libraries' microcomputer clusters, audiovisual facility, and language lab.

The Research and Instructional Technologies Support (RITS) group supports and enhances instruction and research by providing library and academic computing services and resources. These services include on-line text and database services for use in instruction and research; information, advice, and education about computers; and operation of the computer clusters and classrooms in Meyer Library and Tresidder Union.

Information about scope of collections, physical facilities, and services (such as general borrowing regulations, reserve books, book stack access, interlibrary loans, and photocopies) is available in printed publications and guides and electronically through Folio, Portfolio, and the World Wide Web. Anyone wishing further explanation of library services should consult the Privileges Desk in Cecil H. Green Library, or the reference staff in J. Henry Meyer Memorial Library, or in the University Libraries branches.

During Autumn, Winter, and Spring Quarters, academic computing services staff offer short, noncredit courses that provide an introduction to the computer clusters' hardware and basic operations, file servers, and cluster policies.

The Academic Software Development group develops applications and tools that assist Stanford faculty in performing their instruction and research.

CECIL H. GREEN LIBRARY

Cecil H. Green Library maintains research collections in the social sciences and humanities. These collections, which number more than 2.4 million volumes, are now housed in two locations: the stack area of Green Library and the Stanford Auxiliary Library. During regular academic sessions, Green Library is open Monday through Thursday from 8 a.m. to 12 midnight, Friday from 8 a.m. to 6 p.m., Saturday from 9 a.m. to 5 p.m., and Sunday from 1 p.m. to 12 midnight. More detailed information, including holiday and intersession hours and hours for other libraries on campus, is given in the handout "Hours for the Academic Year," available in public service units throughout Green, Meyer, and the branch libraries.

The Green Library collections and services are currently distributed in two interconnecting buildings known as the East Wing and the South Stack. The East Wing is the building facing the J. Henry Meyer Memorial Library; the South Stack consists of the two basement floors of the Meyer Library. The West Wing, the former Main Library, faces the Quadrangle and is currently closed for repairs from damage sustained in the 1989 Loma Prieta earthquake. All stack areas, whether East, South, or West are accessible only through the East Wing. The facility can seat more than 1,600 users at one time in a variety of seating arrangements — carrels, lounge areas, tables, individual studies, and group study rooms.

Major service units housed in the East Wing include General Reference; Foreign Language and Area Collections; Access Services; Current Periodicals, Newspapers, and Microtexts; and the Interlibrary Borrowing Service Office.

East Wing facilities include Socrates terminals; photocopy machines and courtesy phones in the Communications rooms on the lower, second, and third levels; and three photocopy machines and a photocopy dispenser in General Reference on the first level. There are pay phones on each of Green East's four floors. Microcomputer clusters are available for use by Stanford faculty, staff, and students. Requests for information should be made to the Loan Desk.

J. HENRY MEYER MEMORIAL LIBRARY

The J. Henry Meyer Memorial Library is the media and instructional support library for Stanford University. Meyer's collections and services are designed to meet many of the initial research needs of Stanford students and the teaching support needs of faculty. In addition, Meyer houses the University's language laboratory, a computer classroom, a computer cluster, and a new Curriculum Development Lab.

Reserves for most graduate and undergraduate courses in the humanities and social sciences are kept in Meyer. The course reserves include microcomputer software and audiovisual as well as book materials. Study space is located amid the intensive-use collection on the third floor.
The media collections and facilities are located on the second floor of the library and are available for individual or group use. Rooms for small group viewing or listening are available on a scheduled basis. Nonprint reserve materials are also located within this facility, as is the Media Rental Service. A cluster of Macintosh microcomputers is available to students for course work and independent study.

BRANCH LIBRARIES

Humanities Branch Libraries include the Art and Architecture Library, the Cubberley Education Library, and the Music Library (including the Archive of Recorded Sound).


COURSES

The following are intended to serve those students for whom a more extended study of bibliographic organization is useful.

ART

237. Art History Bibliography and Library Methods — Primarily for art history graduate students; upper-class undergraduate majors who plan to continue in art history on the graduate level may enroll with the consent of the instructor. Introduction to reference works and library techniques essential to the study of architectural and art history. Sources of artistic, historical, and cultural information in their printed and automated forms.

4 units Win (Ross)

LATIN AMERICAN STUDIES

260. Latin American Bibliography — Introduction to research use of Stanford library collections on Latin American topics.

3 units, Aut (Trujillo) T 10:15-11:45

MUSIC

200. Graduate Proseminar — Required of first-year graduate students in music. Introduction to research in music, bibliographical materials, major issues in the field, and philosophy and methods in music history. Guest lecturers and individual research topics.

4 units, Aut (Berger, Nagy)

SLAVIC LANGUAGES

200A. Introduction to Slavic Bibliography — Open to undergraduate and graduate students. Introduces the library's bibliographic and book resources, reference sources in English and Western languages, and provides a historical and critical analysis of Slavic bibliographic and reference tools and search methodology. Final bibliography project required. Knowledge of a Slavic language is required for Slavic students registered for 3 units, others register for 1 unit.

1 or 3 units, Win (Zalewski) W 3:15-5:05
LIBRARIES — COORDINATES

**Hoover Institution**
See below.

**J. Hugh Jackson Library, Graduate School of Business**
Director: Tim Wei
Assistant Director/Head Technical Services Librarian: Karen A. Wilson
Head Public Services Librarian/Assistant Director: Robert E. Mayer

**Lane Medical Library**
Director: Peter Stangl
Deputy Director and Head of Public Services: Valerie Su
Head of Technical Services and Systems Librarian: Dick Miller

**Crown Law Library**
Law Librarian: Lance E. Dickson
Associate Law Librarian: Rosalee M. Long
Public Service Librarian: J. Paul Lomio

**Stanford Linear Accelerator Center Library**
Head Librarian: Patricia Kreitz

**East Asian Collection — Curator: Ramon H. Myers; Deputy Curator: Mark Tam**
**East Central Europe Collection — Curator: Maciej Sierkierski**
**Hanna Education Collection — Curator: Gerald A. Dorfman**
**Hoover Institution Archives — Archivist: Anne Van Camp**
**Latin and North American Collections — Curator: William E. Ratliff**
**Russian and Commonwealth of Independent States Collection — Curator: Robert Conquest; Deputy Curator: Joseph D. Dwyer**

Since its founding by Herbert Hoover in 1919 as a special collection dealing with the causes and consequences of World War I, the Hoover Institution on War, Revolution and Peace has become an international center for documentation, research, and publication on political, economic, social, and educational change in the 20th century.

The library includes one of the largest private archives in the world and has outstanding area collections on Africa, East Asia, Eastern Europe, Russia and the former Soviet Union, Latin America, the Middle East, North America, and Western Europe.

Holdings include government documents, files of newspapers and serials, manuscripts, memoirs, diaries, and personal papers of men and women who have played significant roles in the events of this century, the publications of societies and of resistance and underground movements, and the publications and records of national and international bodies, both official and unofficial, as well as books and pamphlets, many of them rare and irreplaceable. The materials are open to all Stanford students, faculty, and staff and to scholars from outside the University.
GRADUATE INTERSCHOOL PROGRAM

GRADUATE SPECIAL PROGRAM

The Graduate Special Program is designed for students who have demonstrated outstanding academic performance in a doctoral program at Stanford and who are interested in an interdisciplinary Ph.D. degree that cannot reasonably be completed in an existing graduate department or interdisciplinary program. It is administered by the Committee on Graduate Studies (C-GS) through a standing subcommittee appointed by the C-GS chair, which reviews proposals and makes recommendations on admission to C-GS.

The normal eligibility criteria for application to the Graduate Special Program are:
1. Completion of a minimum of two quarters in a Stanford doctoral level program.
2. Completion of no more than three years of graduate study at Stanford.
3. Completion of all department or program requirements (including qualifying examinations and required GPA) if applicable, that normally would be completed within the time that the applicant has been enrolled in the primary graduate degree program. The application must also specify a formal Ph.D. qualifying procedure for the Graduate Special Program that is acceptable to the faculty members on the student’s proposed supervisory committee and to the Graduate Special Subcommittee.
4. a) If the applicant is beyond the second year of study in a Ph.D. or Ed.D. program, admission to candidacy is required before the Graduate Special application is accepted.
   b) Students in an M.D. or J.D. program may apply only if they wish to obtain the Graduate Special Ph.D. in addition to the graduate degree that originally brought them to Stanford.
5. Any exceptions to the above eligibility requirements must be approved by C-GS.

The applicant is responsible for obtaining the agreement of at least four faculty members to serve on a supervisory committee. The principal advisor must be an Academic Council member, and at least two of the committee members must be tenured faculty. In accordance with the nature of the program, members of the committee should represent at least two departments of the University.

The deadline for applications is the second week of the quarter in which review is requested. The application must include a succinct statement of the dissertation topic describing and justifying the field of inquiry, its interdisciplinary nature, and why it cannot be completed within an existing department or program. A title for the program should be selected that does not include the name of any department or graduate program at Stanford. The applicant should also describe his or her preparation in the subjects relevant to the proposal and the reasons for wishing to pursue the field of inquiry.

If the proposal is approved, the student submits a Graduate Program Authorization Petition and enrolls as a Graduate Special doctoral student in the field designated on the proposal. Any subsequent changes in the program or the composition of the supervisory committee must be approved by the Graduate Special Subcommittee.

Each student in a Graduate Special program must have the agreement of a graduate department or program to provide the administrative support and services normally available to its doctoral students. This department is usually the student’s previous department or that of the principal adviser. The home department is not obliged to provide financial support or to monitor academic progress.

Students registering for special research under the guidance of their committee or for the Ph.D. dissertation should use the following course numbers:

COURSES

400. Research
   by arrangement

401. Ph.D. Dissertation
   by arrangement

501. Special Summer Course
   1 unit, Sum (Staff) by arrangement
THE CONTINUING STUDIES PROGRAM

Dean: Marsh McCall
Associate Dean and Administrative Director: Charles Junkerman

The Continuing Studies Program provides adult members of the surrounding communities and University staff with the opportunity to take classes on a part-time basis for intellectual enrichment, both personal and professional.

The faculty are drawn from the ranks of the University's distinguished professoriate, representing every school in the University. The program presents a wide variety of courses, with a central concentration in such humanities disciplines as literature, history, music, and art.

The program also offers a Master of Liberal Arts degree, which emphasizes a flexible, interdisciplinary approach to enable adults to seek a broad education in the liberal arts.

Courses are offered in all four academic quarters. For a course catalog, contact the Continuing Studies Program, Building 590, Room 104, Stanford, California 94305 or call 415-725-2650.

THE SUMMER SESSION

Students attending Stanford Summer Session enroll in either the Regular Degree Program or the Summer Visitor Program.

The Regular Degree Program is for students who are candidates for a Stanford degree and who are continuing their academic work in the Summer Quarter. Degree-seeking Stanford students should indicate on Axess their intention to register for the Summer Quarter. Separate application is not required.

The Summer Visitor Program is for students who are not presently candidates for a Stanford degree. It is open to persons 18 years or older, and high school students who have completed their junior year. High school students may only attend through the Summer College for High School Students.

Students in the Summer Visitor Program enjoy all the privileges of students in the Regular Degree Program except that work completed cannot apply toward a Stanford degree or credential until the student has been admitted to regular standing. Admission as a summer visitor does not imply later admission to matriculated status. However, should the visitor matriculate at a later date through normal admission procedures, the summer work may, in most cases, be applied toward the requirements for a Stanford degree or credential.

Students who are interested in the Summer Visitor Program may call 415-723-3109 or fax their request for a copy of the Stanford University bulletin, Summer '96 to 415-725-4248, or write to the Summer Session Office, Building 590, Stanford University, Stanford, California 94305-3005. This bulletin includes all the pertinent information (for example, fees, housing, activities, course listings) and an application form.
STUDENT AFFAIRS

Student Affairs supports the academic mission of the University by providing a climate conducive to living and learning in a multicultural environment. The organization encompasses a broad range of programs and services for undergraduate and graduate students in the areas of health services, student life, residential education, advising and tutoring, career services, housing and food services, financial services, and registration. It serves the wider community through the Haas Public Service Center and is responsible for the information systems and institutional reporting on students, courses, and classrooms.

The Vice Provost and Dean for Student Affairs provides policy direction, administrative support for budget, personnel, facilities, and development, and has oversight of the efficiency and effectiveness of each of the organization’s units. The Vice Provost interacts with the President, the Provost, the University Cabinet, schools, department representatives, and students, and is an ex officio member of the Senate of the Academic Council.

DEAN OF STUDENTS

The Office of the Dean of Students seeks to ensure that the University is sensitive and responsive to the needs of students outside the classroom. The office is responsible for Judicial Affairs and several administrative offices and community centers including the Asian American Activities Center; Black Community Services Center; El Centro Chicano; Native American Cultural Center/American Indian Program Office; Bechtel International Center; the Office of the Multicultural Educator; Lesbian, Gay, and Bisexual Community Center; Women’s Center; Disability Resource Center (DRC); and Tresidder Memorial Union, including the Office of Student Activities and Greek Affairs. The office also provides consultation and coordination with student organizations, student media, activities, publications, and the Associated Students of Stanford University. The office is located in room 323, Old Union, telephone 415-723-2733. Students are welcome in that office to discuss ideas, personal issues, or general concerns about student life.

The Dean of Students also works closely with the Residence Deans, who are supervised by Residential Education. Residence Deans provide assistance to on- and off-campus students. They can advise students about academic and personal matters, occasionally intervene directly in behavior problems, and assist with personal emergencies. Advice is also available on issues of academic probation or suspension, leaves of absence, special concerns of women or minorities, and administrative matters. Residence Deans are assigned to specific residences and to off-campus students; for further information, call the Office of the Dean of Students.

DISABILITY RESOURCE CENTER (DRC)

The Disability Resource Center provides information, referrals, and services for students and other community members with physical and learning disabilities. A number of support services are available for students with long-term disabilities or illnesses, as well as those with short-term disabling conditions. Services include recorded text, class notes, sign language or oral interpreting, braille writing, and accessible transportation. Additionally, services for students with learning disabilities include referral for educational diagnostic testing, advocacy, peer support, and peer tutoring. The DRC’s library contains updated information ranging from scholarships to accessible travel, and the staff can assist in access arrangements with the University’s departments and programs.

Access Stanford, a guide to University resources for students with disabilities, is available in print, large print, or cassette tape. For more information, call the DRC at 415-723-1066 (voice) or 723-1067 (TDD). The DRC is located at 123 Meyer Library; office hours are 9 a.m. to 12 noon and 1 to 5 p.m., Monday through Friday.

INTERNATIONAL CENTER

The Bechtel International Center (I-Center) is a meeting place for students and senior research scholars at Stanford from throughout the world and for internationally oriented U.S. students, faculty, and visitors on the campus. Through a variety of social, cultural, and educational programs, I-Center facilities are utilized to acquaint students and scholars with the life of the University and the community, and to bring them together in activities of mutual interest.

The I-Center emphasizes the international dimensions of the University through its counseling services, through the cultural contributions to campus life by the various nationalities represented, and by bringing to the attention of U.S. students the many opportunities for work, volunteerism, study, and travel abroad.

Responsibilities of the I-Center advisers, working closely with the University’s academic de-
partments, include advising foreign students on matters such as immigration, housing, practical training, transactions with foreign governments, study programs, and financial-aid problems; counseling in personal matters relating to academic performance, psychological and cultural adjustment, and proficiency in English; coordinating the international reception and orientation program; encouraging utilization of foreign students as resource people in a variety of academic programs; and evaluating the Stanford experience after the students return home.

TRESIDDER MEMORIAL UNION

Tresidder Memorial Union (TMU) is a center of community activity on the Stanford campus. It houses food services; meeting rooms for special occasions; two pleasant patios; a campus information center; the American Express Travel service; banking services, including automatic tellers for Stanford Federal Credit Union and Bank of America; a Wells Fargo branch office with express stops, walk-up windows, and an office for account handling and loan applications; a recreation center offering billiards, foosball, and video games; and a hairstyling shop. Tresidder Express carries groceries, magazines, and sundries.

TMU is also the home of the Associated Students of Stanford University (ASSU), Office of Student Activities (OSA), the undergraduate Department of Computer Science, and the Macintosh clusters.

A full range of food services is provided at TMU. The main dining area includes The Cafe, which features hot entrees and a salad bar; The Corner Pocket, which specializes in pizza; and Baker Street, which has coffee and pastries, salads and sandwiches, and frozen yogurt. The Coffee House, a Stanford tradition, offers deli-style dining, beer, wine, and regular evening entertainment. The Patio Grill cooks made-to-order burgers and chicken sandwiches. Bon Appetit Catering provides food and personalized service for events.

To learn more about activities in Tresidder Union, as well as events on and off campus and employment opportunities, stop by the Information Center on the first floor, or call 415-723-3384.

VOLUNTARY ORGANIZATIONS

At its March 1963 meeting, the Board of Trustees adopted the following policy:

“Students are encouraged to study, discuss, debate, and become knowledgeable about contemporary affairs. Expressing opinions or taking positions with respect to these matters is up to the individual students or to volunteer groups of students so constituted that they are authorized to speak for their members. This is not a function of student government at Stanford.

“All students are required to become members of the Associated Students of Stanford University, which represents them with respect to student affairs on the Stanford campus. The student government, under this policy, is not authorized to speak for students on other matters.

“Under such regulations as may be established from time to time by the President of the University, students may form voluntary organizations constituted to speak for their members with respect to matters outside the scope of student government, provided such organizations clearly identify themselves and, in any public statements, make it clear that they do not represent or speak for the University or the Associated Students.

“Any questions concerning the interpretation and application of this policy shall be resolved by the President of the University.”

Voluntary organizations are those organizations (1) in which membership is not mandatory, (2) in which membership is both open and limited to members of the Stanford community, that is, Stanford students, faculty members, and staff, and their immediate families, and (3) whose purposes and procedures are not inconsistent with the goals and standards of the University. In order to use University facilities and/or the Stanford name, and in order to advocate publicly a position on a public issue, all voluntary organizations must register with the University through the Office of Student Activities (OSA) on the second floor of Tresidder Memorial Union.

As conditions of registration, each voluntary organization must file the following:

1. A statement of purpose and organizational constitution.
2. A statement about membership eligibility.
3. A statement that, should Stanford facilities be used for the generation or collection of funds, all funds of the organization shall be deposited with the Students' Organizations Fund (SOF) in the ASSU Office and shall be handled by the Treasurer of the organization in the manner prescribed by the rules and regulations of the fund and of the ASSU. (Sectarian religious organizations in the Stanford environs may be exempt from the requirement of membership in the SOF, with the approval of the Student Financial Manager and OSA.)
4. Identification of the authorized representative of the group, who must be a currently registered student, and at least five active members in the organization who are currently registered students.

Each voluntary organization must renew its registration with the University annually, early in Autumn Quarter, by submitting the name of the new authorized representative or by reconfirming the current representative, and by updating other information.
A voluntary organization that is registered with the University may use University facilities for meetings open to more than its own members and to specifically invited guests, subject to the regulations of the Committee on Public Events. Contact Nonacademic Facilities Scheduling, the Registrar's Office, B8, Old Union, for further information about nonacademic room scheduling.

A voluntary religious organization may hold open meetings only with the approval of the Office of the Dean of the Chapel.

A registered voluntary organization may advocate publicly a position on a public issue, provided the organization clearly identifies itself, and provided such an organization in any public statement makes clear it does not represent or speak for the University or for the Associated Students.

No voluntary group may use University space or facilities or receive University support for purposes of supporting candidates for public office. In accordance with procedures governing public events, groups supporting candidates may have use of public places such as White Plaza for tables, speeches, and similar activities; may have intermittent use of on-campus meeting rooms; and may reserve auditoriums and similar space for public events including speeches by political candidates.

Religious Activities—Religious and ethical concerns are shared by a significant number of Stanford undergraduate and graduate students, many of whom are actively involved in a variety of campus religious organizations. In addition to a range of Christian groups, there are the Hillel Foundation, the Islamic Society at Stanford, the Bahá'í Association, and Buddhism at Stanford.

The larger worship gatherings are the Shabbat services and dinners on Fridays at 6:30 p.m. in the Old Union Clubhouse, Catholic Mass on Sundays at 4:30 p.m. in Memorial Church, and University Public Worship (Protestant Christian) at 10 a.m. on Sundays in Memorial Church. Black Church at Stanford meets at 6:30 p.m. on Sundays in Memorial Church.

The University's commitment to the process by which convictions and values are defined and sharpened is manifest in its support of the diverse religious groups on campus and its maintenance of the Chaplaincy staff of Memorial Church. Central in Stanford's history, from its founding, is multi-faith exploration and dialogue—a vital part of both ethos and education in this institution. For further information about religious life at Stanford, call Stanford Associated Ministries 415-723-3114, or the Memorial Church 723-1762.

JUDICIAL AFFAIRS AND STUDENT CONDUCT

The Board of Trustees at its September 1963 meeting adopted the following statement, entitled The Government and Conduct of Students: The Fundamental Standard and the Honor Code.

"In student affairs, Stanford seeks the largest individual liberty consistent with good work and orderly conduct.

"The authority and responsibility for student conduct and discipline have been vested in the President of the University by the Board of Trustees.

"In order to encourage responsible citizenship and the exercise of individual and corporate responsibility on the part of students in the government of student affairs and activities, the University has authorized the Associated Students of Stanford University to exercise major privileges and responsibilities through its constitution and in a manner consistent with the policies and regulations established by the University and the Board of Trustees."

LEGISLATIVE, JUDICIAL, AND ADVISORY BODIES

Legislative, judicial, and advisory bodies for student conduct are bodies whose nature and function are specified in The Legislative and Judicial Charter of 1968, as published by the President's Office. These bodies include:

Committee of Fifteen (C-15)
Stanford Judicial Council (SJC)
Student Conduct Legislative Council (SCLC)

THE LEGISLATIVE AND JUDICIAL CHARTER

The Legislative and Judicial Charter was approved by the students, the faculty, and the President in 1968. The charter created two University committees: the Student Conduct Legislative Council (SCLC) and the Stanford Judicial Council (SJC). The SCLC, consisting of five students, six faculty, and a chair appointed from the faculty, is charged with the responsibility of promulgating regulations governing student conduct and establishing disciplinary sanctions for use by the SJC.

Amendments to Article II of the charter were approved by the students, faculty, and President in 1975. Article II provides for the composition and operation of the SJC, which deals with all student disciplinary cases. The council is made up of three faculty members chosen by the Academic Senate; three students chosen by the ASSU Senate from a randomly selected pool; a faculty cochair, chosen by the President, who presides over all cases except those involving Honor Code violations; and a student cochair, also chosen by the President, who presides over Honor Code cases.
If there are contested issues of fact, they are resolved at a hearing before a Hearing Officer (an attorney not associated with the University). The SJC determines whether the facts, as found by the Hearing Officer, constitute a violation of University regulations and, if so, recommends to the President, Provost, or Vice Provost and Dean for Student Affairs an appropriate penalty.

In the alternative, a student may have his or her case heard by the Dean of Students, if the student so requests and the dean agrees. In such cases, the dean recommends to the President, Provost, or Vice Provost and Dean for Student Affairs an appropriate penalty.

When a violation of the Fundamental Standard or the Honor Code occurs, the University administration pursues the case to completion. Consequently, whenever a member of the University community believes such a violation has occurred, he or she should contact the Office of Judicial Affairs, 323 Old Union, 415-723-9610.

THE FUNDAMENTAL STANDARD
Students are expected to observe the Fundamental Standard of student conduct, which was stated by Stanford's first President, David Starr Jordan, as follows:

"Students are expected to show both within and without the University such respect for order, morality, personal honor, and the rights of others as is demanded of good citizens. Failure to do this will be sufficient cause for removal from the University."

THE HONOR CODE
The Honor Code at Stanford is essentially the application of the Fundamental Standard to academic matters. Provisions of the code date from 1921, when the honor system was established by the Academic Council of the University Faculty at the request of the student body and with the approval of the President.

The standard of academic conduct for Stanford students is as follows:

A. The Honor Code is an undertaking of the students, individually and collectively:

1) that they will not give or receive aid in examinations; that they will not give or receive unpermitted aid in class work, in the preparation of reports, or in any other work that is to be used by the instructor as the basis of grading;

2) that they will do their share and take an active part in seeing to it that others as well as themselves uphold the spirit and letter of the Honor Code.

B. The faculty on its part manifests its confidence in the honor of its students by refraining from proctoring examinations and from taking unusual and unreasonable precautions to prevent the forms of dishonesty mentioned above. The faculty will also avoid, as far as practicable, academic procedures that create temptations to violate the Honor Code.

C. While the faculty alone has the right and obligation to set academic requirements, the students and faculty will work together to establish optimal conditions for honorable academic work.

Examples of conduct which have been regarded as being in violation of the Honor Code include:

- Copying from another's examination paper or allowing another to copy from one's own paper
- Unpermitted collaboration
- Plagiarism
- Revising and resubmitting a quiz or exam for regrading without the instructor's knowledge and consent
- Giving or receiving unpermitted aid on a take-home examination
- Representing as one's own work the work of another

Giving or receiving aid on an academic assignment under circumstances in which a reasonable person should have known that such aid was not permitted

In recent years, most student disciplinary cases have involved Honor Code violations; of those, the most frequent is plagiarism. The ordinary penalty for a first offense is a one-quarter suspension from the University, a grade of "No Credit" for the class in which the violation occurred, and a work penalty. The ordinary penalty for a multiple violation (for example, cheating more than once in the same course) is a three-quarter suspension, a grade of "No Credit," and a work penalty.

INTERPRETATIONS AND APPLICATIONS
1. General

a) The Honor Code is agreed to by every student who registers at Stanford University and by every instructor who accepts an appointment.

b) The Honor Code provides a standard of honesty and declares that compliance with that standard is to be expected. It does not contemplate that the standard will be self-enforcing but calls on students, faculty, and administration to encourage compliance and to take reasonable steps to discourage violations. If violations occur, procedures are prescribed by the Legislative and Judicial Charter. However, the Honor Code depends for its effectiveness primarily on the individual and collective desire of all members of the community to prevent and deter violations rather than on proceedings to impose penalties after violations have occurred.

c) It must be understood that the individual and collective responsibility of the students...
for upholding the Honor Code (including so-called third-party responsibility) was not imposed upon the students by the administration or the faculty but was assumed by the students at their own request. Without such student responsibility, the Honor Code cannot be effectively maintained.

d) In interpreting and applying the general provisions of the Honor Code, it should be kept in mind that although primary responsibility for making the code effective rests with the students, faculty cooperation is essential since the faculty sets the academic requirements which students are to meet.

The faculty should endeavor to avoid academic requirements and procedures which place honorable and conscientious students at a disadvantage. The faculty should also be ready and willing to consult with students and should be responsive to their suggestions in these matters.

2. Specific Interpretations and Applications

a) Third-Party Responsibility — A primary responsibility assumed by students is to discourage violations of the Honor Code by others. Various methods are possible. Drawing attention to a suspected violation may stop it. Moral suasion may be effective. Initiating formal procedures is a necessary and obligatory remedy when other methods are inappropriate or have failed. Faculty members have like responsibilities when suspected violations come to their attention.

b) "Proctoring" — Proctoring means being present in the examination room during a written examination, with the following exceptions:

1) The prohibition against proctoring should not be construed to prohibit an instructor or teaching assistant from remaining in the examination room for the first few minutes to distribute and explain the examination; or from visiting the examination room briefly to transmit additional information; or from returning at the end of the examination to collect the examination papers.

2) Nor does the prohibition against proctoring prohibit an instructor or teaching assistant from visiting the examination room in response to specific prior reports from students that cheating has been observed, in connection with that exam, to investigate the basis for such reports. The instructor or teaching assistant may also visit the examination room briefly and infrequently in order to answer students' questions.

c) "Unusual and Unreasonable Precautions" — In interpreting and applying this provision, consideration should be given to standard procedures that are customary at Stanford and the need for cooperation between students and faculty in making the Honor Code effective. The following situations are cited as examples.

An instructor should not require students to identify themselves before being admitted to an examination room, or require students to submit in advance to being searched for notes or other materials, or maintain surveillance upon students who leave the examination room.

Nor should the instructor take deliberate steps to invite dishonesty in order to entrap students. Procedures of this kind would be unusual and unreasonable.

On the other hand, an instructor may require copies of an examination or test to be returned after the examination. When possible, alternate seating should be provided and used for all examinations. To avoid controversy in any rereading or regrading of students' work, the instructor may take measures by which the original work may be clearly identified.

An instructor who requires students to make up a missed test or examination may administer a different test or examination of equivalent range and difficulty. Such procedures are not to be construed as unusual or unreasonable.

d) "Procedures That Create Temptations to Violate the Honor Code" — Although students are expected to resist temptations to cheat, the faculty should endeavor to minimize inducements to dishonesty. Examples of undesirable procedures include the following: failure to give clear directions and instructions concerning course requirements and the limits of acceptable collaboration in course work; treating required work casually as if it were unimportant; carelessness or inconsistency in maintaining security of examinations or tests; reusing an examination that is neither kept secure from public exposure nor made available to all students. If take-home examinations are given, they should not be closed-book examinations, nor should there be a specified time limit less than the full period between the distribution of the examination and its due date. Such procedures place honorable and conscientious students in a difficult position and often at a disadvantage.

e) Penalty Grading — Under the Legislative and Judicial Charter, students are not to be penalized for violations of the Honor Code without notice, hearing, and adjudication, as therein provided. An instructor may not, therefore, lower a student's grade or impose any other academic pen-
ally on the grounds of dishonesty in the absence of such formal proceedings.

f) Taking Tests Outside the Examination Room — Provided that alternate seats are available, tests will be taken from the classroom only with the consent of the instructor.

THE STUDENT CONDUCT
PENALTY CODE

The student conduct penalty code is subject to the provisions of the Legislative and Judicial Charter and is to be read with the following points in mind.

1. The Penalty Code operates only to govern the actions of the University’s judicial bodies regarding student conduct. It in no way governs the actions of persons in the discharge of their duties regarding the hiring or appointment of University personnel.

2. If any person charged with the duties of hiring, appointing, or discharging personnel, or of otherwise controlling employment for the University, promulgates any policy which relates to the fact of conviction for any offense which results in penalties under the code, such policy should be made explicit and should immediately be dispatched to the SCLC, the chairs of all relevant judicial bodies, and the Dean of Student Affairs. In the event that the SJC or other relevant judicial body has not been notified of such a policy, and the implementation of the policy results in a possible injustice to the student, the judicial body which heard the case is encouraged to reopen the case and to reconsider the penalty.

3. Section II,c,2,a of the Penalty Code is intended to permit a judicial body (a) to suspend a student for the remainder of the quarter in progress, or (b) to suspend a student for the remainder of the quarter in progress plus one or more subsequent quarters, or (c) to permit a student to remain in school for the remainder of a quarter in progress and suspend that student for one or more future quarters.

TYPES OF PENALTIES

Upon determination that a student has committed an offense, the judicial body having jurisdiction shall impose a penalty in accordance with the nature and seriousness of the offense and the underlying motivation of the student. The following penalties, and only the following penalties, may be imposed:

A. Expulsion from the University
B. Indefinite suspension from the University
C. Suspension from the University until a specified date
D. Payment of a monetary fine
E. Payment of a fine by work for an on-campus facility or organization
F. Loss for a specified period of time of the right or privilege:
   1. To take part in intercollegiate activities, such as athletic contests, debating contests, or any similar activities as a representative of the University;
   2. To serve in a non-committee position of trust and responsibility, such as resident assistant, sponsor, or any other position requiring appointment by the University administration or faculty;
   3. To enjoy any other specific right or privilege on campus or to use University facilities.

G. Probation for a specified period of time
H. Formal censure
I. Academic penalties for Honor Code violations
J. Combination of penalties

DEFINITION OF PENALTIES

A. Expulsion from the University is the permanent termination of an individual’s status as a student, with the loss of all rights and privileges appurtenant thereto.

B. Indefinite Suspension from the University
   1. Indefinite suspension is identical to expulsion while it is in effect.
   2. An indefinite suspension may be terminated provided the suspended student can demonstrate that this serves the interests of the University community.
   3. The judicial body (for example, the SJC, its appellate body, a subordinate council, or the Dean of Student Affairs) which originally imposed the penalty has not been notified of such a policy, and the implementation of the policy results in a possible injustice to the student, the judicial body which heard the case is encouraged to reopen the case and to reconsider the penalty.

4. If the appropriate judicial body wishes to consider the possible termination of a suspension, the judicial aide shall investigate and report the facts.

5. In no event shall an indefinite suspension be terminated within two calendar years from the date the suspension began.

C. Suspension from the University until a Specified Date
   1. a) Suspension is the termination of student status until a specified date. During such period, the student under suspension loses all rights and privileges appurtenant to student status. These include, but are not exclusively limited to, the right to attend classes; utilize library facilities; utilize any other facilities of the University except those open to the general public; obtain credit for any academic work;
engage in any activities, including holding any positions whatsoever on any University committees or in student organization, whether appointive or elective; live in student housing; or in any way represent him/herself as or being entitled to the privileges of a student of Stanford University. While suspended, no student shall hold or continue to hold any position such as, but not limited to, sponsor, tutor, research assistant, teaching assistant, or residential assistant, if the student was informed prior to accepting that position—either directly or by public notice—that holding such position is contingent upon student status.

b) In the sole discretion of the Dean of Student Affairs, where otherwise undue hardship would result, a student, although under suspension, may nevertheless be permitted to enjoy certain student benefits, such as being permitted to remain in University housing when the suspension is only for a short period of time.

2. a) No suspensions shall be for less than one academic quarter, except that a student may be suspended solely for the remainder of a quarter in progress.

b) With regard to any student regularly enrolled in the University under a program run totally or primarily on a semester basis, the word “quarter” shall be read as “semester” insofar as suspension is concerned.

c) No student who has been suspended in a future quarter shall be eligible to receive a University degree until the period of suspension has terminated.

3. A student under suspension or who has been suspended in a future quarter continues to be subject to University rules governing student conduct and shall be treated as a student for all disciplinary purposes.

D. Payment of a Monetary Fine

1. Prior to the payment of any fine imposed, no student shall obtain a degree from Stanford University.

2. a) Whenever ordered to pay a fine, the student shall be informed in writing of the time(s) by which specific amounts must be paid.

b) Every order to pay a fine shall be conditioned as follows: the Dean of Student Affairs shall, upon application by the student, postpone the time that the work must be completed when, in the dean’s judgment, it appears necessary to avoid undue hardship. In no event, however, shall a University degree be awarded until that student has successfully completed the work.

c) A student who has failed to pay as ordered shall be treated as though suspended and shall be subject to all the disabilities of section C above until such time as full payment is made.

3. a) Except as provided in item paragraph b above, fines shall be paid to the Dean of Student Affairs for use in assisting students who are in need of financial help.

b) A fine can be ordered paid to the Dean of Student Affairs for use in defraying the actual financial losses of any individual or organization, which losses were directly caused by the offense for which the fine was imposed.

E. Payment of a Fine by Work for an On-Campus Facility or Organization

1. a) Prior to the imposition of such a penalty, the judicial body shall inquire of the student whether or not he or she has any objection in principle to penalties requiring involuntary imposition of work. If so, an alternative penalty shall be imposed.

b) Prior to successful completion of any work fine imposed, no student shall obtain a degree from Stanford University.

2. a) Any work fine shall specify the number of hours to be worked and set a deadline before which time the work is to be satisfactorily completed.

b) Every work fine deadline shall be conditioned as follows: the Dean of Student Affairs shall, upon application by the student, postpone the time that the work must be completed when, in the dean’s judgment, it appears necessary to avoid undue hardship. In no event, however, shall a University degree be awarded until that student has successfully completed the work.

c) A student who has failed to meet a work fine deadline shall thereupon be treated as though suspended and shall be subject to all the disabilities of section C above until such time as the work is satisfactorily completed.

3. a) No work fine shall be imposed without prior agreement of the person responsible for the on-campus facility or organization where the work is to be done.

b) A written statement from the person responsible for the on-campus facility or organization that the student satisfactorily completed the work fine will be conclusive.

c) In the absence of the written statement in section D, 3, b, above, the Dean of Student Affairs shall determine if and when the work has been satisfactorily completed. If the dean finds that such completion has not occurred and the student dis-
agrees, the SJC shall determine the issue.

F. Loss for a Specified Period of Student Rights and Privileges

1. Whenever a student is deprived of a right or privilege, both the specific right or privilege lost and the period of such loss must be stated in writing.

2. Under Article I, section F, 2, no student who has contracted with the University to provide personal services and who has entered into performance of the services shall have the contract terminated unless prior to or at the time of formal notification of appointment, the student was also notified, directly or by general publication of which he or she had reason to be aware, that the pertinent judicial body could impose termination of employment as a penalty.

3. Under Article I, section F, 3, a student may be deprived of such rights and privileges as living in University housing, using University machinery, driving a motor vehicle on campus, and other rights and privileges of this type.

4. The right or privilege of serving on any committee shall not be subject to restriction under Article I, section F.

G. Probation for a Specified Period of Time

1. Imposition of a penalty or any part of a penalty may be postponed for a specified period of time, during which the student shall be placed on probation.

2. A violation of the probation shall consist of conviction for an offense which was committed during the period of probation, unless the judicial body hearing the offense specifically deems it to be either trivial or non-related to the type of offense for which the probation was granted.

3. The postponed penalty shall be imposed following a determination that a violation of probation has occurred.

4. Should no violation of probation be determined to have occurred during the period of probation, the probation shall be terminated and the postponed penalty automatically shall be cancelled.

5. The judicial body may impose an independent penalty for the subsequent offense itself. In determining the penalty for the subsequent offense, the judicial body shall consider the reinstated penalty for the first offense and its severity, and may allow the initial penalty, as reinstated, to suffice for both offenses, or it may impose additional penalties.

H. Formal Censure

Formal censure shall consist of a letter of reprimand from the judicial body to the student, and it shall explain the reasons for the censure. The judicial body may request that the President of the University sign the letter of censure.

I. Academic Penalties for Honor Code Violations

1. An academic penalty may consist of the whole or partial withdrawal of credit for a course or an examination, or the determination of a grade for a course or an examination, including the awarding of a failing grade, or it may consist of a combination of these penalties. These penalties may be imposed only with respect to the course in which the violation occurred.

2. An academic penalty may be applied only in the case of an Honor Code violation and only with the consent of the instructor.

J. Combination of Penalties

The judicial body may impose a sentence combining various penalties, when it deems such action appropriate. For example, a penalty could consist of suspension for a quarter, plus probation (with postponement of a penalty of indefinite suspension) for a two-year period thereafter, during which time the student would not be permitted to live in University housing.

NOTIFICATION OF PENALTIES

All penalties must be specified in writing. No penalty becomes effective until reasonable efforts have been made to notify the student. In those instances when a delay in imposition of the penalty would, in the mind of the student, be detrimental, he or she may waive the right to written notice by so indicating in writing to the judicial body.

CAREER PLANNING AND PLACEMENT CENTER (CPPC)

CPPC is committed to educating the Stanford community about the world of work and helping individuals understand their relationship to it. We encourage both undergraduate and graduate students to consider how their academic course work and other experiences may affect their career decisions. Through a variety of programs and services, the CPPC staff helps students and alumni clarify their interests, skills, and values; explore possible career fields; and prepare for the job search in technology, business, public service, or academia. These services include:

- Career counseling
- Career interest inventories
- Job Connection Day in Spring Quarter
- Job Hotline
- Odyssey, the internship database
- On-Campus Recruiting Program
- Public Service Career and Internship Faire in Winter Quarter
- Reference file service
Resource library, which includes books, periodicals, handouts, and audio/videotapes

Stanford Career Faire in Autumn Quarter Workshops on how to get started at the CPPC, interviewing, internships, and the job search process

Internship information and stop-out advising for students who wish to take time out from their regular academic program, as well as part-time and summer employment opportunities, are also available at the CPPC. Check the Friday Stanford Daily or the CPPC bulletin board for up-to-date information on programs and events.

The CPPC, located on White Memorial Plaza between the Bookstore and the Clock Tower, is open Monday through Friday from 8:15 a.m. to 4:30 p.m.; telephone: 415-723-3963.

COWELL STUDENT HEALTH SERVICE

Cowell Student Health Service provides medical care, including a range of counseling and mental health services, to regularly enrolled Stanford students. Costs of care are paid for by the University, excepting hospital care and long-term care as described below.

MEDICAL CARE

The facility, at 606 Campus Drive, has a full-time staff of physicians and other health professionals. It provides, at no fee, an outstanding program of medical and psychological services to students holding current student body cards. Short-term registrants are covered, but only during the period for which they are registered.

Covered services include visits to Cowell physicians and other professionals; consultation with outside, specified specialists when referred by a Cowell physician (except for care usually covered by insurance); necessary examinations and most laboratory and x-ray tests (except when part of entrance requirements).

The costs of hospitalization, outpatient surgery, and specialized procedures, including physician fees, ancillary charges, and emergency room care, are not covered under Cowell’s program. To cover such costs, all students must carry the Stanford University Supplemental Insurance Plan or their own individual policy.

Hours — Cowell is open 8 a.m. to 5 p.m., Monday through Friday, throughout the year. The daytime telephone is 415-723-4841. A physician and other professionals are on call for urgent care at all other times. The after-hours telephone is 723-4861.

Student Families — Services at Cowell are available for spouses and domestic partners (same and opposite sex) on a discounted fee-for-service basis. Assistance is available at Cowell for securing pediatric care.

Stanford Conference Participants — Persons attending University-sponsored conferences, seminars, institutes, workshops, and the like, which do not require registration, are not eligible for Cowell benefits without cost. While they are welcome to seek medical treatment at the center, they will be charged as private patients at standard fees.

HAAS CENTER FOR PUBLIC SERVICE

The Haas Center for Public Service serves as a focal point for students, faculty, and staff interested in public and community service. The Haas Center maintains, and coordinates volunteer, internship, and community research opportunities for undergraduate and graduate students in the San Francisco Bay Area, nationally, and internationally. Through the "study-service connections" initiative, the staff assists students and faculty seeking to integrate service-based learning with academic study and administers a Public Service Scholars honors research program.

The Haas center is the campus base for Stanford in Washington, an academic program that combines seminars, tutorials, and internships in the nation’s capital. The center also houses student organizations including the Stanford Volunteer Network, Stanford in Government, the East Palo Alto/Stanford Summer Academy (EPASSA), and the You Can Make A Difference Conference. It administers numerous fellowship programs which provide financial support to students undertaking public and community service work during the summer and post-graduation. Through the center’s school programs, students serve East Palo Alto and Redwood City students as tutors, mentors, teaching assistants, and after school recreation leaders.

Students interested in public and community service internships, study-service connections, community research, volunteer work, and fellowships should visit the Haas Center or call 415-723-0992.

BOOKSTORE

The Stanford Bookstore, consisting of six branches, is a nonprofit organization, governed by a Board of Directors composed of Stanford faculty, staff, and members of the business community. New and used textbooks and course readers are arranged by department on the Lower Level at the campus Bookstore in White Plaza. Other books, magazines, and study aids are located on all four levels. Apparel, school and office supplies, film and processing, stationery, souvenirs,
and a café are on the Upper Level. Services include the shipping of purchases, gift certificates, book buyback, fax, and the sale of stamps and campus parking permits. Microdisc, on the Mezzanine Level, meets computer hardware, software, and repair service needs; Telephone: 1-800-533-2670.

The Track House Sports Shop at the corner of Campus Drive and Galvez Street sells sports apparel and equipment. Tresidder Express in Tresidder Union offers snack foods, beverages, newspapers, health and beauty aids, and grocery items. The Stanford Bookstore Palo Alto at 135 University Avenue, Palo Alto carries medical technical, business, and education books. The University Shop in the Stanford Shopping Center, and the University Shop 2 at 250 University Avenue, Palo Alto, sell Stanford apparel and souvenirs.

OMBUDSPERSON

The original charge for an ombudsperson at Stanford described the purpose of the office in this way: "The Ombudsperson's task is to protect the interests and rights of members of the Stanford community from injustices or abuses of discretion, from gross inefficiency, from unnecessary delay and complication in the administration of University rules and regulations, and from inconsistency, unfairness, unresponsiveness, and prejudice in the individual's experience with University activities. The Ombudsperson's office exists to receive, examine, and channel the complaints and grievances of members of the Stanford community, and to secure expeditious and impartial redress."

Any troublesome matter in the University community may be discussed with the University Ombudsperson. Services of the office are available to students, staff, and faculty. Complete confidentiality is assured.

Although possessing no decision-making authority, the Ombudsperson has wide powers of inquiry. The Ombudsperson will refer matters to the proper person or office expeditiously and, where appropriate, assist in negotiations. (For the role of the office of the Ombudsperson in cases of sexual harassment, see the "Non-Academic Regulations" section in this bulletin.)

POLICE SERVICES

The Stanford Police Department, 415-723-9633, is located at the corner of Campus Drive and Serra Street. It comprises several divisions: Deputized Patrol Officers: uniformed officers patrol the campus and respond to calls. They are fully empowered by Santa Clara County and have authority to stop vehicles, make arrests, and enforce all laws. Plain-clothes detectives follow up on cases as necessary.

Community Service Officers (CSOs): enforce parking regulations. The citations they issue for parking violations are payable to Santa Clara County and go to warrant if not paid. The night CSOs check on building security and provide a uniformed presence.

The Special Services Unit (SSU): a campus resource center providing crime prevention and safety awareness programs to the Stanford community. Its free services include pamphlets, videos, and presentations about bicycle safety, earthquake preparedness (earthquake information, 723-0569), personal safety, and property protection. Call 723-0806 to reach the SSU.

For police, fire, or ambulance response at any time, dial 9-1-1, a free call from all pay phones. From University phones (723-, 725-, 497-, or 498-prefix), dial 9-911.

For additional safety information, see the Stanford Farm Almanac, which is available from the Special Services Unit of the Stanford Department of Public Safety (723-0806).

CRIME STATISTICS BY CALENDAR YEAR

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Murder</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sex Offences</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forcible</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Nonforcible</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Robbery</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Aggravated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assault</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Burglary</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structures</td>
<td>162</td>
<td>201</td>
<td>178</td>
<td>175</td>
<td>100</td>
</tr>
<tr>
<td>Vehicles</td>
<td>140</td>
<td>295</td>
<td>137</td>
<td>169</td>
<td>70</td>
</tr>
<tr>
<td>Theft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Vehicle</td>
<td>53</td>
<td>35</td>
<td>31</td>
<td>20</td>
<td>9</td>
</tr>
<tr>
<td>Bicycle</td>
<td>588</td>
<td>682</td>
<td>829</td>
<td>643</td>
<td>343</td>
</tr>
<tr>
<td>Hate Crimes*</td>
<td>N/A</td>
<td>5</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Arrests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquor Law</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Violations</td>
<td>23</td>
<td>14</td>
<td>21</td>
<td>28</td>
<td>22</td>
</tr>
<tr>
<td>Drug Violations</td>
<td>9</td>
<td>4</td>
<td>7</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Weapons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possession</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>14</td>
<td>1</td>
</tr>
</tbody>
</table>

* Not tabulated prior to 1992.
† January to July.

PUBLIC EVENTS

All non-academic, non-athletic programs held in University buildings and/or on University property and that are open to the public and/or to students, except for such programs conducted in Tresidder Union or in student residences by stu-
students residing in such residences, must be scheduled through the Registrar’s Office on a specific form available from that office. All programs must be approved by Stanford Events. Organizations that may request use of University facilities for public events include academic departments, administrative offices, organizations recognized by the President’s Office, official organizations of the Associated Students of Stanford University (ASSU), and voluntary organizations registered with the Office of Student Activities (OSA) and the ASSU, and banking with the student-organization fund of the ASSU. Student organizations sponsoring programs must have the approval of the ASSU student financial manager and the OSA before their requests are presented to the Registrar’s Office for scheduling. Invitations to individuals not connected with the University to speak or perform at any function, social or otherwise, given by the University and open to the public, are extended only through the President. This ruling does not apply to those meetings at which speakers are invited by faculty to address the students of a class, department, or school, and which are part of the instructional program of the University. Stanford Events is responsible for the conduct of the Commencement exercises and all other public ceremonies; the approval of University rooms, buildings, outdoor space, and Laurence Frost Amphitheater for public events or meetings; the presentation of a performing arts series (The Lively Arts at Stanford), and a community outreach program; and managing Visitor Information Services and the Stanford Ticket Office. Copies of the Public Events Policy Manual are available from Stanford Events, Press Courtyard, Santa Teresa Street, Stanford, CA 94305-2250.

**SUMMER CONFERENCE SERVICES**

Policies concerning conferences are the responsibility of the President’s and Provost’s Offices. Arrangements for conferences are the responsibility of the Manager of Conferences. Summer Conference Services (415-723-3126) coordinates conferences from June 23 through September 15. Nonacademic Facilities Scheduling in the Registrar’s Office (415-723-6755) coordinates conferences during nonsummer months (September 16 through June 22).

A “conference” is any student or adult group that is not a part of a regular or summer academic session for registered students, whether convening for only part of a day (including a luncheon), overnight, or for several days. Outside organizations wishing to meet at Stanford must have the sponsorship of a University department. Conferences initiated by organizations within or outside the University must be closely related to the academic program of the University. The sponsoring department submits its proposal to the Manager of Conferences for review in terms of available facilities and for approval of the President’s Office. Arrangements for campus housing and/or meeting room facilities are made with the Manager of Conferences in the Summer Conference Services office, Encina Commons, room 123.

Housing and dining service accommodations in campus residences usually are available on the Sunday following Commencement until August 31. Assistance with arrangements for tables, chairs, audiovisual aids, signs, and other equipment may be made with Summer Conference Services.

**CENTER FOR TEACHING AND LEARNING (CTL)**

**Director:** Michele Marincovich

The Center for Teaching and Learning is a University-wide resource on effective learning for undergraduate and graduate students and on effective teaching for faculty, lecturers, and teaching assistants.

**SERVICES TO UNDERGRADUATES AND GRADUATES**

CTL provides a wide range of resources for students who want to modify their study habits and clarify their learning strategies. Through formal courses, individual counseling, and outreach programs, CTL helps students build skills that will be the foundation for continuous improvement and lifelong learning.

Free tutoring is available to undergraduates in most introductory subjects, including writing, by filling out a request form at CTL; usually a tutor will be assigned by the next day. Students interested in, and qualified for, tutoring others can take CTL’s courses on tutoring.

CTL is on the first floor of Sweet Hall, and is open Monday through Friday 9:00 a.m. to 12:00 noon and 1:00 to 5:00 p.m., telephone: 415-723-1326.

**SERVICES TO FACULTY AND TEACHING ASSISTANTS**

CTL provides the Stanford community with services and resources on effective teaching. Its aims are to: identify and involve successful teachers who are willing to share their talents with others, provide those who are seeking to improve their teaching with the means to do so, acquaint
the Stanford community with important innovations and new technologies for teaching, prepare inexperienced teachers for their responsibilities, and expand awareness of the role of teaching at research universities and increase its rewards.

Goals are realized through continuing programs such as: videotaping and consultation; small group evaluation; workshops and lectures; a handbook on teaching and a library of teaching materials; quarterly teaching orientations; and by working with individuals, groups, and departments on their specific needs. CTL offices are on the first floor of Sweet Hall. For further details, see CTL’s teaching handbook or the CTL brochure, both available by calling 723-1326.

**COURSES**

Workbooks, detailed syllabi, sample videos, and complete sets of evaluations for most CTL courses are available in room 115, Sweet Hall.

10. **Self-Coaching and Continuous Improvement** — Adopting a self-coaching strategy is the key to continuous improvement, a strategy that emphasizes self-motivation, self-observation, analysis, and a willingness to experiment.

1 unit, Aut, Spr (Matthies)

11. **Concept Busting** — Difficult, abstract concepts frequently do not yield their meaning on the basis of repeated rereading. Through the use of various techniques for active learning, it is possible to accelerate the process of conquering difficult concepts while also achieving higher levels of understanding.

1 unit, Aut, Spr (Matthies)

30. **Working Smarter Through Precision Questioning** — When work is driven by questions, concentration is better, recall is more complete, and motivation improves. Understanding the basic categories of questions and their interrelationships enables us to be more precise, better organized, and more critical.

2 units, Win (Matthies)

40. **Reading Faster** — Coping with the problem of information overload requires speed reading as it traditionally has been defined and the ability to overview, skim, extract, browse, and navigate through hypertext. To decide what is worth reading, quick and reliable judgments must be made about relevance and credibility.

1 unit, Aut, Spr (Matthies)

41. **Reading Smarter** — In addition to relying on various high-speed gears (CTL 40), expert readers have the ability to shift smoothly into forms of reading that are slower and more reflective. Primary goals of smart reading include: accurate long-term recall, precise interpretation, systematic criticism, idea generation, self-knowledge, and personal growth.

1 unit, Aut, Spr (Matthies)

50. **Think On Your Feet** — To be effective in groups, participants must quickly grasp the point being made, the supporting arguments, and the nature of the responses to arguments on the other side of the question. Effective teamwork depends on non-superficial forms of collaboration.

2 units, Win (Matthies)

116. **Critical Thinking** — Critical thinking encompasses knowing how to find assumptions, recognize ambiguity, evaluate arguments, and judge the credibility of sources of expert opinion. To think critically in one’s daily life and studies requires being comfortable with questions instead of answers, complexity instead of simplicity, uncertainty instead of certainty. These abilities are developed through practical exercises based on contemporary issues and through practice with college-level work from a variety of disciplines. Emphasizes the value of developing a questioning mind and the importance of differentiating between academic and intellectual motivation.

3 units, Sum (Staff)

118. **Public Speaking** — A practical approach to the art of public speaking. Examines speech at the informal level, looking at impromptu and anecdotal communication. Emphasizes skill development in various speech types: exposition, argumentation, and persuasion. Students sharpen skills with the aid of textbooks, videotape, recorded speeches, and participation in a final program of talks. Students also evaluate presentations by others.

3 units, Sum (Wagstaffe)

120. **Peer Tutor Training** — Readings, discussion of videotapes, and individual and group projects. Topics: problem-solving, study skills, effective listening and feedback, cross-cultural sensitivity, and teaching with questions. Short internship required for new tutors.

1 unit, Aut, Win (Prosko)

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 (Prosko)

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 (Prosko)

by arrangement

180. **Breakthrough Learning** — Drawing on research in cognitive science, human motivation, and developmental psychology, the focus is on a key meta-skill: learning how to learn. Strategies help students construct new learning practices by be-
coming deeply aware of one's own learning processes. Topics: the art of unlearning, language structure and change; learning styles and the intelligence trap; metacognition; harassing paradox and intuition; communities of inquiry.

1 unit, Sum (Milojkovic) F 9-10:50

AWARDS AND HONORS

FACULTY AND STAFF

KENNETH M. CUTHBERTSON AWARD

The Kenneth M. Cuthbertson Award was established in 1981 for recognition of exceptional service to Stanford University. It was established by members of the faculty who wish to remain anonymous. All members of the Stanford community are eligible for the award; the sole criterion is the quality of the contribution that the recipients have made to the University. The award provides a way of honoring members of the staff and faculty for their efforts on behalf of the University.

Ordinarily, one award is made each year. The award was first presented in 1981 to the person for whom it is named. Kenneth M. Cuthbertson was one of the early architects of Stanford's long-term financial planning and fundraising program. His service to Stanford has set an enduring standard for those who will come after him. The award is made annually at the University Commencement Ceremony.

LLOYD W. DINKELSPIEL AWARDS

The Lloyd W. Dinkelspiel Awards recognize Distinctive and Exceptional Contributions to Undergraduate Education at Stanford University. The two principal awards are made to the faculty or staff members adjudged to have made the most distinctive contribution to the development and enrichment of undergraduate education in its broadest sense. Two awards are also made to graduating seniors who combine academic achievement with effective contributions to undergraduate student life. Preference is given to service in the School of Humanities and Sciences in the area of liberal education. The awards are made from an endowment fund established in memory of Lloyd W. Dinkelspiel, a Stanford alumnus and trustee. The awards are made annually at the University Commencement Ceremony.

WALTER J. GORES AWARDS

The Walter J. Gores Faculty Achievement Awards for excellence in teaching were established by bequest of Walter J. Gores, Stanford Alumnus of the Class of 1917 and a professor at the University of Michigan for 30 years. Teaching is understood in its broadest sense and includes, in particular, lecturing, leading discussions, tutoring, and advising at the undergraduate or professional levels. Any member of the teaching staff of the University is eligible for an award, including all faculty of professorial rank, instructors, lecturers, teaching fellows, and teaching and course assistants. Ordinarily, awards are made to a senior faculty member (associate or full professor) or senior lecturer; a junior faculty member or member of the teaching staff; a teaching assistant (graduate or undergraduate student). The awards are made annually at the University Commencement Ceremony.

STUDENT SERVICES AND PROGRAMS

ALLAN COX MEDAL FOR FACULTY EXCELLENCE FOSTERING UNDERGRADUATE RESEARCH

The Allan Cox Medal for Faculty Excellence Fostering Undergraduate Research is awarded annually to a faculty member who has established a record of excellence directing undergraduate research over a number of years of advising one or two undergraduates who demonstrated superior work. The medal was established in memory of the former professor of Geophysics and dean of the School of Earth Sciences, a strong supporter of faculty-student research collaboration.

HERBERT HOOVER MEDAL FOR DISTINGUISHED SERVICE

David Starr Jordan's firm belief that every academic degree should represent work actually done in or under the direction of the institution granting it has meant that since its founding, Stanford has awarded no honorary degrees. As a means of recognizing extraordinary individuals who deserve special acknowledgment, the Stanford Alumni Association in 1962 voted to establish the Herbert Hoover Medal for Distinguished Service. The name pays tribute to the former President's example of service to his University, to his country, and to the cause of world humanitarianism. Indeed, Mr. Hoover was the first award recipient. The gold medal is presented following selection by an anonymous committee appointed by the Chair of the Board of Directors of the Alumni Association. There have been 11 honorees.

STUDENT BOOTHE PRIZE

Awarded during the freshman year, the Boothe Prize recognizes excellence in writing. Students are selected for this honor on the basis of essays written for courses in Cultures, Ideas, and Val-
AWARDS AND HONORS

The President's Award honors students who have exceptionally distinguished academic records that exemplify a strong program of study in the freshman year. Students eligible for the award normally have completed Writing and Critical Thinking and Cultures, Ideas, and Values during their first year at Stanford.

The Firestone Medal is awarded to seniors in recognition of excellence in undergraduate research. Departments in the School of Humanities and Sciences nominate students who have completed outstanding honors projects in the social, physical, and natural sciences.

The Golden Medal recognizes outstanding achievement in the humanities and the creative arts. Seniors receive these medals upon nomination by their major department.

The Terman Award is presented to seniors for outstanding academic achievement. The awardees share their award with a high school teacher of their nomination.

The Deans' Award honors individuals for exceptional accomplishments including course-related work, unusual achievement in independent research, success in national competitions of an academic nature, writing or presentations for a regional or national audience, and other similar achievements. Awarded are selected on the basis of faculty nominations and academic records.

Phi Beta Kappa is a nationwide society honoring students for the excellence and breadth of their undergraduate scholarly accomplishments. Membership in the Stanford Chapter (Beta of California) is open to undergraduates of all majors.

Approximately a tenth of the members of a graduating class are elected to Phi Beta Kappa. Of this number, about one fourth are chosen in their junior year, the remainder in their senior year.

To be elected to Phi Beta Kappa at Stanford, a student must achieve academic distinction in the major as well as in courses across a broad range of fields. Normally, a student will not be considered to have met the breadth standard if he or she has not satisfied all the Distribution Requirements by the time elections to the Stanford chapter are held, early in the Spring Quarter. In its evaluation of the breadth of a student's program of study, the selection committee looks for achievement beyond the beginning level in areas outside the major.

A grade of "+" is not considered a sign of distinction.

The academic records of all students are automatically reviewed, so no special action is required for students wishing to be considered for membership. Anonymity in the election process is ensured by removal of students' names from their academic records before consideration. Students who desire that their records not be made available for consideration by the Stanford chapter of Phi Beta Kappa should inform the Registrar, room 133, Old Union.
STATEMENT OF NONDISCRIMINATORY POLICY

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

REHABILITATION ACT OF 1973

In its programs, activities, and employment, Stanford University does not discriminate on the basis of handicap. An affirmative action officer has been appointed to coordinate the University’s efforts to comply with the Rehabilitation Act of 1973 and regulations promulgated thereunder prohibiting discrimination on the basis of handicap. Anyone who believes that in some respect Stanford is not in compliance with the Rehabilitation Act and its regulations should call the Office for Multicultural Development at 415-723-3484.

AMERICANS WITH DISABILITY ACT

The ADA prohibits discrimination against individuals with disabilities and guarantees disabled people “full and equal enjoyment of the goods, services, facilities, privileges, advantages, or accommodations of any place of public accommodation.” Rosa Gonzalez has been designated the 504/ADA Compliance Officer and may be reached at the Office for Multicultural Development at (415) 723-3484, TTY 723-1216. Anyone who believes that Stanford is not in compliance with the ADA and its regulations should call Ms. Gonzalez.

TITLE IX OF THE EDUCATION AMENDMENTS OF 1972

It is the policy of Stanford University to comply with Title IX of the Education Amendments of 1972 and its regulations, which prohibit discrimination on the basis of sex. Sally Dickson, Director of the Office of Multicultural Development, has been appointed to coordinate the University’s efforts to comply with the law. Anyone who believes that, in some respect, Stanford is not in compliance with Title IX and its regulations should contact Ms. Dickson at 415-723-3484.

COPYING PRINTED MATERIAL FOR TEACHING AND RESEARCH

Federal copyright law governs copying intellectual property such as books and articles, including the making of copies for teaching and research. It is each faculty member’s responsibility to be aware of and abide by the law, and the Provost’s Office periodically issues memorandum reminding faculty and staff members of their responsibilities in this area.

The memoranda, in addition, list those publishers with whom Stanford has an experimental photocopying license that permits Stanford faculty, staff, and students to make as many copies as they need of excerpts of any length (but not an entire book or issue of a periodical) in connection with the educational, research, or administrative functions of the University. For the most current information on this subject, faculty members should consult their department chair or the Provost’s Office.

DOMESTIC PARTNERS POLICY

In October 1990, Stanford University adopted a domestic partners policy. This policy, which implements the University’s nondiscrimination policy, makes services that have historically been available to married students available on an equal basis to students with same-sex or opposite-sex domestic partners. These services include access to student housing, a courtesy card that provides access to University facilities, and the ability to purchase medical care at Cowell Health Service. A domestic partnership is defined as an established long-term partnership with an exclusive mutual commitment in which the partners share the necessities of life and ongoing responsibility for their common welfare.

POLICY ON SEXUAL HARASSMENT

It is the policy of Stanford University to maintain the University community as a place of work and study for students, faculty, and staff free of sexual harassment and all forms of sexual intimidation and exploitation. It is fundamental to the concepts of academic freedom and equal opportunity that each member of the University community be treated with dignity and without regard to any factor irrelevant to participation in the activities of this community.

It is further the policy of the University to prevent, correct, and remedy sexual harassment. All students, faculty, and staff are subject to this policy. Individuals who violate this policy are
subject to discipline up to and including discharge, expulsion, or other appropriate sanction.

Reprisals against an individual who in good faith raises a concern or makes a charge about behavior that may violate this policy are against the law and will not be tolerated. Intentionally false charges, however, are grounds for discipline.

Stanford is committed to the principles of free inquiry and free expression. Vigorous discussion and debate are fundamental to the University, and this policy is not intended to stifle freedom of expression nor will it be permitted to do so. Sexual harassment is not protected expression; it compromises the integrity of the University, its tradition of intellectual freedom, and the trust placed in its members.

Sexual harassment violates state and federal law as well as University policy. Written information on sexual harassment is available at the Office of the Sexual Harassment Coordinating Adviser 415-723-3682. Copies of the University policy on Sexual Assault, which complements this Sexual Harassment policy, as well as all other documents mentioned below, are also available at Coordinating Adviser’s office.

WHAT IS SEXUAL HARASSMENT?

Sexual harassment consists of unwanted sexual advances, requests for sexual favors, and other visual, verbal, or physical conduct of a sexual nature when:

1. It is implicitly or explicitly suggested that submission to or rejection of the conduct will be a factor in academic or employment decisions or evaluations, or permission to participate in a University activity; or

2. The conduct has the purpose or effect of interfering with an individual’s academic or work performance by creating a hostile and unacceptable educational, work, or student living environment.

The determination of what constitutes sexual harassment depends upon the specific facts and the context in which the conduct occurs. Sexual harassment may take many forms. It may be subtle and indirect or blatant and overt. It may be conduct affecting an individual of the opposite sex or conduct affecting an individual of the same sex. It may occur between peers or between individuals in a hierarchical relationship. The key question is always whether the conduct is unwelcome to the individual to whom it is directed, regardless of the intentions of the actor. Sexual harassment includes sexual advances that are repeated and unwanted, even where they are exclusively verbal and not coercive. Coercive behavior, including suggestions that academic or employment reprisals or rewards will follow the refusal or granting of sexual favors, constitutes gross misconduct and will not be tolerated. A single incident could be grounds for discharge or expulsion.

CONSENSUAL RELATIONSHIPS

Those who supervise or evaluate the work of others, both in academic and employment settings, must base their decisions on the merits and must deserve the trust of persons affected by these decisions. To be effective, they must be perceived to make their decisions fairly and without favoritism. There are special risks in any sexual or romantic relationship between individuals in inherently unequal positions (such as teacher and student, supervisor and employee, or student resident and the individual who supervises the day-to-day student living environment). Such relationships may undermine the real or perceived integrity of the supervision and evaluation provided, and the trust inherent particularly in the student-faculty relationship. They may, moreover, be less consensual than the individual whose position confers power believes. The relationship is likely to be perceived in different ways by each of the parties to it, especially in retrospect.

The University has no formal policy prohibiting consensual romantic or sexual relationships among faculty, staff, or students. But relationships in which one party is in a position to review the work or influence the career of the other may provide grounds for complaint when that relationship gives undue access or advantage, restricts opportunities, or creates a hostile and unacceptable environment for others. Furthermore, circumstances may change, and conduct that was previously welcome may become unwelcome. Even when both parties have consented at the outset to a romantic involvement, this past consent does not remove grounds for a charge based upon subsequent unwelcome conduct.

GLOSSARY

In addition to “sexual harassment,” which has already been defined, the terms “concern,” “charge,” “complainant,” “informal resolution,” and “grievance” are used in a somewhat technical way in the discussion below. They are used in this policy in the following sense:

A concern is a question or problem involving sexual harassment or similar conduct that an individual wants to discuss without (yet) having made the decision to pursue the matter further. The reason for distinguishing between concerns and complaints is that members of the University community should be able to get advice about behavior that may constitute sexual harassment even if they are not certain that it violates this policy or that they want to take action.

A charge is an assertion that a named individual has violated this policy. A charge may be
concerns and charges

Students, faculty, and staff members should feel free to discuss any concerns, even when they do not amount to charges, with the Sexual Harassment Advisers or other University officers. The decision to pursue a concern as a charge is always one for the individual who believes that she or he has experienced sexual harassment, although there may be situations in which the University must act even in the absence of a formal charge. For example, when other students or employees may be at risk, the University may investigate and take action on the basis of facts it discovers, but without naming the original source of information.

Any University official receiving a charge of sexual harassment must ensure that the charge is investigated promptly and fully and that effective steps are taken to eliminate harassment where it exists, even when it is too late for a formal grievance to be brought.

A charge may be handled informally or, where applicable, through a formal grievance process. While a request for informal resolution may be made at any time, the more promptly the charge is made, and the more information the complainant can provide, the more likely it is that a full investigation can be conducted effectively.

Informal resolution procedures

For all parties concerned, informal resolution of charges is generally the preferable course.

There are several ways in which charges may be handled informally. These include:

Advice: some people may prefer to try to deal with the situation themselves, at least in the first instance, and may simply want advice about how best to proceed.

Moderated discussion: the complainant may wish to discuss the matter with the other party in the presence of that person's department chair, dean, or supervisor, or a Sexual Harassment Adviser, or both.

Mediation: where both parties are willing, a more structured mediation may be arranged.

Investigation followed by supervisory action: if significant facts are contested, the department chair, dean, or supervisor of the person accused may undertake an investigation, in consultation with a member of the Sexual Harassment Panel. Although informal, the investigation will be carried out in a way that respects the rights of the person being charged and the privacy of all those involved, including the complainant. The results of such an investigation will be available for use in the event of a subsequent grievance or disciplinary action.

Possible outcomes of informal processes include explicit agreements about future conduct,

Procedures and implementation

What to do about sexual harassment

There are many resources for people who may have been sexually harassed. Deans, department chairs, and supervisors are all available to hear concerns from or about individuals within their program areas. The Coordinating Adviser is an expert trained to respond to sexual harassment, and is responsible for overseeing the implementation of this policy. The duties of the Coordinating Adviser include providing information, personally or through the advisers, about the full range of possible ways to proceed.

Any of these individuals may be consulted on a confidential basis; no records are kept, and no steps will be taken that identify the person requesting advice unless and until that person states in writing that the University may take such steps. Please note, however, that while this provision governs the process so far as it is within Stanford's control, there are certain obligations that may require disclosure despite University policy. Under subpoena, or in connection with the applications by others for security clearances or professional licenses (for teaching, or practicing law or medicine, for instance) Stanford personnel can be required to divulge information known to them, even though it was acquired in confidence. When it is important to reduce or eliminate even this risk of disclosure, concerned individuals may wish to avoid giving any names in the initial stages. Additional information and suggestions about confidentiality can be obtained from the Coordinating Adviser.

Regardless of whether an individual is following an informal procedure or a formal grievance, a request that it be reviewed by someone other than his or her immediate supervisor is always honored.
changes in workplace assignments, substitution of one class for another, or any other appropriate relief.

GRIEVANCES
As an alternative to informal procedures, or when informal resolution efforts fail, the complainant may be able to file a grievance. At Stanford, grievance procedures are generally designed to provide a remedy when an individual is adversely affected in his or her University capacity. The applicable procedure depends on the grievant's status as a student, faculty member, or member of the various staff categories. Generally, the process consists of the grievant's submission of a written statement. An investigation by a University officer followed by a decision and, in some cases, the possibility of one or more appeals, usually to administrative officers at higher levels. The relevant procedure should be read carefully, since they vary considerably, for example, the Bargaining Unit grievance procedures provide for binding arbitration. Note that if the identified grievance officer has a conflict of interest, an alternate will be arranged; the Coordinating Adviser can help make sure this occurs. In most cases, grievances must be brought within a specified time after the action complained of. While informal resolution efforts will not automatically extend the time limits for filing a grievance, in appropriate circumstances the complainant and the University may mutually agree in writing to extend the time for filing a grievance.

Copies of the following established grievance procedures may be obtained from the Office of the Coordinating Adviser:
Nonacademic Staff Grievance Procedure (Guide Memo 22.10)
Collective Bargaining Agreements for unit members
Academic Staff Grievance Procedure
Faculty Grievance Procedure (Guide Memo 21.4)
Student Academic Grievance Procedure (see “Academic Grievance Procedure” section of this bulletin)
Student Employee Grievance Procedure (Guide Memo 24)
Student Nonacademic Grievance Procedure pursuant to Title IX (for additional information, consult the Director of the Office for Multicultural Development, who serves as the University’s Title IX Officer).

Student conduct is governed by the Fundamental Standard listed in this bulletin.

DISCIPLINE
Independent of any remedy for the individual complainant, the University may determine that disciplinary action should be taken against the person being charged. The decision to initiate disciplinary action is in the discretion of the President or his or her designee (for faculty and students) or the administrative supervisor (for staff employees). The complainant and the Coordinating Adviser will be informed of any disciplinary action that is imposed.

RESOURCES FOR DEALING WITH SEXUAL HARASSMENT
OVERVIEW
Enforcement of this policy is the responsibility of the senior University officers (deans, vice presidents, and their delegates) responsible for faculty, staff, and student affairs; the Sexual Harassment Coordinating Adviser is responsible for coordinating its implementation. Anyone who believes he or she may have been sexually harassed, or who has individual concerns about sexual harassment in the University, is encouraged to discuss the matter with any University officer and obtain guidance and advice about available procedures. Informal, local resolution of a concern or charge is preferable whenever feasible. There are, however, a number of individuals specially trained, and charged with specific responsibilities, in the area of sexual harassment.

Each school and administrative unit may also designate an individual or group of individuals to respond to concerns or charges.

COORDINATING ADVISER
The coordinating adviser is responsible for coordinating the implementation of the Sexual Harassment Policy. He or she provides advice to individuals and generally coordinates matters arising under this policy. Among the most important functions of the Coordinating Adviser are:
Publishing and disseminating an informational pamphlet containing this policy and providing guidance for those affected by sexual harassment.
Distributing this policy statement to all students, faculty, and staff at the time of their joining the University and annually thereafter.
Distributing and posting relevant material and making any reports required by state or federal law.

The duties of the Coordinating Adviser also include (1) acting as one of the Sexual Harassment Advisers; (2) supervising the day-to-day advising duties of the other advisers; (3) acting as a resource to the Sexual Harassment Panel; (4) providing information to other University officers about sexual harassment; (5) being aware of, and encouraging and facilitating the use of, prevention education resources specific to sexual harassment; (7) maintaining records of every charge, including the names of the complainant and the person being charged and the disposition of the charge; (8) transmitting to the Presi-
dent annually a report of the number of charges made to the advisers and other University officers; (9) taking other action necessary to implement this policy. The Coordinating Adviser reports to the Provost.

SEXUAL HARASSMENT ADVISERS

Sexual Harassment Advisers are appointed by the Provost and may include faculty, students, and staff. Although training is provided to all new advisers whenever possible, the advisers include at least one faculty member with expertise in the field.

Advisers are responsible to discuss any concerns or charges with students, faculty, or staff members, to provide copies of this policy, and to explain the internal options. If requested, an adviser may assist an individual in making a police report. Advisers do not keep permanent records or files reflecting their discussions. Even if an individual does not wish to make a charge and no further action is taken by the University, the adviser may be able to give useful advice. If an individual decides to make a charge, however, the facts of the charge and the identity of the parties involved will be recorded, and the adviser will consult with the coordinator before taking any specific action to resolve the matter informally.

THE SEXUAL HARASSMENT PANEL

The Sexual Harassment Panel acts as an optional resource to school or administrative officers responsible to investigate charges and remedy situations where sexual harassment is found. The panel is also a resource to University officers hearing grievances involving sexual harassment.

Members of the panel are appointed by the President. The panel may include faculty, students, and staff. On request of the cognizant University official, the panel (or one or more of its members, as determined by its chair) will advise and assist administrative officers in investigating or considering action based on a charge of sexual harassment. In any formal grievance procedure in which sexual harassment is asserted, the University grievance officer will consult the panel, which will provide guidance and advice. The panel reports to the Coordinating Adviser on every charge in which it is involved.

RESOURCES WITHIN ACADEMIC OR ADMINISTRATIVE UNITS

The cognizant University official (deans of schools and heads of other administrative units) may handle concerns and charges themselves or with the help of an advisory individual or group. The Coordinating Adviser is available to facilitate training of individuals so designated. Charges brought to a school or administrative unit (either by the complainant in the first instance, or because the charge cannot be resolved informally by an adviser) is handled as follows:

1. If facts are disputed, the charge will be investigated by the cognizant University official; once the facts are determined, if sexual harassment (or other unfair or inappropriate action) is found, the cognizant University official will attempt to reach a negotiated or mediated resolution.

2. If a negotiated or mediated resolution is not reached, the cognizant University official will take appropriate action.

3. In either case the complainant and the Coordinating Adviser will be advised of the outcome of the investigation and the action, if any, taken in response to the charge.

Those handling charges brought to schools or administrative units are strongly encouraged to consult with the panel (or a member designated by the chair of the panel) concerning the investigation and remedies. In any event, the disposition of every charge shall be reported to the Coordinating Adviser.

POLICY REVIEW AND EVALUATION

This policy went into effect on October 6, 1993. After it has been in effect for two years, the Provost will establish a committee that includes faculty, staff, and students to evaluate it and make recommendations for its improvement.

POLICY ON SEXUAL ASSAULT

Background—Stanford University's policy and procedures on sexual harassment are published in Administrative Guide Memo 23.2 and are re-published annually in the Stanford Bulletin and elsewhere. This statement supplements them, providing Stanford University's policy and procedures specifically concerning sexual assault. This statement has been enacted by Stanford University in accordance with California State Law, Assembly Bill 3098, Postsecondary Education: Student Safety, July, 1990.

Definition — For the purposes of this statement by the University, "sexual assault" includes, but is not limited to, rape, forced sodomy, forced oral copulation, rape by a foreign object, sexual battery, or threat of sexual assault.

Policy — Sexual assault by force or coercion, including deliberate coercion through the use of drugs or alcohol, is absolutely unacceptable at Stanford University. Any member of the Stanford community who commits sexual assault at or on the grounds of the University, or at any of the University's off-campus facilities or activities, or at the facilities or activities of any affiliated student organization, will face maximal institu-
tional sanctions, in addition to any prosecutions
external authorities may undertake. Stanford
University is committed to providing informa-
tion on services, resources, and treatment avail-
able to victims of sexual assault.

Notification — With the consent of the victim,
charges of sexual assault received by University
offices or personnel shall be communicated
promptly to the Department of Public Safety, 711
Serra Street, telephone (9)-911 for emergency
response or 415-723-9633 during normal busi-
ness hours, or, in the case of a student, to the sexual
assault response team at Counseling and Psychol-
ogical Services (CAPS) at Cowell Student Health
Center, 606 Campus Drive, telephone 723-3785.

Legal Reporting Requirements — Health care
professionals are expected to fulfill legally man-
dated reporting requirements.

Emergency Services Available to Victims —
Victims of sexual assault are urged to seek im-
mediate attention from emergency police, medical,
and counseling services. On the Stanford cam-
pus and in the immediate vicinity, the following
provide 24-hour response and will arrange for
police assistance, medical assistance, emotional
support services, and advocacy and support:

“911” Emergency Network: dial 9-911 from
University phones or 911 from outside phones.
Santa Clara Valley Medical Center, 751 South
Bascom Avenue, San Jose, telephone 408-299-
5311.

Mid-Peninsula Rape Crisis Center, 4161 Alma
Street, Palo Alto, telephone 415-493-RAPE.
Sexual Assault Response Team (CSART), for
students, at the Cowell Student Health Cen-
ter, telephone 723-3785.

Stanford University Hospital, 300 Pasteur Drive,
Stanford, telephone 723-5111.

Non-Emergency Resources — Additional re-
sources for students are available at Cowell Stu-
dent Health Center (415-723-3785) including
short-term counseling, referral to long-term
therapy, follow-up pregnancy testing, and test-
ing and treatment for sexually transmitted dis-
eases. Additional services for faculty and staff
are available at the University’s HELP Center,
Galvez House (723-4577), including general
counseling, information, support, and referral.
The University Ombudsperson (723-6494) is
available to all in the Stanford community for
general counseling, advice, and advocacy.

Ongoing Case Management Procedures — Both
informal procedures and formal grievance pro-
cedures for case management of sexual assault
charges are given in the University’s policy on
Sexual Harassment appearing as Administrative
Guide Memo 23.2 and published annually in the
Stanford Bulletin. Victims are to be kept infor-
med by those responsible for those procedures of the
status of any disciplinary proceedings and the
results of any disciplinary action or appeal, pro-
viding that the victim agrees in advance, in writ-
ing, to treat this information as confidential. The
offices of the Dean of Students are available to
help student victims deal with academic diffi-
culties that may arise because of the victimiza-
tion and its impact.

Information Requests and Confidentiality —
The University offices responding to charges of
sexual assault have established protocols for pro-
tecting confidentiality and for handling inquir-
ies from the press, concerned students, and par-
ents.

Information about Options — The University
offices responding to charges of sexual assault
will inform victims, at a minimum, of the op-
tions of: criminal prosecution, civil prosecution,
the disciplinary process, the appropriate griev-
ance procedure, the availability of mediation,
alternative housing assignments, and academic
assistance alternatives.

POLICY ON CAMPUS
DISRUPTION

Because the rights of free speech and peace-
able assembly are fundamental to the democratic
process, Stanford firmly supports the rights of
all members of the University community to ex-
press their views or to protest against actions and
opinions with which they disagree.

All members of the University also share a
concurrent obligation to maintain on the cam-
pus an atmosphere conducive to scholarly pur-
Pursuits, to preserve the dignity and seriousness of
University ceremonies and public exercises, and
to respect the rights of all individuals.

The following regulations are intended to re-
concile these objectives.

It is a violation of University policy for a mem-
er of the faculty, staff, or student body to (1)
prevent or disrupt the effective carrying out of
a University function or approved activity,
such as lectures, meetings, interviews, ceremo-
nies, the conduct of University business in a
University office, and public events; (2) ob-
struct the legitimate movement of any person
about the campus or in any University build-
ning or facility.

Members of the faculty, staff, and student body
have an obligation to leave a University build-
or facility when asked to do so in the fur-
therance of the above regulations by a mem-
er of the University community acting in an
official role and identifying himself or her-
self as such; members of the faculty, staff, or
student body also have an obligation to iden-
tify themselves, when requested to do so by
such a member of the University community
who has reasonable grounds to believe that the
person(s) has violated section (1) or (2) of this policy and who has so informed the person(s).

The policy has been applied to the following actions: refusal to leave a building which has been declared closed; obstructing the passage into or out of buildings by sitting in front of doorways; preventing University employees from entering their workplace; preventing members of a class from hearing a lecture or taking an examination, or preventing the instructor from giving a lecture, by means of shouts, interruptions, or chants; preventing others from hearing a schedules speaker by means of shouts, interruptions, or chants; refusing to leave a closed meeting when unauthorized to attend; and intruding upon or refusing to leave a private interview.

It should be understood that while the above are examples of extraordinarily disruptive behavior, the application of the policy also takes situational factors into consideration. Thus, for example, conduct appropriate at a political rally might constitute a violation of the Policy on Campus Disruption if it occurred within a classroom.

There is no "ordinary" penalty which attaches to violations of the Policy on Campus Disruption. In the past, infractions have led to penalties ranging from censure to expulsion. In each case, the gravity of the offense and the prior conduct of the student are considered; however, the more serious the offense, the less it matters that a student had otherwise not done wrong.

### POLICY ON CONTROLLED SUBSTANCES AND ALCOHOL

Student conduct is guided by the Fundamental Standard, which states the expectation that students will act in ways that demonstrate respect for order, personal honor, and the rights of others. Implicit in the Standard is the understanding that students are responsible for making their own decisions and accepting the consequences of those decisions.

In order to make informed decisions about alcohol use, students and others should be aware of the health and safety risks associated with its use, as well as the state and local laws about possessing, serving, and consuming alcohol. It is widely recognized that the misuse and abuse of drugs ("controlled substances") and the abuse of alcohol are major contributors to serious health problems, as well as to social and civic concerns. The health risks associated with the use of illicit drugs and the abuse of alcohol include various deleterious physical and mental consequences including addiction, severe disability, and death. Information concerning the known effects of alcohol and specific drugs is available from the Alcohol and Drug Information Center at the Cowell Student Health Center.

The goal of this policy is to reduce drug and alcohol abuse and the human and material costs associated with it. The University, as an educational institution, approaches student conduct issues from a perspective that places greater emphasis on individual responsibility and development than on regulatory measures. Consequently, education about and prevention of alcohol-related problems will continue to be our primary emphasis. Moreover, it is the intention of the University that students as individuals and as members of groups will conduct themselves in accordance with this and all other University policies governing student conduct.

* Controlled substances are those defined in 21 U.S.C. 812 and include, but are not limited to, such substances as marijuana, heroin, cocaine, and amphetamines.
POLICY

It is the policy of the University to maintain a drug-free workplace and campus. The unlawful manufacture, distribution, dispensation, possession, and/or use of controlled substances or the unlawful possession, use, or distribution of alcohol is prohibited on the Stanford campus, in the workplace, or as part of any of the University’s activities. The workplace and campus are presumed to include all Stanford premises where the activities of the University are conducted. Violation of this policy may result in disciplinary sanctions up to and including termination of employment or expulsion of students. Violations may also be referred to the appropriate authorities for prosecution. This policy will be reviewed at least biennially.

SOME APPLICATIONS

No University funds or funds collected by the University may be used in a way which violates the policy.

While there are a few freshmen at Stanford who are 21 or older, and residence staff members often are in the 21 or older age range, the fact remains that the great majority of residents of an all-freshman dormitory are minors. Consequently, it is hard to imagine how house dues for all-freshman residences could be used to buy alcohol without violating both state law and University policy.

Notwithstanding the foregoing, regardless of how money is collected, all provisions of the policy apply to all students, faculty, and staff.

Event planners will be held individually and collectively responsible for planning and carrying out events in compliance with the policy. One or more house/organization officers must assume responsibility for the event’s compliance with the alcohol policy. These officers’ names must be made available to the police and to the University upon request.

CONSEQUENCES OF VIOLATION

Educational and rehabilitative measures will be the preferred response to infractions unaccompanied by more egregious conduct. However, behavior could run the gamut from a simple Minor in Possession (of alcohol) with no prior disciplinary history to drunken behavior resulting in loss of life. Penalties will be calibrated according to the severity of the misconduct. Behavior associated with drug or alcohol use and abuse may constitute one or more of the following.

1. Violation of the University residence agreement or “Terms and Conditions of Fraternity Occupancy,” subjecting the student to loss of University housing.

2. Violation of student organization conditions of recognition, subjecting the student to expulsion from the organization and/or the organization’s loss of University recognition and associated privileges.

3. Violation of the Fundamental Standard, subjecting the student to University discipline, which includes as a possible outcome suspension or expulsion from Stanford.

Inebriation is not an excuse for misconduct but rather is an aggravating circumstance. A student’s careless or willful reduction, through the use of alcohol or other intoxicants, of his or her own ability to think clearly, exercise good judgment, and respond to rational intervention is considered grounds for more stringent penalties than might be levied otherwise.

Residences or student organizations found to have violated the policy are subject, as groups, to University sanctions such as suspension of social privileges and loss of University recognition, meeting space, and housing, if applicable.

CIVIL LIABILITY

While the law regarding civil liability is complex, it is important to know that under some circumstances party hosts, sponsors, bartenders, or others may be held legally liable for the consequences of serving alcohol to underaged drinkers or to obviously intoxicated persons.

CRIMINAL LIABILITY

Stanford University is not a sanctuary from the enforcement of state and local laws. Students and others on campus who violate the law may be and have been arrested and prosecuted. Primary responsibility for law enforcement, including that related to alcohol, rests with law enforcement agencies, primarily the Stanford Police Department. Uniformed officers who patrol the campus and respond to calls are deputized by the sheriff of Santa Clara County and are fully empowered and authorized to stop vehicles, make arrests, and enforce all laws. Laws are subject to change; consequently, the following information is illustrative but must not be relied on as a complete and current citing of relevant laws. More information is available at the Stanford Department of Public Safety, 711 Serra Street.

Generally, as of September, 1990, it is a criminal offense:

1. To provide any alcoholic beverage to a person under 21 (California Business and Professions Code 25658).

2. To provide any alcoholic beverage to an obviously intoxicated person (California Business and Professions Code 25602).

3. For any person under age 21 to purchase alcohol (California Business and Professions Code 25628).

4. To be under the influence of alcohol in a public place and unable to exercise care for one’s own safety or that of others (California Penal Code 647).
5. For persons under 21 to have any container of alcohol in any public place or any place open to the public (Business and Professions Code 25662).

6. To operate a motor vehicle while under the influence of alcohol or other intoxicants or with a blood alcohol level of .08% or higher (California Vehicle Code 23152).

7. To have an open container of alcohol in a motor vehicle and for persons under 21 to drive a vehicle carrying alcohol or to possess alcohol while in a motor vehicle (California Vehicle Code 23223, 23224).

8. To have in one's possession or to use false evidence of age and identity to purchase alcohol (California Business and Professions Code 25661).

9. To illegally manufacture, sell, distribute, or possess controlled substances (those listed in Schedules I through V of the Controlled Substances Act) (21 USC 812; 21 USC 828, 841, 844, 845, 845A).


11. To transport, sell, or distribute marijuana to a minor or to use a minor to transport, sell, or distribute marijuana (California Health and Safety 11361).

WHERE TO GET HELP

Campus Resources (Area Code 415) — The Bridge (phone 723-3392); Counseling and Psychological Services (phone 723-3785); Campus Ministries (phone 723-3114); Cowell Urgent Care (phone 723-4861); Stanford Alcohol and Drug Treatment Center (phone 723-6682).

Project R2ISC: Risk Reduction of Intoxicants in the Stanford Community, a student-led program associated with Cowell Health Center and its Health Promotion Program, which provides educational programs, party-planning assistance, and information about the use and misuse of alcohol and drugs (phone 723-0821).

Alcohol and other Drug Information Center (phone 723-0821). STOP: provides pick-up from parties to prevent alcohol-impaired driving (phone 725-STOP).

Community Resources — Alcoholics Anonymous (phone 415-573-6811); Al-Anon (phone 415-873-2356); Bay Area Hotline (phone 415-366-7374); Cocaine Hotline (phone 1-800-COCAINEN); National Council on Alcoholism Hotline (phone 1-408-267-HELP).

SMOKE-FREE ENVIRONMENT

Policy — It is the policy of Stanford University that smoking of tobacco products in enclosed buildings and facilities and during indoor or outdoor events (and the selling of tobacco products) on the campus is prohibited. Subject to renegotiations, the University will comply with any current lease agreement permitting the sale of tobacco products on the campus.

Applicability — This policy applies to all academic and administrative units of Stanford University, including SLAC, and all Residence Halls. This policy does not supersede more restrictive policies which may be in force in compliance with federal, state, or local laws or ordinances. The policy was effective in the Residence Halls and other campus student housing locations at the beginning of the 1994-1995 academic year.

Guidelines — Smoking is prohibited in classrooms and offices, all enclosed buildings and facilities, in covered walkways, in University vehicles, during indoor and outdoor athletic events, and during other University sponsored or designated indoor or outdoor events.

Ashtrays will not be provided in any enclosed University building or facility. Tobacco products will not be sold at the University. "Smoking Prohibited" signs will be posted.

Smoking is permitted in outdoor areas, except during organized events. Outdoor smoking areas should be located far enough away from doorways, open windows, covered walkways, and ventilation systems to prevent smoke from entering enclosed buildings and facilities. To accommodate faculty, staff, and students who smoke, Vice Presidents, Vice Provosts, and Deans may designate certain areas of existing courtyards and patios as smoking areas in which case ashtrays must be provided. Costs associated with providing designated smoking areas and ashtrays will be absorbed by the specific academic or administrative unit(s).

Enforcement — This policy relies on the consideration and cooperation of smokers and non-smokers. It is the responsibility of all members of the University community to observe and follow this policy and its guidelines.

Smoking cessation programs are available for faculty and staff through the Center for Research in Disease Prevention, Health Improvement Program (HIP). Students may contact the Health Promotion Program (HPP) through the Student Health Center for smoking cessation information or programs.

Faculty, staff, and students repeatedly violating this policy may be subject to appropriate action to correct any violation(s) and prevent future occurrences.

Implementation and Distribution — Copies of this policy will be disseminated by the Vice President for Faculty and Staff Services and the Vice Provost for Student Affairs to all faculty, staff, and students and to all new members of the University community.
Admissions information and applications can be obtained from the Office of Undergraduate Admissions and the Graduate Admissions Section of the Registrar's Office (Old Union).

Financial aid information for undergraduate and graduate students is available from the Financial Aid Office (Old Union).

Library guides, facts, maps, and borrowing regulations are available at service desks of all Stanford libraries (address request to Green Library).

Maps and visitors' guides can be obtained at the Visitors' Information Office in Memorial Court, at the Stanford Bookstore, or by writing to the Guide and Visitors Service at the Office of Public Affairs (Building 170).

Minority students, undergraduate and graduate, and their opportunities and experiences at Stanford are addressed in special publications directed to Alaska Natives, American Indians, Blacks, Chicanos, Mexican/Americans, and Puerto Ricans. The Office of Undergraduate Admissions and the recruitment officers of each of the respective schools will respond to requests for the appropriate publication.

Stanford University Bulletins may be obtained as follows: the Stanford Bulletin may be purchased from the Bookstore or by sending a $6.00 check or money order ($6.45 if a California resident; add $3.00 if domestic first class mail is desired) to the Registrar's Mailroom. Summer '96 may be obtained from the Summer Session Office. Individual schools and departments may be contacted directly for more specific information.

Students from other countries may contact the Graduate Admissions Section of the Registrar's Office for Information for International Applicants; Bechtel International Center also provides helpful information to the international community.

The Time Schedule (course listings and registration information) is published quarterly and may be obtained at the Information Window in the Office of the Registrar (Old Union) and in Portfolio.

Other publications of interest:

Access Stanford, a guide for the physically limited, available at the Office of the Dean of Student Affairs (Old Union) and the Disability Resource Center (Meyer Library).


ASSU: Constitution and By-Laws, inquire at Associated Students of Stanford University (Tresidder Union).

ASSU Course Guide, summaries of student evaluations of approximately 200 undergraduate courses, available at the ASSU Office (Tresidder Union).

Campus Report, the weekly faculty/staff newspaper (includes events calendar and employment opportunities), available from News Service (Press Bldg.).

Charter of the Senate of the Academic Council of Stanford University, available at the Academic Secretary's Office.

Committee and Senate Handbook, available at Academic Secretary's Office.

Conference Planning at Stanford, available at the Conference Office (Encina Commons).


Faculty Handbook, available at the Provost's Office.

Graduate Student Handbook, an introduction to offices and people who serve graduate students, available at the Office of the Dean of Graduate Research and Policy.

Human Resources and Development Course Catalogue, published twice-yearly by Stanford's Human Resources Services Office.

Information for Prospective Applicants, an introduction to graduate study and graduate programs at Stanford, available at the Graduate Admissions Section of the Registrar's Office, Old Union.

Life Off the Farm, a guide to off-campus goods, services, and activities, available at the Office of Residential Education (Old Union).

The Lively Arts at Stanford season brochure of concerts and other performances, available at University Events (Press Bldg.).

Rosters of the Senate, Advisory Board, and Various Committees, available at the Academic Secretary's Office.

Stanford Daily, the student newspaper, available at many pickup sites on campus and by request to the Daily office (Storke Bldg.).

Stanford Directory, on sale at Stanford Bookstore and Stores.

Stanford from the Beginning, a history, available at the Visitors' Information Office in Memorial Court (write Guide and Visitors Service, Bldg. 170), and the Stanford Bookstore.
Stanford Map, on sale at the Stanford Bookstore.

Stanford Memorial Church, a guide and history, available at the Visitors' Information Office in Memorial Court (write Guide and Visitors Service, Bldg. 170) and the Stanford Bookstore.

The Stanford Observer, a newspaper for alumni, parents of students, and the University's other friends, available from News Service (Press Bldg.).

Stanford Today, a detailed description of undergraduate opportunities, available from the Office of Undergraduate Admissions (Old Union).

Teaching at Stanford: An Introductory Handbook for Faculty, Academic Staff/Teaching, and Teaching Assistants, available at the Center for Teaching and Learning (Sweet Hall).

Training Opportunities for the Stanford Community, available at the Forsythe Hall information desk.

Books about Stanford that are out of print or hard to find are available to scholars from the University Archives, Green Library. The Stanford University Archives manuscript and archival collections now number more than six million items. These are of related interest.

Allen, P. C., Stanford: From the Foothills to the Bay, 1980

Clark, G. T., Leland Stanford, 1931

Elliott, O. L., Stanford University: The First Twenty-five Years, 1937


Nagel, G. W., Jane Stanford: Her Life and Letters, 1975

Stockholm, G., Stanford Memorial Church, 1980


Tutorow, N. E., Leland Stanford: Man of Many Careers, 1971
APPENDIX

COURSES CERTIFIED FOR 1995-96 AS FULFILLING THE UNDERGRADUATE DISTRIBUTION REQUIREMENTS

The Distribution Requirements were revised for Freshmen who entered Stanford in Autumn Quarter 1991 and thereafter. Information regarding the Distribution Requirements may be found in the "Undergraduate Degrees" section of this bulletin, p. 29-30. 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 1995-96. The symbol (†) indicates courses in Areas 2-9 which also fulfill the Gender Studies Requirement.

**NOTE 1** — In order to satisfy particular Area Distribution Requirements with transfer work, the transfer course(s) must be substantially similar to those course(s) offered at Stanford which satisfy the specific Distribution Requirement Area(s).

**NOTE 2** — Except where noted otherwise, no course may be applied to more than one Area of the Requirements by an individual student. In addition, certain sequences must be completed in their entirety for Distribution Requirement fulfillment, and those sequences are noted below.

**NOTE 3** — By way of standing exception, the Gender Studies component of the Distribution Requirements may be satisfied by completing one course from among those approved for inclusion on a list of routine substitutes drawn up annually by the C-US Subcommittee on Distribution Requirements, based on information provided by departments. These courses are listed at the end of this section following Area 9.

**NOTE 4** — Courses offered overseas during 1995-96 which satisfy Distribution Requirements are listed at the end of this section following Area 9.

**AREA 1: CULTURES, IDEAS, AND VALUES**

Anthropology 8, 9, 10; Origins, Encounters, and Identities (entire sequence must be completed)

CIV 1, 2, 3; Great Works (entire sequence must be completed)

CIV 4, 5, 6; Europe and the Americas (entire sequence must be completed)

English 7, 8, 9; Literature and the Arts (entire sequence must be completed)

German Studies 7A, 8A, 9A; Myth and Modernity (entire sequence must be completed)

History 1, 2, 3; Europe: From Antiquity to the Present (entire sequence must be completed)

Humanities 61, 62, 63; Literature and the History of Ideas (entire sequence must be completed)

Philosophy 5A, 5B, 5C; Philosophy and Human Existence (entire sequence must be completed)

SLE 91, 92, 93; Program in Structured Liberal Education (entire sequence must be completed and thereby also satisfies Areas 7 {2} and 8 {3})

**AREA 2: WORLD CULTURES**

(Area Non-Western Culture under the 1980 DR system)

African and Afro-American Studies 114; Africa and the Black Diaspora

African and Afro-American Studies 115; Africa and Philosophy, Philosophy and Africa

Anthropology 1; Introduction to Social and Cultural Anthropology

† Anthropology 11; Sex Roles and Society

† Anthropology 11C; Gender in Cross-Cultural Perspectives

Anthropology 14; Cultures in Crisis

Anthropology 19; Magic, Witchcraft, and Religion

Anthropology 102; Native American Cultures of North America

Anthropology 102A; Native Peoples and Cultures of the Southwest

Anthropology 103 (same as Latin American Studies 127); Mesoamerican Communities, Ethnicities, and Nations

Anthropology 108; African Societies in a Changing World

Anthropology 114; Introduction to Chinese Society

† Anthropology 117; Traditional Chinese Society

Anthropology 118A; 20th-Century Chinas

Anthropology 121; Japanese Society and Culture

Anthropology 123; Japanese Economic Organization

† Anthropology 126; The Middle East Through Ethnography

Anthropology 164 (same as Human Biology 134); Ecological Anthropology

Anthropology 165; Psychological Anthropology
APPENDIX

Anthropology 168; Medical Anthropology
Anthropology 182A; Archaeology and Education at Zuni Pueblo
Art 2; Ideas and Forms in Asian Art
Art 129; Arts of War and Peace: Late Medieval and Early Modern Japan
Asian Languages 91; Traditional East Asian Civilization: China
Asian Languages 92; Traditional East Asian Civilization: Japan
Asian Languages 95; Japanese Language in Culture
Asian Languages 110; Japanese-Western Literary and Cultural Interaction
Asian Languages 132; Chinese Fiction in Translation
Asian Languages 133; Modern and Contemporary Chinese Literature 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 and Philosophy of Science 153); Science and Technology of Traditional China
Asian Languages 156 (same as History 192A); China from Earliest Times to the 9th Century
Asian Languages 195; Modern Intellectuals in Japanese Literature
Classics 105; History and Culture of Egypt
Comparative Literature 10; Egyptian East/Egyptian West
Dance 177 (same Anthropology 109); Dance and Culture in Latin America
French 133; Literature and Society in Africa and the Caribbean
French 186; Contemporary Francophone Literature: Africa, Caribbean
French and Italian 170E; Introduction to African Systems of Thought
History 24A; Russian Civilization, 9th to the 17th Centuries
History 855; Jews and Muslims
History 148; Introduction to African History
History 148C; Africa: The 20th Century
History 185; Introduction to Islamic Civilization
History 186A (same as Anthropology 120); Modern India
History 187A; The Middle East, 570-1718
† History 187C; Women in the Modern Middle East
History 189A; Israel: 1880 to the Present
History 192A; Chinese History from the Earliest Times to the 9th Century
History 192B; Chinese History from the Mongols to the 19th Century
History 192C; Modern China
History 194A; Early and Medieval Japan to 1500
History 194B; History of Japan, 15th-19th Century
History 194D; 20th-Century Japan
History 195; A History of Japanese Religion
History 289A; The Ottoman Empire
† Human Biology 103; Women, Fertility, and Work: The Biology/Culture Debate about Gender
Human Biology 118; Human Diversity
Human Biology 145 (same as Science, Technology, and Society 271); Third-World Development
Linguistics 162; English Transplanted, English Transformed: Pidgins and Creoles
† Linguistics 625A,B,C; Topics in Arabic Literature and Culture
Philosophy 46 (same as Religious Studies 55); Introduction to Chinese Thought
Political Science 25; Colonialism and Nationalism in the Third World
Political Science 114K; The Political Economy of Development
Political Science 115; Politics in the People’s Republic of China
Political Science 118A; Political Change in Tropical Africa
Political Science 118B; The Politics of Race and Class in Southern Africa
Religious Studies 1E; Eastern and Western Conceptions of the Self
Religious Studies 11; Religious Classics of Asia
Religious Studies 14; Introduction to Buddhism
Religious Studies 18; Zen Buddhism
Religious Studies 20; Chinese Religious Thought and Practice
Religious Studies 116; Japanese Buddhism

AREA 3: AMERICAN CULTURES
(Non-Western Culture under the 1980 DR system is indicated by †)
African and Afro-American Studies 105 (same as Anthropology 105); Introduction to African and Afro-American Studies (*)
African and Afro-American Studies 161C (same as English 161C); 20th Century Afro-American Fiction
African and Afro-American Studies 161D; Afro-American Autobiography
American Studies 214; 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 102A; Native Peoples and Cultures of the Southwest (*)
Anthropology 130; Film Images of African American Culture
Anthropology 150; American Indian Ways of Knowing
APPENDIX

Anthropology 182B; Cultural Anthropology of the West
Comparative Literature 163; Introduction to Contemporary Issues in Asian-American Studies
Drama 65; American Musical Theater
Drama 154A; American Drama, Early 20th Century
† Drama 154B; American Drama, Late 20th Century
Education 107X (same as Linguistics 172); Linguistic Foundations of Racial Strife in American Education
† English 124A; Chicano Cultural Studies
† English 126; 20th-Century American Fictions
English 168A; 20th-Century American Indian Writing
English 169B (same as Comparative Literature 169B); Asian American Novel
English 169D (same as Comparative Literature 169D); Asian American Short Fiction and Drama
† History 151; American Labor History
History 157; Introduction to Afro-American History
History 159; Introduction to Asian American History
History 164 (same as American Studies 164); Introduction to Race and Ethnicity in the American Experience
History 165C; The US in the 20th Century
History 184; Jews in 20th-Century America
History 253A; Topics in the History of the American West
Linguistics 73; African-American Vernacular English
Linguistics 153; Inter- and Intra-ethnic Variation in Urban Vernacular English
Political Science 60; The American Dream
Political Science 181; African Americans and the Political System
† Religious Studies 8; Religion in America
Religious Studies 53; Jews and Judaism in America
† Religious Studies 163; Religion and Ethnicity
Spanish 180; Introduction to Chicano Life and Culture

AREA 4: MATHEMATICAL SCIENCES
(Area 6 under the 1980 DR system)
Biology 141; Biostatistics
Economics 180; Mathematics for Economists
Mathematics 19; Calculus
Mathematics 20; Calculus
Mathematics 21; Calculus
Mathematics 41; Calculus
Mathematics 42; Calculus
Mathematics 43; Calculus
Mathematics 43H; Honors Calculus
Mathematics 103; Matrix Theory and its Applications

Philosophy 57; Logic, Reasoning, and Argumentation
Philosophy 138A, B, or C (same as Classics 138A,B,C; History 138A,B,C; History and Philosophy of Science 138A,B,C); Cosmology Sequence
Philosophy 159 (same as Linguistics 135); Basic Concepts in Mathematical 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
Statistics 190 (same as Economics 80); Statistics for Social Scientists

AREA 5: NATURAL SCIENCES
(Area 7 under the 1980 DR system)
Anthropology 6 (same as Human Biology 6); Human Origins
Astronomy 15A; The Nature of the Universe
Biology 1; Introduction to the Science of Life
Chemistry 31; Chemical Principles
Chemistry 32; Frontiers of Chemical Science
Chemistry 33; Structure and Reactivity
Earth Systems 10; Introduction to Earth Systems
Geological and Environmental Sciences 1; Planet Earth
Geological and Environmental Sciences 2; Earth History
Geological and Environmental Sciences 150; The Oceans
Human Biology 2A or 3A or 4A; Human Biology Core
Physics 11; Symmetries of Nature
Physics 14; Physics of Music
Physics 15B; Cosmic Horizons
Physics 19; An Introduction to Physics (Physics for Poets)
Physics 21; Mechanics and Heat
Physics 23; Electricity and Optics
Physics 25; Modern Physics
Physics 27; Evolution of the Cosmos
Physics 28; Mechanics, Heat, Electricity, and Magnetism I
Physics 29; Electricity and Magnetism II
Physics 41; Mechanics
Physics 43; Electricity
Physics 45; Magnetism
Physics 47; Light and Heat
Physics 50; Astronomy Laboratory and Observational Astronomy
Physics 61; Advanced Freshman Physics
Physics 63; Advanced Freshman Physics
Physics 65; Advanced Freshman Physics
Physics 70; Modern Physics
Physics 100; Introduction to Observational and Laboratory Astronomy
Psychology 70; Brain and Behavior

**AREA 6: TECHNOLOGY AND APPLIED SCIENCE**
(Area 8 under the 1980 OR system)
Civil Engineering 170; Environmental Science and Technology
Civil Engineering 176; Small Scale Energy Systems
Computer Science 105A; Introduction to Computers
Computer Science 106A; Programming Methodology
Computer Science 106B; Programming Abstractions
Computer Science 106X; Programming Methodology and Abstractions
Computer Science 109A; Introduction to Computer Science
Engineering 1 (same as Science, Technology, and Society 51); Nature of Engineering
Engineering 14; Applied Mechanics: Statics and Deformables
Engineering 15; Dynamics
Engineering 30; Engineering Thermodynamics
Engineering 35; Automobile Technology
Engineering 40; Introductory Electronics
Engineering 50; Introductory Science of Materials
Engineering 62; Introduction to Operations Research
Engineering 165 (same as Music 156); Technology and Musical Aesthetics
Engineering-Economic Systems 31; Introduction to Decision Analysis
Geological and Environmental Sciences 5; Earth’s Nonrenewable Resources
Geological and Environmental Sciences 8; Management of Geologic Hazards
Geological and Environmental Sciences 130; Environmental Earth Sciences
Geophysics 4; Natural Hazards and Human Survival
Geophysics 170; Environmental and Geotechnical Geophysics
Operations Research 50/150; Models and Applications of Operations Research in Society
Petroleum Engineering 103; Energy Resources

**AREA 7: LITERATURE AND FINE ARTS**
(Area 2 under the 1980 DR system; Non-Western Culture under the 1980 DR system is indicated by [*])

A) Courses typically taken either by non-majors or by people without special preparation:
Art 1; Introduction to the Visual Arts
Art 2; Ideas and Forms in Asian Art [*]
Art 3; Introduction to the History of Architecture
Art 10; Introduction to Art: Renaissance to the Threshold of the Modern Age
Art 11; Introduction to Ancient Art
Art 20; Introduction to the Art of Asia: to 600 A.D. [*]
Art 21; Introduction to the Art of Asia: 7th to 13th Centuries [*]
Art 22; Introduction to the Art of Asia: 14th Century Onward [*]
Asian Languages 91; Traditional East Asian Civilization: China [*]
Asian Languages 92; Introduction to East Asian Civilization: Japan [*]
Classics 11; The Concept of the Hero: Homer to Milton
Classics 12; Greek Tragedy
Classics 21; Modern Greek Folklore and Ancient Greek Mythology
† Dance 160A; Dance History and Philosophy
† Dance 160B; Dance and Live Art in the 20th Century
Dance 177; Dance and Culture in Latin America [*]
Dance 268; Society, Education, and Dance [*]
Drama 2; Introduction to Theater
Engineering 165 (same as Music 156); Technology and Musical Aesthetics
English 5; Introduction to Literature
English 10/110; Masterpieces of English Literature I
† English 11/111; Masterpieces of English Literature II
English 12/112; Masterpieces of American Literature
English 30/130; The Novel
English 40/140; Introduction to Drama
English 50/150; Poetry and Poetics
† English 50G/150G (same as Feminist Studies 164); Poetry and Poetics
English 60/160; The English Bible
English 65A/165A (same as Medieval Studies 165); Introduction to Medieval Culture
English 65B/165B; Arthurian Literature
German Studies 32A; Origins of Modernism
Music 1; Introduction to Music
Music 2A; The Symphony
Music 3F; Franz Liszt and the Music of the Romantic Era
Music 5A; Music in America
Music 18A,B; Jazz History
Music 19; Introduction to Music Theory
Music 21; Elements of Music I
Religious Studies 15; Hebrew Bible: Issues of Power
Slavic Languages and Literatures 145; The Age of Experiment
Slavic Languages and Literatures 146; Struggles with Authority in the Russian Novel 1861-1922
Slavic Languages and Literatures 147; Russian Literature in the 20th Century
Slavic Languages and Literatures 151; Fyodor Dostoevsky
B) More advanced courses that can still be appropriate:

Art 100A; Archaic and Early Classical Greek Art
Art 100B; Classical and Hellenistic Greek Art
Art 103; Late Roman and Byzantine Empire
Art 107; Age of Cathedrals
Art 108; Age of Realism
Art 110A; The Origins of the Renaissance
Art 110B; Quattrocentro Painting
Art 110C; High Renaissance Art
Art 115A; Artistic Culture in Italy During the 17th Century
Art 115B; 17th-Century Art in the Low Countries
Art 116; Five Great Masters of the Baroque Age
Art 116A; Art and Architecture in the Age of the Baroque
Art 120A; 18th-Century Art in Europe
Art 120B; Painting in the Age of Revolution
Art 120C; The Age of Naturalism 1830-1874
Art 129; Arts of War and Peace: Late Medieval and Early Modern Japan
Art 130; Art in America and Britain 1670-1825
Art 130A; Art in America 1825-1910
Art 175A; Modern Architecture I
Art 175B; Modern Architecture II
Art 176; American Architecture and Urbanism
Asian Languages 110; Japanese-Western Literary and Cultural Interaction
Asian Languages 131; Chinese Poetry in Translation
Asian Languages 132; Chinese Fiction and Drama in Translation
Asian Languages 133; Modern and Contemporary Chinese Literature in Translation
Asian Languages 135; Japanese Drama in Translation
Asian Languages 137; Japanese Fiction in Translation
Asian Languages 138; Modern Japanese Literature in Translation
Asian Languages 142; Constructing the Subject
Asian Languages 181; Japanese Women Writers
Asian Languages 195; Modern Intellectuals in Japanese Literature
Classics 100B; Classical and Hellenistic Art
Classics 169; Greek Ethical Philosophy: Socrates, Plato, and Aristotle
Drama 151; Performance and the Body Politic
Drama 152; Performance and the Body
Drama 153; Performance and the Mind

English 105; Point of View in Fiction: A Linguistic Approach
English 113; The Renaissance
English 115; Survey of 18th-Century Literature
English 126; 20th-Century American Fiction
English 132G; 19th-Century English Novel
English 133G; 20th-Century Novel in English
English 137; Development of the Short Story
English 160D; Cinema and Literature
English 164A; Speaking Back to Scripture
English 164B; Imagining the Holocaust
English 164C; Ecology and Imagination
English 167A; Literature of Fantasy
English 173A; Shakespeare
English 173B; Shakespeare
† French and Italian 166E; Women’s Voices in Contemporary Italian Fiction
French and Italian 206E; The Grail in Modern Culture
French and Italian 225E; Pirandello, Sartre, and Beckett
French and Italian 250E; Poetry and Philosophy: The History of an Antagonism
French and Italian 257E; Economy
° French and Italian 261E; Dante’s Divine Comedy
French and Italian 268E; Italo Calvino in Translation
German Studies 121; Contemporary German Drama
German Studies 161/161A; Faust
† Religious Studies 112; Sexual Politics in the Ancient World
† Spanish 153; Women and Transgression in Spanish Renaissance

C) Courses where some foreign language preparation is necessary:

French 130; Middle Ages and Renaissance France
French 131; 17th- and 18th-Century France
French 132; 19th- and 20th-Century France
French 133; Literature and Society in Africa and the Caribbean
French 178; Paris in History and Literature
† French 192; Women’s Writing in France
German Studies 120; Modern Short Prose
German Studies 122; German Literature
Italian 128; Italian Studies: Middle Ages and the Renaissance
Italian 244 (same as Comparative Literature 244E); Italian Romanticism
° Linguistics 625A, B, C; Topics in Arabic Literature and Culture
Spanish and Portuguese 130B; Spanish Cultural Perspectives
Spanish and Portuguese 140; Introduction to the Methods of Literary Analysis
Spanish and Portuguese 150; Spanish Literature I
Spanish and Portuguese 151; Spanish Literature II
Spanish and Portuguese 160; Spanish-American Literature I
Spanish and Portuguese 161; Spanish-American Literature II

AREA 8: PHILOSOPHICAL, SOCIAL, AND RELIGIOUS THOUGHT

(Area 3 under the 1980 DR system;
Non-Western Culture under the 1980 DR system is indicated by (*))

American Studies 151; The Transformation of American Thought and Culture: 1865 to the Present
American Studies 214; The American 1960s: Thought, Protest, and Culture
† Anthropology 152; Symbolic Anthropology
† Anthropology 154 (same as Feminist Studies 147, Religious Studies 154); Creation and Procreation
† Anthropology 160 (same as Feminist Studies 147A, History and Philosophy of Science 160); Gender and Science
Asian Languages 142; Constructing the Subject
Classics 18; Greek Mythology
Classics 108; Pagans and Christians
Classics 165; Hellenistic Philosophy
Classics 169; Greek Ethical Philosophy: Socrates, Plato, and Aristotle
English 65A/165A (same as Medieval Studies 165); Introduction to Medieval Culture
French and Italian 170; Introduction to African Systems of Thought
† French and Italian 208E; Female Saints
French and Italian 225E; Pirandello, Sartre, and Beckett
French and Italian 250E; Poetry and Philosophy: History of an Antagonism
† History 37S; Love in the Age of Revolution
History 136A; European Thought in the 19th Century
History 136B; European Thought in the 20th Century
History 195; A History of Japanese Religion
Philosophy 10; Knowledge, Self, and World
Philosophy 20 (same as Public Policy 103C); Introduction to Moral Theory
Philosophy 30 (same as Public Policy 103A); Introduction to Political Philosophy
Philosophy 46 (same as Religious Studies 55); Introduction to Chinese Thought (*
Philosophy 60 (same as History and Philosophy of Science 60); Introduction to the History and Philosophy of Science
Philosophy 80; Mind, Matter, and Meaning
Philosophy 100 (same as Classics 65); Greek Philosophy
Philosophy 102A; 17th-Century Philosophy
Philosophy 102B; 18th-Century Philosophy
Philosophy 129; Pragmatism
Philosophy 138A (same as Classics 138A, History 138A, History and Philosophy of Science 138A); Introduction to Cosmology: Ancient Period
Philosophy 138B (same as Classics 138B, History 138B, History and Philosophy of Science 138B); Introduction to Cosmology: Science and Technology in the Scientific Revolution
Philosophy 138C (same as Classics 138C, History 138C, History and Philosophy of Science 138C); Introduction to Cosmology: Newton to Einstein
† Political Science 151A; History of Political Thought I
Political Science 151B; History of Political Thought II
Political Science 151C; History of Political Thought III
† Political Science 153; Utopian Political Thought
† Political Science 154 (same as Feminist Studies 138); Feminist Political Theory: Gender, Power, and Justice
Religious Studies 1E; Eastern and Western Conceptions of Self (*
Religious Studies 5; Basic Issues in Religion
† Religious Studies 8; Religion in America
Religious Studies 11; Religious Classics of Asia (*
Religious Studies 14; Introduction to Buddhism (*
Religious Studies 15; Hebrew Bible: Issues of Power
Religious Studies 18; Zen Buddhism (*
Religious Studies 23; Introduction to Judaism
Religious Studies 24; Introduction to Christianity
Religious Studies 42; Philosophy of Religion
Religious Studies 53; Jews and Judaism in America
Religious Studies 65; Introduction to Christian Ethics
† Religious Studies 112; Sexual Politics in the Ancient World
Religious Studies 142 (same as Classics 104); Early Christianity
Religious Studies 164; The Morality of Peace and War
Religious Studies 166; Myth and Ritual in Judaism
† Religious Studies 264; Adam and Eve: Sexuality and Gender
SLE 91, 92, 93; Structured Liberal Education (entire sequence must be completed and thereby also satisfies Areas 1 and 7(2))
Sociology 170; Classics of Modern Social Theory
Science, Technology, and Society 110 (same as Public Policy 103B); Ethics and Public Policy
Science, Technology, and Society 115 (same as Engineering 131); Ethical Issues in Engineering

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Areas 4 and 5 under the 1980 DR system are indicated by [4] and [5]; Non-Western Culture under the 1980 DR system is indicated by [*])

Anthropology 2 (same as Human Biology 1); Genes, Culture and Human Diversity [5] [*]
Anthropology 3; Human Prehistory [5] [*]
† Anthropology 7; Investigating Culture, Introduction to Anthropology [5] [*]
† Anthropology 11C (same as Feminist Studies 140); Gender in Cross-Cultural Perspective [5] [*]
Anthropology 15/116 (same as Education 116X, African and Afro-American Studies 15); Anthropological Perspectives on American Culture [5]
Anthropology 114; Introduction to Chinese Society [5] [*]
† Anthropology 117; Traditional Chinese Society [5] [*]
Anthropology 118A; 20th-Century Chinas [5] [*]
Anthropology 128; Ethnographic Film [5]
Anthropology 140; Aging: From Biology to Social Policy [5]
Anthropology 141A; Renaissance Europe and Others [5]
† Anthropology 145; Women in Cities [5]
Anthropology 146; Urban Problems in Anthropological Perspective [5]
† Anthropology 147 (same as Feminist Studies 168); Cultural and Feminist Perspectives on Theology [5]
Anthropology 150; American Indian Ways of Knowing [5]
Anthropology 151A; Comparative Cultural Studies [5]
Anthropology 155; Food Production, Poverty, and Famine [5]
† Anthropology 160 (same as Feminist Studies 147A, History and Philosophy of Science 160); Gender and Science [5]
Anthropology 164 (same as Human Biology 134); Ecological Anthropology [5] [*]
Anthropology 165; Psychological Anthropology [4] [*]
Anthropology 168; Medical Anthropology [5]
Anthropology 178; Introduction to Language Change [4]
Anthropology 187; Hunters-Gatherers in Archaeological Perspective [5] [*]
† Classics 3; Democracy and Imperialism [5]
Classics 14; Classical Athletics [5]
Classics 20; Introduction to Archaeology [5]
Classics 101; History of Greece [5]
Classics 102; Greek and Roman History [5]
Classics 103; Roman History II: The Empire [5]
Classics 105; History and Culture of Egypt [5] [*]
† Classics 117; Greek Religion and Society [5]
Classics 120; Athenian Social History [5]
Classics 121; Slavery Ancient and Modern [5]
Classics 125; Ancient Politics [5]
† Classics 190; The Family, Sex, and Marriage in Ancient Rome [5]
Communication 1; Mass Communication and Society [5]
Communication 106; Communication Research Methods [5]
Communication 108; Mass Communication Theory [4]
Communication 157; Public Communication Programs [5]
Communication 160; Political Communication [5]
Communication 169 (same as Science, Technology, and Society 162); Communication, Technology, and Society [5]
Communication 170; Communication and Children [4]
Drama 154B; American Drama, Late 20th Century [5]
Economics 1; Elementary Economics [5]
Economics 113 (same as Science, Technology, and Society 107); Technology and Economic Change [5]
Economics 122; Theory of Capitalist Development [5]
Education 120 (same as Symbolic Systems 20); Problems of Information, Intelligence, and Learning [4]
† Education 197 (same as Sociology 134); Education and the Status of Women: A Comparative Perspective [4] or [5]
Education 255 (same as Psychology 155); Human Abilities [4]
English 102 (same as Linguistics 62); History of the English Language [4]
† Feminist Studies 101A (same as History 173C); Introduction to Feminist Studies [5]
German Studies 30A/130; Central Europe: Geography, Institutions, and Society [5]
German Studies 38A/138; Introduction to the German Languages [4]
German Studies 139 (same as Linguistics 176); Introduction to Germanic Dialects [4]
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>History 15S</td>
<td>The Medieval Church and Violence</td>
<td>5</td>
</tr>
<tr>
<td>History 24A</td>
<td>Russian Civilization 9th to 17th Centuries</td>
<td>5</td>
</tr>
<tr>
<td>History 80</td>
<td>Culture, Society, and Politics in Latin America</td>
<td>5</td>
</tr>
<tr>
<td>History 107</td>
<td>Politics and Society in the High Middle Ages: France and Germany</td>
<td>5</td>
</tr>
<tr>
<td>History 109</td>
<td>Renaissance</td>
<td>5</td>
</tr>
<tr>
<td>History 115</td>
<td>(same as History and Philosophy of Science 121, Science, Technology, and Society 121); Technology and Culture in 19th-Century America</td>
<td>5</td>
</tr>
<tr>
<td>History 119</td>
<td>Aristocracy and Absolutism: Early Modern Eastern Europe</td>
<td>5</td>
</tr>
<tr>
<td>History 120B</td>
<td>Imperial Russia 1700-1917</td>
<td>5</td>
</tr>
<tr>
<td>History 127D</td>
<td>20th-Century Germany</td>
<td>5</td>
</tr>
<tr>
<td>History 132B</td>
<td>Modern France from the Enlightenment</td>
<td>5</td>
</tr>
<tr>
<td>History 134A</td>
<td>(same as Science, Technology, and Society 141); The Industrial Revolution</td>
<td>5</td>
</tr>
<tr>
<td>History 137</td>
<td>The Holocaust</td>
<td>5</td>
</tr>
<tr>
<td>History 141</td>
<td>Yorkist and Tudor England</td>
<td>5</td>
</tr>
<tr>
<td>History 142</td>
<td>Revolutionary England 1603-1689</td>
<td>5</td>
</tr>
<tr>
<td>History 144</td>
<td>Britain 1688-1830</td>
<td>5</td>
</tr>
<tr>
<td>History 145</td>
<td>20th-Century Britain</td>
<td>5</td>
</tr>
<tr>
<td>History 165C</td>
<td>The US in the 20th Century</td>
<td>5</td>
</tr>
<tr>
<td>History 172A</td>
<td>America Since 1945</td>
<td>5</td>
</tr>
<tr>
<td>History 173B</td>
<td>US Women’s History 1820-1980</td>
<td>5</td>
</tr>
<tr>
<td>History 176</td>
<td>Spain in America 1492-1825</td>
<td>5</td>
</tr>
<tr>
<td>History 179</td>
<td>History of Mexico</td>
<td>5</td>
</tr>
<tr>
<td>History 186A</td>
<td>(same as Anthropology 120); Modern India</td>
<td>5</td>
</tr>
<tr>
<td>History 187C</td>
<td>Women in the Modern Middle East</td>
<td>5</td>
</tr>
<tr>
<td>History 188B</td>
<td>Jews in the Medieval World</td>
<td>5</td>
</tr>
<tr>
<td>History 188C</td>
<td>Jews in the Modern World</td>
<td>5</td>
</tr>
<tr>
<td>History 205A</td>
<td>Private Lives: Public Stories</td>
<td>5</td>
</tr>
<tr>
<td>History 207</td>
<td>Topics in Comparative Women’s History</td>
<td>5</td>
</tr>
<tr>
<td>History 211</td>
<td>Body, Gender, and Society in Medieval Europe</td>
<td>5</td>
</tr>
<tr>
<td>History 230A</td>
<td>(same as French 189A); Women and Gender in Modern France</td>
<td>5</td>
</tr>
<tr>
<td>History 233A</td>
<td>Modern German Jewry</td>
<td>5</td>
</tr>
<tr>
<td>History 287A</td>
<td>Modern Jewish Identity</td>
<td>5</td>
</tr>
<tr>
<td>History and Philosophy of Science 152 (same as History 133, Science, Technology, and Society 130); The Darwinian Revolution</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Human Biology 2B or 3B or 4B; Human Biology Core</td>
<td>4 or 5</td>
<td></td>
</tr>
<tr>
<td>Human Biology 169; Women, Sexuality, and Health</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Industrial Engineering 107; Work, Technology, and Society</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Latin American Studies 191; Problems in US-Mexico Relations</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Linguistics 1; Introduction to Linguistics</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Linguistics 70; Structure of English Words</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Linguistics 72 (same as English 105); Point of View in Fiction: A Linguistic Approach</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Linguistics 73; African-American Vernacular English</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Linguistics 146; Language and Gender</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Linguistics 150; Introduction to Sociolinguistics</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Linguistics 153; Inter- and Intra-Ethnic Variation of Urban Vernacular English</td>
<td>4 or 5</td>
<td></td>
</tr>
<tr>
<td>Linguistics 160; Introduction to Language Change</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Linguistics 162; English Transplanted, English Transformed: Pidgins and Creoles</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Philosophy 181; Philosophy of Language</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Political Science 1; Major Issues of American Public Policy</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 10; American National Government</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 25; Colonialism and Nationalism in the Third World</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 35; International Politics</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 113A; Politics and Development in Latin America</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 114K; The Political Economy of Development</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 115; Politics in the People’s Republic of China</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 116B; European Politics and Society II</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 117R; The Role of the Military in Politics</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 118B; The Politics of Race and Class in Southern Africa</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 119A; Soviet History 1917-1993</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 122G; Political Economy of Contemporary Europe</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 134A; Strategy, War, and Politics</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 170; Judicial Politics and Constitutional Law</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 181; African Americans and the Political System</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Political Science 182F (same as American Studies 179, Law 106); Introduction to American Law</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Psychology 1; Introduction to Psychology</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Psychology 102; Perception</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Psychology 106; Introduction to Cognitive Psychology</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Psychology 111; Developmental Psychology</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Psychology 116; Psychology of Gender</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Psychology 120; Cognitive Development</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Psychology 121; Social Psychology</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Psychology 136; Abnormal Psychology</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
Psychology 146; Language and Thought {4}
Sociology 1A, B, C, Introduction to Sociology {5}
† Sociology 5; Status, Friendship, and Social Pressure: An Experiential Approach {4} or {5}
Sociology 110; Politics and Society {5}
Sociology 120; Interpersonal Relations {4} or {5}
† Sociology 140; Introduction to Social Stratification {5}
† Sociology 142 (same as Feminist Studies 134); Sociology of Gender {5}
Sociology 145; Race and Ethnic Relations {5}
Sociology 155; Children and Society {5}
Sociology 160; Formal Organizations {5}
Sociology 170; Classics of Modern Social Theory {5}
Science, Technology, and Society 101 (same as Engineering 130); Science, Technology, and Contemporary Society {5}

In addition to those courses marked with a dagger (†) in Areas 2-9, the following courses will also satisfy the Gender Studies Requirement:

History 184B; Women, Gender, and Jewish Modernity
Human Biology 150 (same as Feminist Studies 145); Gender-Specific Perspectives on Birth Control
Political Science 163 (same as Feminist Studies 102C); Contemporary Issues in Feminist Thought
Religious Studies 128; Women and Judaism

OVERSEAS STUDIES

BERLIN

AREA 6: TECHNOLOGY AND APPLIED SCIENCE
(Area 8 under the 1980 DR System)
Introductory Electronics (same as Engineering 40)
Introductory Science of Materials (same as Engineering 50)

AREA 7: LITERATURE AND FINE ARTS
(Area 2 under the 1980 DR system)
Architecture and the City, 1871-1990; Berlin as Nucleus of Modernity (same as Art 174Y, History 229V, Urban Studies 143U)
Berlin in Literature - Literature in Berlin (same as German Studies 168B)
German Theater (same as Drama 101A, German Studies 195)
Industrial Revolution and its Impact on Art, Architecture, Theory (same as Art 173Y, Science, Technology, and Society 117V)
Split Images: Post-War German Cinema (same as German Studies 179B)

AREA 8: PHILOSOPHICAL, SOCIAL, AND RELIGIOUS THOUGHT
(Area 3 under the 1980 DR system)
History of German and European Economic Philosophy (same as Political Science 161X, History 129V, Economics 100X)
Women, Literature, and Transitions in Germany (same as German Studies 166B)

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system is indicated by {5}
Area 4 under the 1980 DR system is indicated by {4})
Culture and Politics in Modern Germany (same as German Studies 177A) {5}
International Political Economy (same as Political Science 132X) {5}
Introduction to German Dialects (same as German Studies 139) {4}
Nationalism and Political Culture in Contemporary Germany (same as German Studies 177B, History 228V, Political Science 116X) {5}
The Political Economy of Contemporary Germany (same as Economics 127X) {5}
The Economics of Europe (same as Economics 166X) {5}
Transition in Germany and Eastern Europe (same as Economics 128X) {5}

FLORENCE

AREA 7: LITERATURE AND FINE ARTS
(Area 2 under the 1980 DR system)
Realism, Utopia, Myth, and Society in Italian Cinema (same as Communications 52, Italian 190F)
Representations of Italy through the Eye of the Camera (same as Communication 51, Italian 132F)

AREA 8: PHILOSOPHICAL, SOCIAL, AND RELIGIOUS THOUGHT
(Area 3 under the 1980 DR system)
Rebellion and Renewal: The Italian Renaissance (same as History 234V)

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)
Italian Politics since 1989 in its International Context (same as History 233V, Political Science 133X)
Italy: From an Agrarian to a Post-Industrial Society (same as History 106V, Political Science 158X)
The Integration of Europe (same as Political Science 145X)
The Political Economy of Industrial Change (same as Economics 159X)

KYOTO

AREA 6: TECHNOLOGY AND APPLIED SCIENCE
(Area 8 under the 1980 DR system)
Introductory Electronics (same as Engineering 40)
Introductory Science of Materials (same as Engineering 50)
AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)
The Political Economy of Japan (same as Political Science 215X)

MOSCOW
AREA 9: SOCIAL PROCESSES AND INSTITUTIONS
(Area 5 under the 1980 DR system)
Russian Politics (same as Political Science 119X)
Russia in the Age of Nobility 1700-1840: State, Society, and Culture (same as History 121V)

OXFORD
AREA 2: WORLD CULTURES
(Non-Western Culture under the 1980 DR system)
African History Through the African Novel (same as English 189Y, History 146V)

AREA 7: LITERATURE AND FINE ARTS
(Area 2 under the 1980 DR system)
Art and Society in Britain (same as Art 221Y, History 244V)
Drama in Britain Today (same as Drama 158D, English 254Z)
Literary Theory in Britain in 1996 (same as English 166Z, Modern Thought and Literature 216)
Modern Drama and Its Roots (same as Drama 158M, English 148Z)

AREA 8: PHILOSOPHICAL, SOCIAL, AND RELIGIOUS THOUGHT
(Area 3 under the 1980 DR system)
The British Liberal Political Tradition (same as Philosophy 175P)

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)
Non-Western Culture under the 1980 DR system is indicated by (*)

African History Through the African Novel (same as English 189Y, History 146V) {*}
Constitutional Law in Britain (same as Political Science 171X)
European Imperialism and the Third World, 1870-197 (same as History 141V, Political Science 148X)
European Integration (same as Political Science 147X)
Race and Ethnicity in Modern Britain (same as Political Science 111X)
Thatcherism (same as Political Science 122X)
Urban History in Britain 1500 to the 20th Century (same as History 243V, Urban Studies 146U)

PARIS
AREA 7: LITERATURE AND FINE ARTS
(Area 2 under the 1980 DR system)
French Painting From 1780 - 1900 (same as Art 120Z)
Monstrosity in French Culture (same as French 194P)
The Architecture of Paris (same as Art 175Y, Urban Studies 178U)
19th-Century Paris: “Children of Paradise” (same as French 134P)

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)
Political Attitudes and Behavior in Contemporary France (same as Political Science 211X)
The Left in Europe (same as Political Science 121X, Sociology 115W)
Social History of Modern France (same as History 230V)

SANTIAGO
AREA 6: TECHNOLOGY AND APPLIED SCIENCE
(Area 8 under the 1980 DR system)
Man-Environment Interactions: Case Studies from Central Chile (same as Biology 106Z, Human Biology 106H, Latin American Studies 122X)

AREA 9: SOCIAL AND BEHAVIORAL SCIENCES
(Area 5 under the 1980 DR system)
Modernization and Culture in Latin America (same as Anthropology 104X, Latin American Studies 120X, Spanish 290Z)
A.B. Degree, 26
Academic Advising, Undergraduate, 36
Academic Calendar, 3
Academic Council, 10
Committees of, 10
Academic Policies and Statements, 49
Examinations, 52
Grading Systems, 54
Guidelines for Student Academic Grievance Procedures, 57
Registration and Records, 49
University Year, The, 49
Academic Standing, (Undergraduates), 34
Notification, 36
Petitioning, 35
Probation, 35
Provisional Registration, 35
Registration and Records, 49
Suspension, 35
Accreditation,
School of Engineering, 126
The University, 2
Acting (Drama), 402
Administrative Executive Officers, 8
Administrative Organization, 8
Admissions, 12
Graduate, 13
Undergraduate, 12
Visas for Foreign Students, 14
Advanced Graduate Registration, 19
Advanced Placement Credit, 30
Aeronautics and Astronautics, 130, 133, 140
Aeronautics and Acoustics, Joint Institute for (JIAA), 143
Aerospace Robotics Laboratory (ARL), 142
African and Afro-American Studies (AAAS), Undergraduate Program in, 273
African Languages, 320; see also East Asian Studies
Assistantships, 17
Associated Students (ASSU), 10
Fees, 20
Astronomy Course Program, 330
Athletic Facilities, 333
Athletics, Fitness, Individual, and Team Sport Activities, 337
Athletics, Intercollegiate, 333, 340
Athletics, Physical Education, and Recreation, 331
Auditing, 51
Awards and Honors, 796
Boothe Prizes, 796
Cox Medal, Allan, 797
Cuthbertson Award, Kenneth M., 796
Dean's Award, 797
Dinkelspiel Awards, 796
Firestone Medal, 797
Golden, Robert M., Medal, 797
Gores Award, Walter J., 796
Herbert Hoover Medal, 796
Phi Beta Kappa, 797
President's Award, 797
Terman Engineering Scholastic Award, Frederick Emmons, 797
Baccalaureate Honors, 27
Bachelor Degree, Second, 27
Bachelor of Arts Degree (A.B.), 26
Bachelor of Arts and Science Degree (B.A.S.), 26, 132
Bachelor of Science Degree (B.S.), 26
Berlin, Stanford Program in, 588
Biochemistry, 734
Biological Sciences, 342
Biomechanical Engineering, 241
Biomedical Ethics, Center for, 737
Biophysics Program, 358
Biosphere, 63, 64
Black Performing Arts, Committee on, 359
Board of Trustees, 8, 9
Officers, 8
Bookstore, 792
Boothe Prize, 796
Branch Libraries, 781
Buildings, Campus, 7
Bulletins, Stanford University, 2
Business, Graduate School of, 60
Application, 13
Grading System, 56
California Cross-Cultural Language and Academic Development (CLAD), 106
Campus and Buildings, 7
Campus Disruption, Policy on, 803
Cancellation of Registration for Cause, 23
Cancer Biology Program, 738
Candidacy for Doctoral Degree, 45
Career Planning and Placement Center (CPPC), 791
Casa Italiana, La, 468
Center for Automation Manufacturing Science (CAMS), 142
Center for Computer Research in Music and Acoustics (CCRMA), 578
Center for Economic Policy Research (CEPR), 770
Center for Integrated Systems (CIS), 228
Center for Materials Research (CMR), 773
Center for Organizations Research (SCOR), 774
Center for Russian and East European Studies (CREES), 677
Center for the Study of Language and Information (CSLI), 773
Center for Space Science and Astrophysics (CSSA), 144, 694
Center for Teaching and Learning (CTL), 794
Center for Turbulence Research (CTR), 237
Chemical Engineering, 127, 133, 156
Chemical Physics, 362
Chemistry, 360
Chicano/a Fellows Program, 366
Chicano Research, Stanford Center for, 770
Children and Society Curriculum, 104, 367
Chinese, Asian Languages, 322, 325
Chinese Language Studies in Taipei, Inter-University, Program for, 772
Civil Engineering, 128, 133, 156
Classics, 370
and Humanities, Joint Ph.D. in, 373
Greek, Courses in, 373
Latin, Courses in, 374
Club Sports, 333, 341
Cognitive Science, 552, 604
Combined Ph.D./M.D. Degree Program, Mechanical Engineering, 243
Committees,
Academic Council, 10
Board of Trustees, 9
University, 9
Communication, 377
Communication Research, Institute for, 382
Community Organization Option, Urban Studies, 721
Comparative Institutional Analysis, Economics, 430
Comparative Literature, 387
Comparative Politics, 638, 644
Computer, Science, 128, 133, 172
Computer Systems, Electrical Engineering, 194
Computer Systems Engineering (CSE), 130
Conduct of Students, see Student Affairs
Conferral of Degrees, Graduate, 42
Construction, Civil Engineering, 157
Construction Engineering and Management Program, 157
Continuing Studies Program, 783
Controlled Substances and Alcohol, Stanford Policy on, 804
Copying Printed Material for Teaching and Research, 798
Coterminal Bachelor’s and Master’s Degrees, 27
Courses of Instruction, 59
Cowell Student Health Services, 792
Cox Medal, Allan, 797
Creative Writing Fellowships, 434
Credentials, Public School, 48
Credit, 30
Activity Courses, 31
Advanced Placement, 30
Internship Guidelines, 31
Transfer, 32
Crime Statistics, 793
Crown Law Library, 781
Cultures, Ideas, and Values, Program in (CIV), 398
Curricula, School of Engineering, 132
Cuthbertson Award, Kenneth M., 796
Dance Division, 332, 334; see also African and Afro-American Studies, Drama, and Music
Database, 174
Dead Week Policy Statement, 52
Deans’ Award for Academic Achievement, 797
Dean of Students, 784
Decision Analysis, Engineering-Economic Systems, 213
Deferment Loan Program, 22
Delinquent Accounts, 22
Departmental Honors Programs, see Department Listings
Design,
Architecture and Urban Design Option (Urban Studies), 722
Art, 307
Product (Engineering), 130, 240
Technical Production (Drama), 402
Developmental Biology, Program in, 739
Dinkelspiel Awards, 796
Directing (Drama), 402
Directory, 8
Board of Trustees, The, 8
Administrative Organization, 8
Disability Act, Americans with, 798
Disability Resource Center (DRC), 784
Dissertation Fee, 21
Distribution Requirements, 29
Credit Transfer, 30
Current System, 29
Petition, 30
Purpose, 28
Undergraduates who entered prior to Autumn, 1991, 30
see also Appendix for course list, 809
Doctor of Education, 44, 107
Doctor of Jurisprudence, 44
Doctor of Medicine, 45, 734
Doctor of Musical Arts, 44
in Composition, 581
Doctor of Philosophy, 45
Candidacy Time Limit, 45
Dissertation, 46
Doctoral Dissertation Reading Committee, 47
Foreign Language Requirement, 45
Ph.D. Minor, 47
Teaching Requirements, 45
University Oral Examination, 45
Doctor of the Science of Law, 45
Document Fee, 20
Documentary Film and Video, 379
Domestic Partners Policy, 798
Dormitories, see Residences, 792
Drama, 401
Drama and Humanities, Joint Ph.D. Program in, 404
Dramatic Literature, Criticism, or Theater History, 402
Drawing, 306
Dual Bachelor’s Degree and B.A.S. Programs, 26
Earth Sciences, School of, 61
Earth Systems Program, 62
East Asian Studies, 409
and Business, 412
and Education, 412
and Food Research, 412
and Health Services Research, 412
INDEX 821

and Law, 412
East Asian Studies Theme House, 321, 411
Econometrics, 429
Economic Analysis, 213
Alternative Approaches to, 426
Economic Development, 427
Economic History, 427
Economics, 417
Economics and Law, Joint Program in, 420
Economics of Industry, 428
Economics of Labor, 428
Ed. D. Degree, 44, 107
Education, School of, 103
Educational Specialist (Ed.S.), 44, 106
Electrical Engineering, 128, 133, 191
Energy Modeling Analysis and Policy, 214
Engineer Degree, 44, 136
Management Option, Petroleum Engineering, 97
Engineering-Economic Systems (EES), 134, 210
Engineering Geology and Hydrogeology, 70
Engineering Management, 222
Engineering, School of, 125
Engineering, (3/2) Degree Programs, 126
English, 432
and American Literature, 437
and Comparative Literature, 438
and French Literatures, 433
and German Literatures, 433
and Humanities, Joint Ph.D. in, 439
and Italian Literatures, 433
and Spanish or Spanish-American Literatures, 433
with a Creative Writing Emphasis, 434
with Interdisciplinary Emphasis, 434
English as a Second language, 559
Environmental and Water Studies, Civil Engineering, 157
Environmental Sciences, 69
Environmental Technology, 64
Epidemiology Program, 741
Ethics in Society, Program in, 449
Examinations, 52
Dead Week Policy Statement, 52
Early Examinations, 54
End-Quarter, 53
Midterms, 52
Exchange Programs, 47
Exploration and Development, 88
Faculty and Staff Awards, 796
Fees, 20
Application, 20
Document, 20
Health Insurance, 20
Late Payment, 22
Paymens, 22
Refunds, 22
Fellowships and Assistantships, 17
Outside, 17
Postdoctoral, 17
Feminist Studies, 451
Film, see Communication
Film Studies, 457
Financial Aid, see Graduate or Undergraduate Financial Aid,
Florence, Stanford Program in, 590
Food Research Institute, 457
Founding Grant, 7
Founding of the University, 6
Fourier Optics and Optical Diagnostics Laboratory, 142
Fraternities, see Residences,
French and Italian, 462
French and African Studies, 463
French and Engineering Studies, 463
French and European Studies, 464
French and Francophone Literature, Language and Culture, 463
French and Linguistics, 464
French Division, 462, 473
Italian Division, 467, 477
Literatures, Ph.D. Minor in, 467, 471
Fundamental Standard, 787
Genetics, 742
Geochemistry, Petrology, and Mineralogy, 73
Geological and Environmental Sciences, 67
Geological Sciences, 68
Geomatics, 73
Geophysics, 86
Geosphere, 63, 65
Geostatistics in the Earth Sciences, 73
German Studies, 479
German Thought, 482
Interdisciplinary Programs, 482
Language and Linguistics, 482
Literature, 482
Ginzton, Edward L., Laboratory, 771
Global Positioning System (GPS), 142
Gores Award, Walter J., 796
Government, see Student Affairs,
Grading Systems, 54
Definition and Explanation, 54
General University, 54
Graduate School of Business, 56
Reporting of Grades, 55
Revision of End-Quarter Grades, 55
Satisfactory/No Credit Option, 54
School of Law, 56
School of Medicine, 56
Graduate Admissions, 13
Exchange Programs, 14
Matriculated Study, 13
Nonmatriculated Study, 14
Postdoctoral Scholars, 14
University Division, 13
Graduate Degrees, 37
Changes of Degree Programs, 42
Doctoral Degree, 45
Engineer Degree, 44, 136
General Degree Requirements, 37
Master's Degree, 43
Minimal Progress, 41
Public School Credentials, 48
Residency, 38
Graduate Financial Aid, 16
Coterminal Students, 18
Fellowships and Assistantships, 17
Honors Cooperative Program, 18, 132
Loans, 17
Outside Fellowships, 17
Postdoctoral Fellowships, 17
Veterans' Benefits, 18
Graduate Interschool Program, 783
Graduate School of Business, 60
Graduate Special Program, 783
Graduate Students, General Requirements
Leave of Absence, 37
Minimum Units, 39
Registration, 37
Residency, 38
Residency Credit for Graduate Work Done Elsewhere, 38
Graduate Students, Guidelines for Dismissal for Academic Reasons, 41
Before Candidacy, 42
During Candidacy, 42
Green Library, 779
Grievance Procedures, Guidelines for Academic, 57
Ombudsperson, 793
Guidance and Control Laboratory, 141, 238
Haas Center for Public Service, 792
Hansen, W. W., Experimental Physics Laboratory, 771
Health Insurance Fee, 20
Health Research and Policy, 744
Health Services, see Cowell Student Health Services
Health Services Research Program, 747
Herbert Hoover Medal For Distinguished Service, 796
High Temperature Gas Dynamics Laboratory (HTGL), 237
History, 488
History of Art, 304, 308
History and Humanities, Joint Ph. D. Program in, 492
History and Philosophy of Science, Program in, 513, 601
History of the University, 6
Honor Code, 787
Honors Cooperative Program, 18, 132
Hoover Institution on War, Revolution, and Peace, 774, 781
Hopkins Marine Station, 351, 355
Housing, see Residences, 21, 24
Rates, 21
Refund, 23
Human Biocultural Evolution (HBE), Anthropology, 283, 286
Human Biology, Program in, 516
Human-Computer Interaction, Computer Science, 174
Humanities and Sciences, School of, 272
Humanities Center, Stanford, 771
Humanities Special Programs, 526
Joint Ph.D. in, 528
Hydrogeology, 70
ID Cards, 51
Immunology Program, 748
Independent Research Laboratories, Centers and Institutes, 770
Individually Designed Majors, (IDMs), Program for, 33, 130
Industrial Engineering and Engineering Management, 129, 134, 221
Information Systems, 195
Information Technology Systems and Services (ITSS), 777
Institutional Interruption of Instruction, 23
Institute for International Studies (IIS), 772
Integrated Circuits, Electrical Engineering, 195
Intelligent Systems, 213
Intercollegiate Athletics, 333, 340
International Center, Bechtel, 784
International Economics, 429
International Policy Studies (IPS), 530
International Relations (IR), 531
International Relations, Political Science Courses in, 629, 635
Intramural Sports (IM), 333
Italian Section, 467, 477
Italian and English Literatures, 465
Italian, English, and French Literatures, 465
Italy, Stanford in, 468
Japanese, 322, 327
Japanese Studies in Yokohama, Inter-University Center for, 772
Jewish Studies, Program in, 540
Journalism, 380
J.D. Degree, 46
J.S.M. Degree, 45
Judicial Affairs and Student Conduct, 786
Knight Fellowship Program, John S., 378
Korean, Asian Languages, 329
Kyoto Center for Japanese Studies, 323, 411
Kyoto, Stanford Program in, 592
Laboratory Fee, 21
Land Resources Planning, 70
Land Systems Management, 63, 64
Language, Literacy, and Culture (LLC), 103
Language Requirement for Undergraduates, 30
Language Programs, 557
Lasers and Quantum Electronics, 195
Late Payment Charges, 22
Latin, see Classics
Latin American Studies, Center for, 541
Legislative, Judicial, and Advisory Bodies, 786
Legislative and Judicial Charter, 786
Libraries-Coordinates, 781
Libraries and Information Resources (L&IR), 777
Linguistics, 550
and Cognitive Science, 552
Literature in Translation, 559
Loans, 17
Deferment Loan Program, 22
Major, the Undergraduate, 32
Individually Designed, 33
Limits on Requirements for, 33
Multiple, 33
Requirements, 32
Secondary, 33
Manufacturing, Programs in, 133, 136
Manufacturing Systems Engineering (MSE), 222, 240
Martial Arts, 339
Mass Media Institute, 382
Master of Arts and Master of Science, 43
Master of Arts in Teaching (M.A.T.), 43, 106
Master of Business Administration (M.B.A.), 43, 60
Master of Fine Arts (M.F.A.), 44, 307
Master of Legal Studies (M.L.S.), 44
Master of the Science of Law, 45
Master's Research Report, MSE, 229
Materials Science and Engineering, 129, 134, 227
Mathematical and Computational Science, 256, 561
Mathematical Economics, 430
Mathematical System Analysis, 214
Mathematics, 563
M.D. Programs, 734
Meal Plans, 21
Mechanical Engineering, 129, 134, 235
Media Studies, 381
Medical Information Sciences Program, 751
Medical Policy, EES, 214
Medical Scientist Training Program, 734
Medical Services, see Cowell Student Health Services
Medicine, School of, 734
Medieval Studies, 572
Meyer Memorial Library, 779
Microbiology and Immunology, 576
Microwaves, Acoustics, and Optics, 195
Modern Thought and Literature, 573
Mus and Humanities, Joint Ph.D. Degree in, 576
Molecular and Cellular Physiology, 758
Molecular Pharmacology, 760
Molecular/Cell/Integrative Ph.D. Track, 346
Monetary Theory and Advanced Macroeconomics, 428
Moscow, Stanford Program in, 592
Multiple Majors, 33
Music, 578
Mus and Humanities, Joint Ph.D. Degree in, 581
Music Practice Fee, 21
Music, Science, and Technology, 579
National Security Policy, 214
Natural Resource and Environmental Economics, 213
Neurobiology, 762
Neurosciences Program, 763
Nonacademic Regulations, 798
Nondiscriminatory Policy, Statement of, 798
Nonmatriculated Graduate Study, 14
Numerical Analysis/Scientific Computation, 173
Ombudsperson, 793
Operations Research, 134, 255
Organization, 8
Academic Council, 10
Associated Students, 10
Board of Trustees, 9
Executive Officers, 8
President, 9
Provost, 10
University Committees, 10
Organization Studies, 684
Orientation Fee, New Student, 21
Overseas Studies, Program, 587
Overseas Studies, Distribution Requirements, 817
Oxford, Stanford Program in, 593
Painting, 306
Paris, Stanford Program in, 465, 595
Pathology, 765
Payments, 22
Petitions,
Against Suspension, 35
For Distribution Requirements, 30
Petroleum Engineering, 93
With Management Option, 97
Ph.D. Degree, 45
Ph.D. Minor, 47
Phi Beta Kappa, 797
Philosophy, 698
and Cognitive Science, 604
History and Philosophy of Science, 599, 601
and Humanities, 604
of Language, 602
and Religious Studies, 600
and Symbolic Systems, 602, 604
Photography, 307
Physical Education, see Athletics, Physical Education, and Recreation, and Sports Theory, 336
Leadership Opportunities, 336
Physics, 612
PINS, 51
Police Services, 793
Political and Comparative/Historical Sociology, 684
Political Organizations, 628, 633
Political Science, 623
Political Theory, 631
Population and Organismal Biology Ph.D. Track, 347
Population and Resource Studies, Morrison Institute for, 638
Portuguese Language Program, 707
Postdoctoral Scholars, 14
Predental, Premedical, Preparamedical Requirements, 344
President of the University, 9
President's Award, 797
Privacy of Student Records, 52
Probation, 35
Product Design, 130, 240, 242
Proficiency in German, Certification of, 480
Prospective Principal's Program, 105
Provisional Registration, 35
Provost, 10
Psychological Studies in Education (PSE), 103, 105
Psychology, 639
Cognitive Science Program, 644
Public Events, 793
Public Finance, 428
Public Policy, Political Science, Emphasis in, 624
Public Policy Program, 655
Public School Credentials, 48
Public Service, Haas Center for, 792
Quantitative Structural Geology, Geomechanics, and Active Tectonics, 73
Radiation Oncology, 767
Radio Astronomy Institute, 125
Radiology, 767
Real-World Computing, 174
Records, 51
Certification of Enrollment or Degrees, 51
Privacy, 52
Transcripts, 51
Recreation, 333
Refunds, 22
Room and Meal Plan, 23
Tuition, 22
Registration and Study Lists, 49
Amount of Work, 50
Auditing, 51
Identification Cards, 51
Personal Identification Numbers, 51
Repeated Courses, 50
Student List Changes, 50
Transcripts, 51
Unit of Credit, 50
Withdrawal Following Registration, 51
Regulations, Compliance with, 49
Rehabilitation Act of 1973, 798
Reinstatement, Graduate Division, 37
Religious Activities, 786
Religious Studies, 658
and Humanities, Joint Ph.D. Program in, 660
and Philosophy, Major in, 659
Repeated Courses, 50
Reporting of Grades, 55
Requirements, Degree
Graduate, 41
Undergraduate, 28
Requirements, Undergraduate,
Distribution, 29
Language, 30
Major, 32
Writing, 29
See also Appendix, 809
Research and System Applications, 212
ROTC, Scholarships and Grants, 16
Residences, 24
Community Housing, 25
Graduate, 24
Undergraduate, 24
Residency, Graduate, 38
Credit for Graduate Work Done Elsewhere, 38
Leaves of Absence, 37
Minimum Units Requirements, 39
Reinstatement, 37
Residency, 38
Residential Education Program, 24
Room and Meal Fees, 21
Rates, 21
Refunds, 23
Russian and East European Studies, Center for, 667
Russian Language and Literature, 672
Russian Language, Culture, and History, 672
Santiago, Chile, Stanford Program in, 597
Satellite Systems Development Laboratory (SSDL), 142
Schools of the University, 10
Science and Technology Policy, 214
Science, Technology, and Society (STS), 261
Scientific Computation, 173
Scientific Computing and Computational Mathematics Program, 134, 269
Sculpture, 307
Secondary Major, 33
Second Bachelor’s Degree, 27
Sedimentary Geology and Paleontology, 74
Sexual Assault, Stanford’s Official Policy on, 802
Sexual Harassment, Policy on, 798
Consensual Relationships, 799
Glossary, 799
Policy Review and Evaluation, 802
Procedures and Implementation, 800
Resources for Dealing with, 801
Resources within Academic or Administrative Units, 802
Slavic Languages and Literatures, 672
and Humanities, Joint Ph.D. Program in, 676
Slavic Theme House, 688
Sloan Program, Stanford, 60
Smoke-Free Environment, Stanford’s Official Policy on, 806
Social Psychology and Interpersonal Processes, 584
Social Sciences, Anthropology Major in, 283
Social Sciences and Educational Practice (SSEP), 103
Social Stratification and Inequality, 684
Sociology, 583
Sociology Theory, 690
Sociology, Joint Program with the Law School, 587
Software Theory, 173
Solid State, Electrical Engineering, 196
Sophomore Dialogues and Seminars, 726
Space Physics and Radioscience, 195
Space Science and Astrophysics (CSSA), Center for, 694
Spanish and Portuguese, 695
Overseas Programs in Brazil, Chile, Spain, and Portugal, 697
Special Programs, School of Humanities and Sciences, 726
Special Fees, 21
Stanford Linear Accelerator Center (SLAC), 775
Stanford Synchrotron Radiation Laboratory (SSRL), 776
Stanford Teacher Education Program (STEP), 105
Stanford Tubingen Graduate Exchange, 481
Statistics, 708
Stratification and Inequality, 688
Structural Biology, 768
Structural Engineering and Geomechanics, 158
Structural Geology, Regional Geology, and Tectonics, 74
Structured Liberal Education, Program in, 716
Structures and Composites Laboratories, 143, 237
Student Affairs, 784
Associated Students, 10
Campus Disruption, Policy on, 803
Compliance with University Regulations, 49
Controlled Substances and Alcohol, Policy on, 804
Fundamental Standard, 787
Honor Code, 787
Legislative and Judicial Charter, 786
Sexual Assault, Stanford’s Official Policy on, 802
Sexual Harassment, Stanford’s Official Policy on 798
Voluntary Organizations, 785
Weapons on Campus, Prohibition of, 804
Students, Dean of, 784
Student Services,
Bookstore, 792
Career Planning and Placement Center, 791
Center for Teaching and Learning (CTL), 794
Cowell Student Health Center, 792
Disability Resource Center, 784
Haas Center for Public Service, 792
International Center, 784
Ombudsperson, 793
Religious Activities, 786
Tresidder Union, 785
Study List Changes, 50
Summer Conference Services, 794
Summer Session, 57
Surface and Aqueous Geochemistry, 74
Surgery, 769
Suspension, 35
Symbolic Systems, Program in, 716
Systems, Computer Science, 173
Systems Economics, 214
Table of Contents, 4
Teaching Credentials, 48
Telecommunications and Information Policy, 214
Telecommunications and Space Information Systems, 196
INDEX 825

Terman Engineering Scholastic Award, Frederick Emmons, 797
Terminal Graduate Registration (TGR), 19
Theoretical Computer Science, 173
Thermosciences Laboratory, 237
Title IX of the Education Amendments of 1972, 798
Transcripts, 51
Transfer Credit, Undergraduate, 30
Tresidder Memorial Union (TMU), 785
Tübingen Graduate Exchange, 481
Tuition, 19
  Amounts, 19
  Payments, 22
  Refunds, 22
Turbulence/Combustion Laboratory, 142
Undergraduate Academic Advising, 36
Undergraduate Admissions, 12
  Matriculated Study, 12
  Nonmatriculated Study, 12
Undergraduate Degrees, 26
Undergraduate Financial Aid, 15
  Applicant Documents, 16
  Application and Award Notification Process, 15
  Filing Deadlines, 15
  Notification Dates, 16
  Payment and Financing Options, 16
  ROTC Scholarships and Grants, 16
Undergraduate Research Opportunities (URO), 729
  Funding Available, 729
  Listing Research, 729
  Resource Files, 729
Undergraduate Residences, 24
  Assignment To, 24
  Residential Education Program, 24
Undergraduate Scholars Program (USP), 274
  Unit Load, see Amount of Work
  Unit of Credit, 50
University Committees, 9
University Division (Graduate), 13
University Governance and Organization, 8
  Directory, 8
  Organization, 9
University Libraries and Academic Information Resources, 796
University Publications, 807
University Year, The, 49
Urban Studies, Program on, 720
  Urban Planning Option, 722
Vehicle Registration, 21
Vertebrate Animals, Academic Instructional Use of, 49
Veterans' Benefits, 18
Vincenti Prize, Walter G, 262
Visas for Foreign Students, 14
Volcanology, 75
Voluntary Organizations, 785
Washington, Stanford in, 730
Weapons on Campus, Prohibition of, 804
West Reference Room, Political Science, 626
Women and Gender, Institute for Research on, 774
Writing Across the Curriculum, 730
Writing Requirement, 29