General Catalogue

Consisting of

PART I—CIRCULAR OF INFORMATION
(published as a separate bulletin on May 15, 1960)

PART II—ANNOUNCEMENT OF COURSES
(to be published as a separate bulletin on August 15, 1960)

Fall and Spring Semesters
1960–1961

AUGUST 10, 1960

UNIVERSITY OF CALIFORNIA, BERKELEY
PART I
Circular of Information
Circular of Information

BERKELEY

Fall and Spring Semesters

1960–1961

MAY 15, 1960

UNIVERSITY OF CALIFORNIA, BERKELEY
# CALENDAR

Referring Primarily to the Departments of the University at Berkeley


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<th>Date</th>
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<tr>
<td>July 15, Friday</td>
<td>Last day for filing credentials and applications for admission to graduate standing with the Dean of the Graduate Division.</td>
</tr>
<tr>
<td>Aug. 15, Monday</td>
<td>Final date for filing applications for readmission to graduate standing with the Dean of the Graduate Division.</td>
</tr>
<tr>
<td>Sept. 1, Thursday</td>
<td>Last day for filing applications for readmission to undergraduate status with the Registrar.</td>
</tr>
<tr>
<td>Sept. 9, Friday, or Sept. 12, Monday</td>
<td>Examination in English for foreign students, 1 to 4 p.m., 101 California Hall.</td>
</tr>
<tr>
<td>Sept. 10, Saturday</td>
<td>Subject A Examination, 9 a.m. to 12 m.</td>
</tr>
<tr>
<td>Sept. 12, Monday</td>
<td>Fall semester begins.</td>
</tr>
<tr>
<td>Sept. 13, Tuesday</td>
<td>Registration of students, graduate and undergraduate, in the departments at Berkeley for courses of the fall semester.</td>
</tr>
<tr>
<td>Sept. 16, Friday</td>
<td>Advance enrollment. Assignment to sections.</td>
</tr>
<tr>
<td>Sept. 30, Friday</td>
<td>Last day for filing applications in candidacy for all master's degrees to be conferred in January, 1961; office of the Dean of the Graduate Division, 250 Sproul Hall. All signatures required upon these applications must be obtained in advance.</td>
</tr>
<tr>
<td>Oct. 3, Monday</td>
<td>Last day for filing announcement of candidacy for a bachelor's degree to be conferred in January, 1961; before 4:30 p.m. at the office of the Registrar, Sproul Hall.</td>
</tr>
<tr>
<td>Oct. 7, Friday</td>
<td>Last day for filing applications in candidacy for the degrees of Doctor of Philosophy, Doctor of Public Health, Doctor of Engineering, Doctor of Education, and Doctor of Library Science, to be conferred in June, 1961; office of the Dean of the Graduate Division, 250 Sproul Hall. All signatures required upon these applications must be obtained in advance.</td>
</tr>
<tr>
<td>Oct. 25, Tuesday</td>
<td>Last day to file petitions to add or drop courses. After this date, upon written petition duly approved by the dean of the college or school, an undergraduate student may discontinue attendance in a course, though without permission to drop the course from the study list. Normally, &quot;F&quot; will be assigned as the final grade in such discontinued courses. Graduate students may drop courses after this date with the permission of the Dean of Graduate Division.</td>
</tr>
<tr>
<td>Nov. 4, Friday</td>
<td>Last day to file application to take an engineering examination for admission in the spring semester, 1961.</td>
</tr>
</tbody>
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*Importance of early application:* In order to give time for necessary correspondence and for due notice to applicants who may be required to take examinations for admission, applications and credentials should be forwarded to the Director of Admissions at the earliest possible date.
Calendar

Nov. 5, Saturday
Nov. 19, Saturday
Nov. 24, Thursday, to Nov. 26, Saturday
Dec. 15, Thursday
Dec. 19, Monday, to Jan. 2, Monday
Dec. 23, Friday
Dec. 26, Monday
Dec. 30, Friday
Jan. 2, Monday

1961
Jan. 3, Tuesday
Jan. 4, Wednesday
Jan. 10, Tuesday
Jan. 14, Saturday
Jan. 16, Monday, to Jan. 25, Wednesday
Jan. 25, Wednesday

1960
Dec. 15, Thursday

1961
Jan. 16, Monday
Jan. 27, Friday, or Jan. 30, Monday
Jan. 30, Monday
Feb. 1, Wednesday
Feb. 2, Thursday
Feb. 3, Friday
Feb. 6, Monday
Feb. 7, Tuesday
Feb. 13, Monday

Engineering Examinations: Lower Division, 8 a.m. to 12:30 p.m.; Upper Division, 8 a.m. to 4:30 p.m.

Last day to file application for admission to the University for students wishing to enroll in the College of Engineering in the spring semester, 1961.

Thanksgiving holiday—academic and administrative.
Fall recess—an academic holiday.

Last day for filing credentials and applications with the Dean of the Graduate Division for admission to graduate standing in the spring semester.

Last day for filing applications with the Dean of the Graduate Division for readmission to graduate standing in the spring semester.

Last day for filing in final form with the committees in charge of theses for master's degrees to be conferred in January, 1961.

Instruction resumes.


Last day for students enrolled in the current semester to file applications for undergraduate scholarships for 1961-1962.

Instruction ends.

Final examinations in the departments at Berkeley.

Fall semester ends.

Last day for filing theses with the Dean of the Graduate Division for master's degrees to be conferred in January, 1961.

SPLING SEMESTER, 1961

Last day for filing credentials and applications with the Dean of the Graduate Division for admission to graduate standing.

Last day for filing applications with the Dean of the Graduate Division for readmission to graduate standing.

Applications for admission to undergraduate status for the spring semester, test scores and credentials to be filed with the Director of Admissions.

Last day for filing applications for readmission to undergraduate status with the Registrar.

Last day to file application for readmission to the University for students wishing to enroll in the College of Engineering in the spring semester, 1961.

Examination in English for foreign students, 1 to 4 p.m., 101 California Hall.

Spring semester begins.

Registration of students, graduate and undergraduate, in the departments at Berkeley for courses of the spring semester.

Advance enrollment. Assignment to sections.

Instruction begins.

Last day for filing applications for fellowships and graduate scholarships for 1961-1962.

Lincoln's Birthday—an academic and administrative holiday.
Calendar

Feb. 17, Friday  Last day for filing applications in candidacy for all master's degrees to be conferred in June, 1961; office of the Dean of the Graduate Division, 250 Sproul Hall. All signatures required upon these applications must be obtained in advance.

Feb. 21, Tuesday  Last day for filing announcement of candidacy for a bachelor's degree to be conferred in June, 1961; before 4:30 p.m. at the office of the Registrar, Sproul Hall.

Feb. 24, Friday  Last day for filing applications in candidacy for the degrees of Doctor of Philosophy, Doctor of Public Health, Doctor of Engineering, Doctor of Education, Doctor of Library Science, and Doctor of Social Welfare, to be conferred in January, 1962; office of the Dean of the Graduate Division, 250 Sproul Hall. All signatures required upon these applications must be obtained in advance.

Last day to file petitions to add or drop courses. After this date, upon written petition duly approved by the dean of the college or school, an undergraduate student may discontinue attendance in a course though without permission to drop the course from the study list. Normally, "F" will be assigned as the final grade in such discontinued courses. Graduate students may drop courses after this date with the permission of the Dean of the Graduate Division.

Feb. 27, Monday  Last day for filing applications and programs in candidacy for the certificates of completion of teacher-training curricula to be received in June, 1961; office of the Faculty Counseling Committee of the School of Education, 103 Haviland Hall.

March 1, Wednesday  Last day for entering students to file applications for undergraduate scholarships for 1961–1962.


March 27, Monday, to April 1, Saturday  Last day for filing application to take an engineering examination for admission in the fall semester, 1961.

April 8, Saturday  Engineering Examinations: Lower Division, 8 a.m. to 12:30 p.m.; Upper Division, 8 a.m. to 4:30 p.m.

April 22, Saturday  Last day to file application for admission to the University for students wishing to enroll in the College of Engineering in the fall semester, 1961.

May 9, Tuesday  Last day for filing in final form with the committees in charge of theses for master's degrees to be conferred in June, 1961.

May 19, Friday  Last day for filing theses with the Dean of the Graduate Division for the degrees of Doctor of Philosophy, Doctor of Public Health, Doctor of Engineering, Doctor of Education, and Doctor of Library Science, to be conferred in June, 1961.

May 27, Saturday  Instruction ends.

May 30, Tuesday  Memorial Day—an academic and administrative holiday.

May 31, Wed., to June 9, Friday  Final examinations in the departments at Berkeley.

June 9, Friday  Last day for filing theses with the Dean of the Graduate Division for master's degrees to be conferred in June, 1961. Spring semester ends.
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THE REGENTS OF THE UNIVERSITY

REGENTS EX OFFICIO

His Excellency, EDMUND G. BROWN, LL.B., Governor of California and President of the Regents
State Capitol, Sacramento 14

GLENN ANDERSON
Lieutenant-Governor of California
State Capitol, Sacramento 14

RALPH M. BROWN, A.B., LL.B.
Speaker of the Assembly
State Capitol, Sacramento 14

ROY E. SIMPSON, M.A., Litt.D.
State Superintendent of Public Instruction
721 Capitol av, Sacramento 14

APPOINTED REGENTS

The term of the appointed Regents is sixteen years, and terms expire March 1 of the years indicated in parentheses. The names are arranged in the order of original accession to the Board.

717 N Highland av, Los Angeles 38

EDWARD H. HELLER, A.B. (1976)
100 Montgomery st, San Francisco 4

VICTOR R. HANSEN, LL.B. (1962)
1734 Earlmount av, La Canada

CORNELIUS J. HAGGERTY (1966)
Room 810, 995 Market st, San Francisco 3

JESSE H. STEINHART, A.B., LL.B., LL.D. (1962)
111 Sutter st, San Francisco 4

100 Bush st, San Francisco 4

GERALD H. HAGAR, A.B., J.D. (1964)
1500 Central blvd, 14th and Broadway, Oakland 12

HOWARD C. NAFFZIGER, B.S., M.S., M.D. (1968)
Room 417, 58 Sutter st, San Francisco 4

MRS. DOROTHY B. CHANDLER (1970)
202 W First st, Los Angeles 53

MRS. CATHERINE HEART (1974)
701 N Canon dr, Beverly Hills

SAMUEL B. MOSHER, B.S. (1972)
811 W Seventh st, Los Angeles 17

Lockheed Aircraft Corporation, Burbank

PHILIP L. BOYD, A.B. (1972)
3900 Market st, Riverside

JERD F. SULLIVAN, JR. (1964)
Crocker-Anglo National Bank, 1 Montgomery st, San Francisco 4

NORTON SIMON (1976)
Suite 1201, 3440 Wilshire blvd, Los Angeles 5

OFFICERS OF THE REGENTS

His Excellency Edmund G. Brown, LL.B., Governor of California
President
State Capitol, Sacramento 14

Donald H. Mclaughlin, B.S., M.A., Ph.D., D.Eng., Chairman
100 Bush st, San Francisco 4

Robert M. Underhill, B.S., Secretary and Treasurer
615 University Hall, Berkeley 4

Stanley J. Thomson, A.B., Assistant Secretary and Assistant Treasurer
615 University Hall, Berkeley 4

Miss Marjorie J. Woolman, Associate Secretary
689 University Hall, Berkeley 4

Thomas J. Cunningham, A.B., LL.B., General Counsel of the Regents
590 University Hall, Berkeley 4

John E. Landon, A.B., LL.B., Associate Counsel of the Regents
590 University Hall, Berkeley 4

John P. Sparrow, A.B., LL.B., Associate Counsel of the Regents
590 University Hall, Berkeley 4

Milton H. Gordon, A.B., LL.B., Assistant Counsel of the Regents
590 University Hall, Berkeley 4

R. Bruce Hoffe, A.B., LL.B., Assistant Counsel of the Regents
590 University Hall, Berkeley 4

Mark Owens, Jr., A.B., LL.B., Assistant Counsel of the Regents and Attorney in Residence Matters
590 University Hall, Berkeley 4
UNIVERSITY OF CALIFORNIA

GENERAL ADMINISTRATIVE OFFICERS

Clark Kerr, Ph.D., LL.D., President of the University.
Robert Gordon Sproul, B.S., LL.D., Litt.D., President of the University, Emeritus.
Harry R. Wellman, Ph.D., Vice-President of the University.
Claude B. Hutchison, M.S., LL.D., D.Agr. (hon.c.), Vice-President of the University and Dean of the College of Agriculture, Emeritus.
James H. Corley, B.S., Vice-President—Governmental Relations and Projects.
Thomas J. Cunningham, A.B., LL.B., Vice-President and General Counsel.
Raymond W. Kettler, M.A., Vice-President—Finance and Controller.
Elmo R. Morgan, B.S., Vice-President—Business.
Robert M. Underhill, B.S., Vice-President, and Secretary and Treasurer of the Regents.
John W. Oswald, Ph.D., Assistant Vice-President.
Daniel G. Aldrich, Jr., Ph.D., University Dean of Agriculture.
Paul H. Sheats, Ph.D., Dean of University Extension.
Glenn T. Seaborg, Ph.D., Sc.D., LL.D., Chancellor at Berkeley.
Emil M. Mrak, Ph.D., Chancellor at Davis.
Vern O. Knudsen, Ph.D., Chancellor at Los Angeles (to June 30, 1960).
Franklin D. Murphy, A.B., M.D., Sc.D., L.H.D., LL.D., Chancellor at Los Angeles (from July 1, 1960).
Herman T. Spieth, Ph.D., Chancellor at Riverside.
Samuel B. Gould, M.A., LL.D., Chancellor at Santa Barbara.
John B. deC. M. Saunders, M.B., Ch.B., F.R.C.S. (Edin.), Provost at San Francisco Medical Center.
Roger R. Revelle, Ph.D., Director at La Jolla.
Edgar L. Lazier, Ph.D., Acting Director of Admissions (to June 30, 1960).
Grace V. Bird, A.B., Acting Director of Relations with Schools (to June 30, 1960).

GENERAL ADMINISTRATIVE OFFICERS—BERKELEY CAMPUS

Glenn T. Seaborg, Ph.D., Sc.D., LL.D., Chancellor.
William B. Fretter, Ph.D., Acting Vice-Chancellor (from March 1, 1960, to June 30, 1960).
James D. Hart, Ph.D., Vice-Chancellor.
Alex C. Sherriffs, Ph.D., Vice-Chancellor—Student Affairs.
Edward W. Strong, Ph.D., Vice-Chancellor.
Clinton C. Gilliam, A.B., Registrar.
James C. Stone, M.A., Ed.D., Acting Associate Director of Admissions.
Morris A. Stewart, Ph.D., LL.D., Dean of the Graduate Division, Northern Section.
James M. Cline, Ph.D., Associate Dean of the Graduate Division, Northern Section.
Robert A. Cockrell, Ph.D., Associate Dean of the Graduate Division, Northern Section.
Sanford A. Mosk, Ph.D., Associate Dean of the Graduate Division, Northern Section.
William F. Shepard, Ph.D., Dean of Students.
Arleigh T. Williams, M.A., Dean of Men and Associate Dean of Students.
Katherine A. Towle, M.A., LL.D., Dean of Women and Associate Dean of Students.
Administrative Officers

Catharine DeMotte Quire, Ph.D., Associate Dean of Women.
Eric C. Bellquist, Ph.D., Assistant Dean of Students.
George D. Changaris, M.A., Assistant Dean of Students.
Helen E. Clarke, M.A., Assistant Dean of Students.
Thomas B. Dutton, M.A., Assistant Dean of Men.
Gordon Hearn, Ph.D., Assistant Dean of Students.
Betty H. Neely, M.Ed., Assistant Dean of Students.
Maryanne Reid, M.A., Assistant Dean of Students.
Thomas B. Dutton, M.A., University Librarian.
W. Sheridan Warrick, M.A., Foreign Student Adviser.
James G. Siler, M.S., Supervisor of Special Services.
Ruth N. Donnelly, A.B., Supervisor of Housing Services.
Forrest E. Treggea, A.B., Acting Business Manager.
Norman M. Mundell, M.S., Accounting Officer.
Lloyd D. Bernard, Ph.D., Manager of the School and College Placement Service.
Robert Calvert, Jr, Ed.D., Manager of the Student and Alumni Placement Center.
Barbara A. Kirk, M.A., Manager of the Counseling Center.
Henry B. Bruyn, Jr., M.D., Director of the Student Health Service.

ADMINISTRATIVE OFFICERS OF THE COLLEGES AND SCHOOLS

BERKELEY CAMPUS

Roy Bainer, M.S., Assistant Dean of the College of Engineering (Resident at Davis).
Leonard J. Black, Ph.D., Assistant Dean of the College of Engineering.
William A. Brownell, Ph.D., LL.D., Dean of the School of Education.
Elroy L. Bundy, Ph.D., Assistant Dean of the College of Letters and Science.
Eugene W. Burgess, Ph.D., Assistant Dean of the Graduate School of Business Administration.
Milton Chernin, Ph.D., Dean of the School of Social Welfare.
Lincoln Constance, Ph.D., Dean of the College of Letters and Science.
J. Periam Danton, Ph.D., Dean of the School of Librarianship.
Arnold Elston, Ph.D., Assistant Dean of the College of Letters and Science.
Clyne F. Garland, M.S., Associate Dean of the College of Engineering.
Ewald T. Grether, Ph.D., LL.D., Dean of the Graduate School of Business Administration and Dean of the School of Business Administration.
Ralph R. Hultgren, Ph.D., Assistant Dean of the College of Engineering.
William N. Keeler, A.B., J.D., Assistant Dean of the School of Law.
Walter D. Knight, Ph.D., Assistant Dean of the College of Letters and Science.
S. E. Torsten Lund, Ph.D., Assistant Dean of the School of Education.
Theodore D. McCown, Ph.D., Associate Dean of the College of Letters and Science.
Maurine McKeany, Ph.D., Associate Dean of the School of Social Welfare.
F. Theodore Malm, Ph.D., Assistant Dean of the School of Business Administration.
Gerald E. Marsh, M.A., Associate Dean of the College of Letters and Science and Director of the Summer Sessions.
Charles Muscatine, Ph.D., Assistant Dean of the College of Letters and Science.
Donald S. Noyce, Ph.D., Assistant Dean of the College of Chemistry.
Kenneth S. Pitzer, Ph.D., Dean of the College of Chemistry.
William L. Prosser, A.B., LL.B., LL.D., Dean of the School of Law.
Benbow F. Ritchie, Ph.D., Assistant Dean of the College of Letters and Science.
Administrative Officers

Erhard Rostlund, Ph.D., Assistant Dean of the College of Letters and Science.
Knowles A. Ryerson, M.S., Dean of the College of Agriculture.
Herbert J. Scott, E.E., Assistant Dean of the College of Engineering.
Lysle E. Shaffer, E.M., Assistant Dean of the College of Engineering.
Charles E. Smith, M.D., D.P.H., Dean of the School of Public Health.
Kenneth B. Stoddard, Ph.D., Dean of the School of Optometry.
Harold A. Stump, A.B., Assistant Dean of the College of Environmental Design.
Frederick T. Tyler, Ph.D., Associate Dean of the School of Education.
Henry J. Vaux, Ph.D., Dean of the School of Forestry.
Dow Votaw, M.B.A., LL.B., Associate Dean of the School of Business Administration.
John T. Wheeler, Ph.D., Associate Dean of the Graduate School of Business Administration.
John R. Whinnery, Ph.D., Dean of the College of Engineering.
William W. Wurster, A.B., F.A.I.A., Dean of the College of Environmental Design.

SAN FRANCISCO CAMPUS

Robert H. Crede, M.D., Assistant Dean of the School of Medicine.
Troy C. Daniels, Ph.D., Dean of the School of Pharmacy.
Willard C. Fleming, D.D.S., D.Sc., Dean of the School of Dentistry.
Leon Goldman, M.D., Associate Dean of the School of Medicine.
Mary T. Harms, Ed.D., Assistant Dean of the School of Nursing.
Helen Nahm, Ph.D., Dean of the School of Nursing.
John B. deC. M. Saunders, M.B., Ch.B., F.R.C.S., Dean of the School of Medicine.
Kathryn M. Smith, M.A., Assistant Dean of the School of Nursing.
David E. Snodgrass, A.B., LL.B., Dean of Hastings College of the Law.
Malcolm S. Watts, M.D., Assistant Dean of the School of Medicine.
Gurdon G. Woods, Director of the California School of Fine Arts.
Wendell L. Wylie, D.D.S., M.S., Assistant Dean of the School of Dentistry.
The University of California is composed of academic and professional colleges, professional schools, divisions, departments of instruction, museums, libraries, research institutes, bureaus and foundations, and the University of California Press, situated on seven different campuses throughout the State, namely: Berkeley, Davis, La Jolla, Los Angeles, Riverside, San Francisco, and Santa Barbara. A list of the divisions on each campus follows:

I. AT BERKELEY

The colleges of Letters and Science, Agriculture, Chemistry, Engineering, Environmental Design; The schools of Business Administration, Criminology, Education, Forestry, Law, Librarianship, Optometry, Public Health (in part), Social Welfare.

The Graduate Division (Northern Section); The University Extension (offering instruction wherever classes can be formed, or anywhere in California by correspondence, and providing lectures, recitals, moving pictures, and other material for visual instruction); The Agricultural Extension Service; the Agricultural Experiment Station (in part); The Giannini Foundation of Agricultural Economics; M. Theodore Kearney Foundation of Soil Science; The Computer Center; Wild Lands Research Center; The Museum of Vertebrate Zoology; The Museum of Paleontology; The Museum of Anthropology; The Heller Committee for Research in Social Economics; The institutes of Engineering Research, Experimental Biology, Geophysics (in part), Human Development, Industrial Relations (in part), International Studies, Personality Assessment and Research, Social Sciences, Transportation and Traffic Engineering (in part); The bureaus of Business and Economic Research (in part), International Relations, Public Administration; The William H. Crocker Radiation Laboratory; The Forest Products Laboratory; The Laboratory of Radio Astronomy; The Virus Laboratory; The Lick Observatory (at Mount Hamilton); The University Art Gallery; The University of California Press; The University Library.

Departments of Instruction in the Colleges at Berkeley

II. AT LOS ANGELES*

The college of Letters and Science, Engineering, Applied Arts, Agriculture; The schools of Business Administration, Business Administration—Graduate, Education, Law, Medicine, Nursing, Public Health (in part), Social Welfare; The Graduate Division (Southern Section); Agricultural Experiment Station (in part); The bureaus of Business and Economic Research (in part), Governmental Research; The institutes of Geophysics (in part), Industrial Relations (in part), Slavic Studies (in part), Transportation and Traffic Engineering (in part); The University Library; The Senator William Andrews Clark Memorial Library.

III. AT SAN FRANCISCO

Schools of Dentistry, Medicine (including the University Hospital and Langley Porter Neuropsychiatric Institute), Nursing, Pharmacy, Public Health (in part); The George Williams Hooper Foundation (for medical research); California School of Fine Arts; Hastings College of the Law.

IV. AT DAVIS

The College of Agriculture, the College of Engineering (Berkeley), the College of Letters and Science, and the School of Veterinary Medicine.

V. AT RIVERSIDE

The College of Letters and Science and the Citrus Experiment Station.

VI. AT LA JOLLA

The Scripps Institution of Oceanography and the School of Science and Engineering.

VII. AT SANTA BARBARA

The Division of Applied Arts and the Division of Letters and Science.

DIVISION OF AGRICULTURAL SCIENCES

There is established a Division of Agricultural Sciences which shall consist of the College of Agriculture, the School of Forestry, the School of Veterinary Medicine, the Agricultural Extension Service, the Agricultural Experiment Station, the Citrus Experiment Station, the Giannini Foundation of Agricultural Economics, and the M. Theodore Kearney Foundation of Soil Science.

ADMINISTRATION

The Regents of the University of California, by authority vested in them by the State constitution, created an academic administrative body called the Academic Senate. The Senate, subject to the approval of the Regents, determines the conditions for admission, for certificates, and for degrees. It authorizes and supervises all courses of instruction in the academic and professional colleges and schools, except in professional schools offering courses at the graduate level only. The dean or director of a school, college, or other division of the University is entrusted with the duty of assisting the President in the administration of the University, with special reference to the welfare of the particular school, college, or other division concerned, and of the students therein.†

SURVEY OF CURRICULA

In order that the student may gain some idea of the scope of the curricula offered—undergraduate, professional, and graduate—and of the academic

* A more detailed description of instruction offered at Los Angeles will be found on page 16.
† For a list of the administrative officers of the University at Berkeley and San Francisco, see pages 8—10.
and professional opportunities that are open to him, there is presented in the
following paragraph a cursory but fairly comprehensive outline of the pro-
grams of instruction offered in the different schools and colleges.

**THE FOUR ACADEMIC UNDERGRADUATE COLLEGES**

Four academic colleges at Berkeley offer undergraduate curricula of four
years, leading, in the College of Letters and Science, to the bachelor's degree
in arts (A.B.), and in the three colleges of applied sciences to the bachelor's
degree in science (B.S.). The undergraduate colleges are:

**College of Letters and Science**

**Colleges of applied sciences—**

**College of Agriculture.** In this College, curricula are open in the fields of
plant science, animal science, agricultural economics, entomology and
parasitology, food science, home economics, irrigation science, nutrition,
soil science, or agricultural education.

**College of Chemistry.** In this College, the student may choose a program
in chemistry or a program in chemical engineering.

**College of Engineering.** The student in this College may elect a program
of study at Berkeley in agricultural engineering, ceramic engineering,
civil engineering, electrical engineering, engineering science (engineering
physics), geological engineering, industrial engineering, mechanical
engineering, metallurgy, mining engineering, petroleum engineering, or
process engineering; or at Davis in engineering in the areas of agricul-
tural power and machinery, structures, and processing; irrigation,
drainage, and water resources; and food processing.

**PROFESSIONAL CURRICULA**

Most of the professional curricula offered by the University are based on
two or more years of undergraduate work. Some of the curricula may be
carried to completion at Berkeley; others must be pursued in part at Berkeley
and completed in San Francisco or at Davis; others may be pursued in full
at Davis or at San Francisco. These curricula lead to the higher degrees, or
to degrees and/or certificates, in the respective fields of architecture, bio-
radiology, business administration, city planning, criminology, dentistry, edu-
cation, engineering, forestry, journalism, landscape architecture, law, li-
brarianship, medicine, nursing, optometry, pharmacy, public health, social
welfare, and veterinary medicine. Full details of the respective curricula will
be found in later pages of this bulletin.

**The Professional Schools—**

The School of Business Administration offers a program beginning with
junior standing in the University, normally requiring two years and leading
to the degree of Bachelor of Science.

The Graduate School of Business Administration offers curricula leading
to the degree of Master of Business Administration. The master's degree nor-
mally requires from one to two years, depending upon the undergraduate
preparation. Students who have completed the work for the degree of Bachelor
of Science in the School of Business Administration, University of California,
or an equivalent institution, should be able to complete the requirements for
the degree of Master of Business Administration in one year.

The School of Criminology offers curricula on both the undergraduate and
graduate levels. Students may be admitted to the undergraduate curricula
leading to the Bachelor of Arts or the Bachelor of Science degree upon at-
taining upper division standing and at least a grade C average in the College
of Letters and Science or the equivalent elsewhere. The graduate curriculun
leads to the degree of Master of Criminology.
The School of Dentistry offers three curricula: a six-year curriculum leading to the degrees of Bachelor of Science and Doctor of Dental Surgery; a curriculum, limited to women students, in the training of dental hygienists; and a graduate curriculum leading to the degree of Master of Dental Surgery, and Master of Science in Dentistry.

The degree of Bachelor of Science is awarded for completion of the work of the first five years—two years in the College of Letters and Science at Berkeley or Los Angeles, followed by three years of the four-year professional curriculum in the School of Dentistry at San Francisco—and the degree of Doctor of Dental Surgery is awarded after one additional year (the fourth year of the professional curriculum) in San Francisco. The degree of Master of Dental Surgery is awarded upon completion of a graduate curriculum of three years, following receipt of the degree of Doctor of Dental Surgery.

For the training of dental hygienists a four-year curriculum is offered, including two years of academic instruction similar in scope and content to that required for admission to the curricula in dentistry, followed by two years of professional training in dental hygiene. On completion of the curriculum for dental hygienists, the degree of Bachelor of Science is awarded.

The School of Education offers two programs. The first (a three-year curriculum) covers, with the required preliminary work, a total of five years—the usual four undergraduate years leading to the bachelor's degree, and an additional graduate year leading to the Certificate of Completion of teacher-training curricula. The second program (a two-year curriculum following the bachelor's degree) requires six years—the four undergraduate years leading to the bachelor's degree, and two graduate years, leading either to the degree of Master of Education or to the degree of Doctor of Education.

The School of Forestry offers undergraduate and graduate curricula leading to the degrees of Bachelor of Science, Master of Forestry, and Master of Science. For further details, consult the Announcement of the School of Forestry.

The School of Law offers the following curricula:

1. A three-year curriculum leading to the degree of Bachelor of Laws. Applicants for admission to the professional curriculum must have received the degree of Bachelor of Arts or Bachelor of Science from the University of California, or an equivalent degree from a college or university of approved standing. (For admission requirements, see under School of Law in later pages of this bulletin and consult the Announcement of the School of Law, a copy of which may be obtained from the Dean of the School.)

2. A graduate curriculum of one year, based on the degree of Bachelor of Laws and leading to the degree of Master of Laws (LL.M.) or Doctor of the Science of Law (J.S.D.).

The School of Librarianship offers a curriculum of two years based on the bachelor's degree, leading to the degree of Master of Library Science; and a curriculum of two years following completion of the basic professional curriculum of a graduate library school of approved standing, leading to the degree of Doctor of Library Science.

The School of Medicine (at San Francisco) prescribes a curriculum of four years based on three years of undergraduate work. The three years of undergraduate work may be taken in the College of Letters and Science, Berkeley. The student who completes the courses specified by the School of Medicine and attains the equivalent of senior standing in the College of Letters and Science may apply for admission to the School of Medicine for the senior year. If he completes the junior year in the College of Letters and Science, Berkeley, he must elect a regular major for the A.B. degree and enroll in that major program. A student who enters the School of Medicine in his senior year may be a candidate for the bachelor's degree upon completion of his first year in
the School of Medicine. The four-year curriculum in the School of Medicine leads to the degree of Doctor of Medicine.

The School of Nursing (at San Francisco) offers a curriculum of five years, leading to the degree of Bachelor of Science. Matriculation and the completion of the lower division requirements in the College of Letters and Science or in the College of Applied Arts are required. The program includes two years in the College of Letters and Science at Berkeley or Los Angeles or in the College of Applied Arts at Los Angeles, and three years in the School of Nursing. A graduate curriculum is also offered, leading to the Master of Science degree.

The School of Optometry offers a curriculum of three years based on the completion of two years of study in the College of Letters and Science, or its equivalent, leading to the degree of Bachelor of Science at the end of two years, and the Certificate of Completion in optometry and to the Master of Optometry degree at the end of an additional graduate year.

The School of Pharmacy (at San Francisco) offers a four-year curriculum leading to the degree of Doctor of Pharmacy. The requirements for admission are completion with an average grade of C or better of 60 units of college work in the University of California or another institution of approved standing.

The School of Public Health offers curricula on both the undergraduate and the graduate levels. Students may be admitted to the undergraduate curricula leading to the degree of Bachelor of Science upon attaining junior standing and at least a grade C average in the College of Letters and Science or the equivalent elsewhere. The graduate curricula lead to the degrees of Master of Public Health and Doctor of Public Health.

The School of Social Welfare offers two graduate programs: a two-year curriculum, based upon the bachelor's degree, leading to the degree of Master of Social Welfare; and a program of advanced study and research, based on the Master of Social Welfare degree, leading to the degree of Doctor of Social Welfare.

The School of Veterinary Medicine (at Davis) offers a curriculum of four years based upon two or more years of undergraduate work, leading to the degree of Doctor of Veterinary Medicine.

The Professional Colleges—

The College of Environmental Design offers the following professional curricula:

1. A five-year undergraduate curriculum in architecture leading to the degree of Bachelor of Architecture.
2. A graduate curriculum in architecture, under the supervision of the Department of Architecture, leading to the degree of Master of Architecture.
3. A four-year undergraduate curriculum in landscape architecture leading to the degree of Bachelor of Landscape Architecture.
4. A graduate curriculum in landscape architecture, under the supervision of the Department of Landscape Architecture, leading to the degree of Master of Landscape Architecture.
5. A two-year graduate curriculum in city planning, under the supervision of the Department of City and Regional Planning, leading to the degree of Master of City Planning.

For further information see pages 105–110 of this circular.

Hastings College of the Law offers a three-year curriculum and a four-year curriculum, both leading to the degree of Bachelor of Laws: September, 1960, will be the last semester for admission of students to the four-year program.

Every applicant for admission to the College must have received the degree of Bachelor of Arts or Bachelor of Science from the University of California, or an equivalent degree from a college or university of approved standing.
Every applicant for admission to the four-year curriculum must have completed at least 60 units of undergraduate work, acceptable toward a bachelor's degree in the College of Letters and Science of the University of California.

Graduate Curricula in Engineering—
Curricula in engineering lead to the advanced professional degrees: Master of Engineering and Doctor of Engineering.

Special Professional Curricula—
The curriculum in physical therapy is given at the School of Medicine in San Francisco. It requires a period of one year divided into two semesters and one summer term of twelve weeks and leads to a certificate or to a B.S. degree in the School of Medicine with a major in physical therapy.

The curriculum for orthoptic technicians is given at the School of Medicine in San Francisco. The total training period is twelve months and leads to a Certificate of Completion of the course for orthoptic technicians.

The curriculum for medical technicians is given at the School of Medicine in San Francisco. It consists of one year (forty-eight weeks) of full-time work and leads to a Certificate of Completion of the curriculum in medical technology.

The curriculum in medical illustration is given at the School of Medicine in San Francisco. The course extends over two forty-eight-week periods of full-time work and leads to a Certificate of Completion in medical illustration upon completion of the course.

The curriculum for X-ray technicians is offered at the University of California Medical Center, San Francisco. It extends through a full year, beginning with the fall semester, and leads to a Certificate of Completion of the course for X-ray technicians.

The curriculum for technicians in exfoliative cytology is given at the School of Medicine in San Francisco. The course is one semester in length and leads to a Certificate of Completion of the course for technicians in exfoliative cytology.

A field of study in journalism leads to the degree of Master of Journalism after at least one year of prescribed graduate work. Candidates must have received the bachelor's degree, must have completed an approved program of study, and must have passed a comprehensive final examination.

A field of study in bioradiology leads to the degree of Master of Bioradiology after at least two years of prescribed work. Candidates must have received a bachelor's degree and must have completed an approved program of study.

UNIVERSITY OF CALIFORNIA, LOS ANGELES

Instruction at the University of California, Los Angeles, is offered in (a) the College of Letters and Science, with curricula leading to the degree of Bachelor of Arts, and Bachelor of Science; also, the following preprofessional curricula: prebusiness, precriminology, predental, predental hygiene, premedical, prepharmacy, and presocial welfare; (b) the College of Applied Arts, with curricula leading to the degree of Bachelor of Arts, and Bachelor of Science; also, the following preprofessional curricula: prenursing, preoccupational therapy, preoptometry, and prepublic health; (c) the College of Engineering, with curricula leading to the degree of Bachelor of Science; (d) the College of Agriculture, with curricula leading to the degree of Bachelor of Science; (e) the School of Business Administration, with curricula leading to the degree of Bachelor of Science; (f) the School of Public Health, with curricula leading to the degree of Bachelor or Science; (g) the School of Nursing, with curricula leading to the degree of Bachelor of Science; (h) the School of Law, with a curriculum leading to the degree of Bachelor of Laws; and (i) the School of Medicine with a curriculum leading to the degree of Doctor of Medicine. Students electing certain curricula in
the College of Agriculture may register at Los Angeles for the first two years and then transfer to Berkeley or Davis to complete the requirements for the degree. The School of Education at Los Angeles supervises curricula leading to the Certificate of Completion for the various elementary and secondary teaching credentials, and for the administrative credential. Graduate study, leading to the degrees of Master of Science, Master of Arts, Master of Business Administration, Master of Education, Master of Engineering, Master of Public Administration, and Master of Social Welfare, and to the degrees of Doctor of Philosophy, Doctor of Education, and Doctor of Public Health, also is available at the University of California, Los Angeles.

SUMMER SESSIONS

During the summer the University conducts at Berkeley one or more sessions of six weeks' duration each. In 1960 two such summer sessions of six weeks each will be conducted, the first session beginning June 20, and the second beginning August 1. Information concerning the Summer Sessions of 1960 is in the SUMMER SESSIONS bulletin, obtainable on or about March 15, 1960, upon request from the Office of the Summer Sessions, 1 Sproul Hall, University of California, Berkeley 4, California.

In addition to the sessions at the University on the Berkeley campus, Summer Sessions are conducted annually by the University of California on the campuses of Davis, Los Angeles, San Francisco, and Santa Barbara.

UNIVERSITY EXTENSION

University Extension makes available the resources of the University to those, especially adults, who cannot take up residence at one of the campuses or who prefer a part-time special program. The program includes classes, correspondence courses, discussion groups, conferences, and special activities in a wide variety of subject fields and interests. In limited number, courses are offered through class and correspondence which are applicable toward the bachelor's degree and toward recommendations for teachers' credentials, subject to University requirements for such degrees and credentials. During the past few years, an increasingly large and significant service has been made available to those in the professions and others with advanced training. Study at the professional level is offered in such fields as engineering and sciences, law, medicine, nursing, public health, dentistry, accounting, public administration, education, social services, and the like. However, the majority of University Extension offerings are in the more general fields and are open to all adults who can profit by the instruction.

The educational services of University Extension are organized around three primary aims: to help men and women advance professionally; to aid them in meeting their responsibilities as citizens; to assist in their pursuit of intellectual and cultural interests.

Five principal methods of instruction are used:

(1) Classes and discussion groups are organized in areas wherever there is a sufficient number of persons who wish to study a subject.

(2) Correspondence courses offer lessons, study materials, and faculty guidance by mail.

(3) Conferences and special activities, for periods ranging from two days to several weeks, provide intensive instruction for groups interested in specialized knowledge.

(4) Lectures, singly or in series, are provided for any committee, club, organization, or community in the State that will make the necessary arrangements for their delivery.

(5) The Department of Visual Communications administers the University's programming in the field of educational television; produces educational
motion pictures as needed by campus departments; makes certain educational films available for purchase; and maintains film libraries on a rental basis for the campus and the general public.

For schedules and literature describing these services in detail, write to University Extension at one of the following addresses: University Extension, University of California, Berkeley 4; University Extension, 55 Laguna Street, San Francisco 2; University Extension, Second and Parnassus Avenues, San Francisco 22; University Extension, Room 164, Home Economics Building, University of California, Davis; University Extension, University of California, Los Angeles 24; University Extension, University of California, Riverside; University Extension, University of California, 129 East Carrillo Street, Santa Barbara; University Extension, 1221 Fourth Avenue, San Diego 1.

THE UNIVERSITY LIBRARY

The Library on the Berkeley campus of the University of California consists of the General Library with its nineteen branch libraries and a number of departmental and special libraries. These groups, collectively known as the University Library, contain about 2,500,000 volumes. Over 30,000 periodicals and serials are received currently.


The Bancroft Library of Californian, western American, and colonial Latin-American history, and the Alexander F. Morrison Library, a recreational reading room open only to students, members of the faculty, and officers of the University, are also located in the Main Library.

The nineteen branch libraries are located near the departments which use them most: Architecture Library, Architecture Building; Art-Anthropology Library, Kroeber Hall; Astronomy-Mathematics-Statistics Library, Campbell Hall; Biochemistry Library, Biochemistry and Virus Laboratory Building; Biology Library, Life Sciences Building; Chemistry Library, Gilman Hall; City and Regional Planning Library, City and Regional Planning Building; East Asiatic Library, Durant Hall; Engineering Library, Hesse Hall Annex; Forestry Library, Mulford Hall; Geology Library, Bacon Hall; Landscape Architecture Library, Agriculture Hall; Lange Library of Education, Haviland Hall; Library School Library, Main Library Building; Matthew Memorial Library of Paleontology, Hearst Mining Building; Music Library, May T. Morrison Hall; Optometry Library, Optometry Building; Physics Library, Le Conte Hall; Public Health Library, Earl Warren Hall.

Departmental and special libraries include the libraries of the Bureau of International Relations and the Bureau of Public Administration on the third floor of the Main Library; the Entomology Library, Agriculture Hall; Giannini Library of agricultural economics, Giannini Hall; the Institute of Industrial Relations Library, California Hall; the Institute of Transportation and Traffic Engineering Library, Richmond Field Station; and the Law Library, School of Law Building.

Registered students may draw books and periodicals from the University Library, according to the regulations of the various units, by presentation of their registration cards as identification. A series of orientation leaflets describing the location of library units and collections and explaining their use are available at the General Reference Service desk in the Main Library.
ADMISSION TO THE UNIVERSITY

ADMISSION IN UNDERGRADUATE STATUS

An applicant who wishes to enter the University must fulfill the general requirements for admission as set forth below. The University of California bases its entrance requirements on two principles: first, that the best guarantee of success in the University is high quality of scholarship in previous work, and second, that the study of certain specified subjects will give to the student both good preparation for the work of the University and reasonable freedom of choice of a major field of study after his entrance. These principles apply to admission in either freshman or advanced standing.

ADMISSION PROCEDURE

All communications concerning admission should be addressed to the Office of the Director of Admissions, 127 Sproul Hall, University of California, Berkeley 4.

Application for Admission

Formal application must be filed with the Director of Admissions, University of California, on the campus at which registration is desired. Application blanks will be supplied by the Office of Admissions upon request. The application should be filed during the semester preceding that for which the applicant wishes to register and must be filed not later than August 15 for the fall semester or January 15 for the spring semester. Applicants for the College of Engineering have earlier dates for filing applications; see under “Special Requirements for Engineering,” page 26.

Application Fee

Every applicant for admission is required to pay a fee of $5 when the first application is filed. Remittance by bank draft or money order should be sent to the Office of Admissions, but be made payable to The Regents of the University of California.

Transcripts and Records

Official transcripts of records should be sent directly to the Office of Admissions from the graduating high school and from each college attended. Transcripts should be endorsed by the proper authority and final college transcripts should include a statement of good standing or honorable dismissal from the last college attended. A preliminary transcript should show work in progress.

Examination Requirement

September, 1960, and thereafter, all applicants for undergraduate status (except those seeking a second baccalaureate degree, admitted in limited status, or admitted to the College of Engineering at the junior level) must present a satisfactory score on the College Entrance Examination Board Scholastic Aptitude Test. This test must be taken within the calendar year immediately preceding first registration as an undergraduate student in the University; if the aptitude test has once been taken and registration delayed or another college attended so that first registration in the University is more than a year from the time the applicant last took the aptitude test, the aptitude test must be repeated. Arrangements to take the test must be made with the Educational Testing Service, P. O. Box 27896, Los Angeles 27, Cali-
Admission to the University

California, or P. O. Box 592, Princeton, New Jersey. The fee for the Scholastic Aptitude Test is to be paid to the Educational Testing Service. Scores will be regarded as official only if they are received directly from the Educational Testing Service. See also sections on "Admission of Nonresidents" and "Admission by Examination."

APTITUDE TEST DATES FOR 1960, 1961

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<th>Test Dates</th>
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<td>Saturday, May 21, 1960</td>
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<td>Wednesday, August 10, 1960</td>
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<td>Wednesday, August 9, 1961</td>
<td>July 12, 1961</td>
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Vaccination Certificate

Every new student (and every student returning to the University after an absence) must present at the time of medical examination by the University medical examiner a certificate establishing the fact that he has been successfully vaccinated against smallpox within the last seven years. A form for this purpose will be furnished by the Admissions Offices of the University. Vaccination should be completed prior to registration.

ADMISSION IN FRESHMAN STANDING

An applicant who does not meet at the time of high school graduation the requirements given below for admission in freshman standing must qualify for admission in advanced standing (see page 24). The only exception to this regulation is in the case of a student whose subject deficiency was the result of not having studied one or more required high school subjects. It is sometimes possible for such a student to clear the deficiency during the summer, provided approval is secured in advance from the Office of Admissions on the campus where the applicant expects to enroll.

An applicant who has attended a junior college, four-year college, university, extension classes of college level, or any comparable institution since graduating from high school is subject to regulations governing admission in advanced standing (see page 24). Such college attendance may not be disregarded, whether or not any courses were completed.

Requirements for California Residents

This includes applicants from out-of-state high schools who are bona fide residents of California.

1. COLLEGE ENTRANCE EXAMINATION BOARD SCHOLASTIC APTITUDE TEST (see above).
2. GRADUATION FROM AN ACCREDITED HIGH SCHOOL.

An accredited high school in California is one that has been officially designated by the Board of Regents of the University as a school from which students will be admitted to the University primarily on the basis of the record of subjects completed and scholarship attained. The list of accredited schools is published by the University annually in the month of September. Accreditation by the University refers to the college preparatory function of the high school and implies no judgment regarding the other educational functions of the school. For information concerning the accrediting of schools,
Admission in Freshman Standing

principals may communicate with the Office of Relations with Schools, Berkeley or Los Angeles. If the high school from which the applicant graduated is not accredited, the Office of Admissions will, upon request, instruct the student regarding the procedure he should follow.

3. ADMISSION—METHOD I (see "Alternate Methods of Admission" under (4) below)

Subject Requirements

Upon the high school authorities rests the responsibility for determining the scope and content of courses preparatory to admission to the University and for certifying such courses to the University. Students naturally will be guided by their respective high school principals in making their preparation for entrance to the University.

(a) History ...............1 unit. This requirement must be satisfied by 1 unit of United States history or 1 unit of United States history and civics.

(b) English ..............3 units. These must consist of six semesters of English composition, literature, and oral expression, certified by the high school principal as University preparatory in nature.

(c) Mathematics ........2 units. These must consist of two semesters of algebra and two semesters of plane geometry or an integrated two-year course covering the same material. Advanced algebra and trigonometry may be substituted for algebra, and trigonometry and solid geometry for plane geometry.

(d) Laboratory Science..1 unit. This must consist of an advanced (eleventh or twelfth grade) year course in one laboratory science. Both semesters must be in the same subject field. Courses designated chemistry or physics are accepted without special certification. Courses in other subjects, such as biology, physiology, botany, physical science, and zoology, are acceptable on written certification from the high school principal.

(e) Foreign Language...2 units. These must be in one language.

(f) Advanced course chosen from one of the following ........1 (or 2) units. 1. Mathematics, a total of 1 unit (second-year algebra, ½ or 1 unit; solid geometry, ½ unit; trigonometry, ½ unit or other course for which trigonometry is a prerequisite).
2. Foreign language, either 1 additional unit in the same foreign language offered under (e), or 2 units of a different foreign language.
3. Science, 1 unit of either chemistry or physics in addition to the science offered under (d) above.

Additional elective units to complete the minimum of 15 standard entrance units.
Scholarship Requirements

An average of grade B (3.0 based on a marking system of four passing grades) is required in the (a) to (f) subjects listed above, which are taken in the tenth, eleventh, and twelfth years. Courses taken for subject credit in the ninth year need show passing grades only.

In determining the B average, a grade of A in one course may be used to balance a C in another; only courses used to meet the (a) to (f) subject requirements and completed in the tenth, eleventh, and twelfth years are used in computing the grade average. Grades are considered on a semester basis, except from schools that give only year grades.

Courses in the required list completed after the ninth year in which a grade of D is received may not be counted in satisfaction of a subject requirement; an A grade may not be used to compensate for D, E, or F grades. Courses taken in the tenth, eleventh, and twelfth years in which a grade of C or lower is received may be repeated to raise grades, when approved by the principal of an accredited high school, in an amount not to exceed 2 units of the (a) to (f) pattern. Only the first repetition of a subject will be used to satisfy scholarship requirements, although additional repetitions are allowed for the purpose of satisfying a subject requirement.

4. ALTERNATE METHODS OF ADMISSION (for students who do not qualify under Method I)

METHOD II
Subject—complete in the entire high school program not less than 10 units in college preparatory courses chosen from the fields of English, mathematics, science, foreign language, and social science

Scholarship—achieve a scholarship rank in the highest ten per cent of the graduating class.

METHOD III
Subject—complete not less than twelve high school units of grade A or B in the work of the tenth, eleventh, and twelfth grades and have no more than 2 units of subject deficiencies in the (a) to (f) subjects. The 2 units of subject shortage must be the result of omission only. Courses such as physical education, study period, work experience, military science, R.O.T.C., and religion are not to be counted under this method

Scholarship—in the subjects completed in the tenth, eleventh, and twelfth years and applied on the (a) to (f) requirements have an average grade of B and no grades lower than C.

METHOD IV
Subject—complete in the eleventh and twelfth grades not less than 6 high school units of A or B grade selected from the following academic subjects:

Third- and fourth-year English
Third- and fourth-year mathematics
Third- and fourth-year laboratory science
Third- and fourth-year foreign language
Third- and fourth-year history or social science (not more than one unit of social science other than United States history or civics may be used)

Scholarship—in the subjects completed in the tenth, eleventh, and twelfth years and applied on the (a) to (f) pattern, earn no grade lower than
C, and maintain a scholarship average of not more than \( \frac{1}{2} \) unit below a B average.

University authorities believe that high school students who follow the regular (a) to (f) pattern of subjects outlined above, together with the additional subjects recommended for particular majors, will be well prepared for work in the University. However, the University does not wish to exclude a student who has followed a program of university preparatory studies recommended to him by his high school and will therefore admit an applicant on a grade B average scholarship in a different program of University preparatory studies provided such a program has been previously filed with, and approved by, the Board of Admissions and Relations with Schools.

5. EXPERIMENTAL PLANS OF ADMISSION

In addition to the foregoing methods, the Board of Admissions and Relations with Schools authorizes from time to time experimental programs to test the validity of suggested procedures. Information about these programs is communicated promptly to school authorities in California by the Office of Relations with Schools. Also the Director of Admissions is charged by the Board with the authority and responsibility for waiving minor deficiencies when justification is evident in the form of unusual academic records or recommendations.

Requirements for Out-of-State Applicants

1. Graduation from an Accredited High School.
   For schools outside California, regional or other accrediting agencies are consulted. The University makes the final decision regarding acceptability.

2. College Entrance Examination Board Scholastic Aptitude Test.
   An average score of 500 or above in the Aptitude Test—see detailed statement on page 19.

3. Subject Requirements.
   The same subject pattern required of California residents—see Method I (page 21).

4. Scholarship Requirements.
   An applicant must present evidence that he has maintained a grade-point average of 3.4 or higher on the required high school subjects. One unit of A counts four points, one unit of B counts three points, one unit of C counts two points, one unit of D counts one point. E and F yield no points.

The alternate plans of admission given on page 22 are not applicable to out-of-state applicants.

ADMISSION BY EXAMINATION

Applicable only to high school graduates who are residents of California and ineligible on their school records and who have no college work.

The University of California does not itself offer entrance examinations but accepts on all campuses the results of examinations given by the Educational Testing Service for the College Entrance Examination Board (see page 19 for information as to dates and places of examinations for 1960-1961).

To qualify by examination, the tests must be taken within the calendar year immediately preceding first registration in the University and arrangements must be made with the Educational Testing Service at least four weeks prior to the test date. Test results must be forwarded directly from the Educational Testing Service to the Office of the Director of Admissions, 127 Sproul Hall, University of California, Berkeley 4.
Assignment of Examinations

An applicant who has completed all of the (a) to (f) subjects with grades of at least C but is deficient in scholarship may qualify by attaining a score of 500 or above on:

(a) The Scholastic Aptitude Test (Verbal and Mathematics scores may be averaged)

and

(b) Each of any three achievement tests in subject fields. An applicant may not present examinations in both Intermediate and Advanced Mathematics.

The applicant who has not completed all the (a) to (f) subjects with C grades or better must consult the Office of Admissions to determine the examinations he is required to take.

The applicant who has graduated from an unaccredited high school may qualify by examination but must consult with the Office of Admissions regarding the required tests.

PREPARATION FOR UNIVERSITY CURRICULUM

In addition to those subjects required for admission to the University, outlined beginning on page 19, certain preparatory subjects are recommended for each University curriculum which, if included in the high school program, will give the student a more adequate background for his chosen field of study. In some cases, lack of a recommended high school course will delay graduation from the University. Details of these recommendations will be found in the circular, PREREQUISITES AND RECOMMENDED SUBJECTS, which may be obtained from the Director of Admissions and Relations with Schools, Berkeley or Los Angeles.

It is recommended that students pursue a full program of academic subjects during their senior year.

A statement of the requirements for the bachelor's degree is contained in this circular and in the announcement of each school or college of the University. A copy of the desired announcement may be obtained from the Office of the Registrar on the campus on which the school or college is located.

HONORS AT ENTRANCE

All entering freshmen are considered for Honors at Entrance on the basis of their high school records. Honors recognition at the time of admission is given to entering freshman students with outstanding high school scholastic records. Certificates are presented to the Honors recipients shortly after registration in the University.

ADMISSION IN ADVANCED STANDING

Requirements for California Residents

1. An applicant who was eligible for admission in freshman standing or whose only deficiency arose from not having studied one or more required high school subjects may be admitted at any time if he presents evidence that:

(a) He has satisfied, either through high school or college courses, the subjects required for admission of high school graduates in freshman standing (see page 21).

(b) His advanced work, in institutions of college level, has met the minimum scholarship standard required of transferring students, in no case lower than a C average in the last college attended, and an over-all C average in all college work attempted. "Scholarship standard" is expressed by a system of grade points and grade-point averages in
Admission in Advanced Standing

courses acceptable for transfer to the University of California. One unit of A counts four grade points; one unit of B counts three grade points; one unit of C counts two grade points; one unit of D counts one grade point; E and F yield no grade points.

The grade-point average is determined by dividing the total number of grade points by the total number of units undertaken. Courses completed with a grade lower than C may be repeated but the units and grade points count each time the course is taken.

(c) He is entitled to return as a student in good standing to the last college attended.

(d) He has earned a satisfactory score in the College Entrance Examination Board Scholastic Aptitude Test (beginning with the fall semester, 1960, see page 19).

2. If an applicant for admission to the University in advanced standing was ineligible at the time of high school graduation because of low scholarship or a combination of low scholarship and incomplete subject preparation, he may remove his deficiencies by completing college courses of appropriate content and amount. These courses completed with satisfactory grades may be taken in any approved college.

(a) The applicant must include in his program courses acceptable for removing high school subject shortages caused by omission or by grades of D or lower and present a minimum of 30 units of transfer courses with a grade-point average of at least 2.4 and a satisfactory score on the College Entrance Board Scholastic Aptitude Test.

or

(b) As an alternative to making up high school subject deficiencies, an applicant may be admitted on the basis of a record showing completion of at least 60 units of transfer courses with a grade-point average of 2.4 or higher in which must be included all of the subjects required for junior standing in a school or college of the University. Applicants qualifying under this regulation will also be required to present a satisfactory score on the College Entrance Examination Board Scholastic Aptitude Test beginning with the fall semester of 1960.

Ordinarily, it is recommended that graduates of California high schools who are not eligible for admission to the University attend one of the California junior colleges and complete the lower division requirements of the college in which they wish to register.

Requirements for Out-of-State Applicants

(See also page 26.)

In addition to the regular admission requirements described above, out-of-state applicants with advanced standing must meet the following regulations:

1. A grade-point average of 2.8 must be maintained in college subjects acceptable for transfer credit, plus an average score of 500 or above on the College Entrance Examination Board Scholastic Aptitude Test.

2. An advanced standing applicant who presents less than 30 units of acceptable transfer courses must also meet both the subject and scholarship requirements set for applicants from out-of-state high schools listed on page 27.

Credit for Work Taken in Other Colleges

The University grants credit for courses appropriate to the curricula that have been completed in other accredited colleges and universities subject to the restrictions of the senior residence requirement.
Admission to the University

As an integral part of the system of public education of California, the University of California accepts at full value approved transfer courses completed with satisfactory grades in the public junior colleges of the State; students who intend to complete their advanced studies at the University will frequently find it to their advantage to complete the first two years of their college course in one of the many excellent California public junior colleges. An applicant may not disregard his college record and apply for admission in freshman standing; he is subject without exception to the regulations governing admission in advanced standing. He should ask the registrars of all high schools and colleges he has attended to forward complete official transcripts directly to the Office of Admissions where he has filed his application. Transcripts not sent directly by the issuing school to the Office of Admissions will be considered unofficial. A statement of good standing from the last college attended must also be sent.

No applicant may receive transfer credit in excess of an average of 18 units per semester. After a student has earned 70 units acceptable toward a degree (except credit allowed on the basis of military service and training), no further unit credit will be granted for courses completed at a junior college.

Extension courses taken at some institution other than the University of California may not be acceptable. The decision as to their acceptability rests with the Office of Admissions. If such a program is planned with the intention of applying it toward a degree at the University of California, it is wise to have the approval of the Office of Admissions in advance.

Removal of Scholarship Deficiencies by Applicants From Other Colleges

Applicants otherwise eligible who seek to transfer from other institutions of collegiate rank but whose college records fail to show a satisfactory scholarship average may be admitted only when the deficiency has been removed by additional work completed with grades sufficiently high to offset the shortage of grade points. This may be accomplished by work in other approved higher institutions, in Summer Sessions, or by courses in University Extension.

SPECIAL REQUIREMENTS FOR ENGINEERING

An engineering qualifying examination must be taken by all applicants for admission to the College of Engineering at either the lower division or the upper division level. The examination is to be taken the previous semester to that in which the applicant desires to register. The dates for the examinations and the dates for filing applications for admission are included in the Calendar on page 2. Students not taking the test on the date scheduled will not be considered for admission to the College of Engineering in the semester immediately following. For details regarding the qualifying examinations and selective admission requirements, see page 89. Out-of-state applicants who have completed the requirements for junior standing in the College of Engineering may use the upper division engineering examination both for the engineering requirement and for the nonresident examination requirement.

LIMITATION OF ENROLLMENT OF OUT-OF-STATE APPLICANTS

It has been necessary to place some limitation on enrollment of applicants who are not residents of California and only those of exceptional promise will be eligible for admission. Children of alumni of the University of California are not subject to the special nonresident requirements for admission nor are applicants who at the time of application have become bona fide residents of California. The regulations below are designed to admit approxi-
Admission of Special Students

mately the upper half of candidates eligible for admission under regular rules as measured by scholastic record and aptitude tests.

Admission in Freshman Standing

An applicant must present evidence that he has maintained a grade-point average of 3.4 or higher on the required high school subjects and an average score of 500 or above on the College Entrance Examination Board Scholastic Aptitude Test (see “Admission in Freshman Standing for Out-of-State Students,” page 23).

Admission in Advanced Standing

An applicant must present a grade-point average of 2.8 in college subjects acceptable for transfer credit plus an average score of 500 or above on the College Entrance Examination Board Scholastic Aptitude Test (see “Special Requirements for Out-of-State Applicants” under “Admission in Advanced Standing,” page 25).

INTERCAMPUS TRANSFER

An undergraduate student, who has attended a regular session of the University of California and has not since that time been registered in a regular session in another institution, may apply for transfer to another campus of the University by obtaining the proper forms from the campus on which he was last registered. The Intercampus Transfer Application forms and Application for Transcript of Record forms may be obtained from the Office of the Registrar and must be filed with that office by January 15 for the spring semester and August 15 for the fall semester.

ADMISSION OF SPECIAL STUDENTS

Special students are students of mature years who have not had the opportunity to complete a satisfactory high school program or who have not completed a substantial amount of college work, and who, by reason of special attainments, may be prepared to undertake certain courses in the University toward a definite and limited objective. Only cases of very unusual merit will be considered.

The conditions for the admission of each applicant under this classification are assigned by the Director of Admissions, and are subject to the approval of the dean of the college. Ordinarily, a personal interview is required before final action can be taken, and, in general, special students are required to confine their attention to some special study and its related branches. Admission as a special student is for a limited time only, as fixed by the Director, and is subject at all times to satisfactory scholastic achievement.

No person under 21 years of age will be admitted as a special student, but mere attainment of any given age is not in itself a qualification for admission. An applicant will not be admitted directly from high school to the status of special student. Graduates of high schools are expected to qualify for admission in accordance with the usual rules; students admitted to regular status, if not candidates for degrees, may, with the approval of the dean of the students' college, pursue elective or limited programs.

Transcripts of record from all schools attended beyond the eighth grade must ordinarily be submitted by an applicant for special status. He may also be required to take the examination in Subject A.

The University has no “special courses.” All courses are organized for regular students. A special student may be admitted to those regular courses for which, in the judgment of the instructor, he has satisfactory preparation. A special student will seldom be able to undertake the work of the engineering and professional colleges or schools.
A special student may at any time attain the status of regular student by satisfying all the matriculation requirements for admission to! the University, but an applicant will not be admitted to special status for the purpose of making up requirements.

ADMISSION OF LIMITED STUDENTS

Limited students are those with a bachelor's degree but ineligible for admission to graduate standing, or those without a bachelor's degree who have completed a substantial amount of college work in the University of California or in another institution of approved standing with a satisfactory scholarship average and who, by reason of special attainments, may be prepared to undertake certain courses in the University toward a definite and limited objective.

The conditions for the undergraduate admission of each applicant under this classification are assigned by the Director of Admissions and are subject to the approval of the dean of the professional school to which he seeks eventual admission or by the dean of the college or school in which the applicant desires to satisfy a definite need or interest.

Transcripts of record from all schools attended beyond the eighth grade must ordinarily be submitted by an applicant for limited status. He may also be required to take the examination in Subject A.

The applicant will not be admitted to limited status for the sole purpose of raising a low scholarship average. Limited students for whom no grades have been specified are subject to the minimum scholarship requirements of the college or school in which they are enrolled. Any deviation from the program as planned, or any scholarship deficiency incurred while pursuing it, will result in the cancellation of a student's limited status and will render him subject to dismissal from the University.

ADMISSION OF APPLICANTS WITH BACHELORS' DEGREES

Ordinarily, an applicant with a bachelor's degree substantially equivalent to the bachelor's degree granted by the University of California should apply for admission to graduate status. Occasionally, such an applicant with a superior record may qualify as a limited student or, as a result of complete change of objective, as an undergraduate seeking a second baccalaureate degree. In either case, the previous scholarship record must be such as to indicate very strong probability of academic success. Admission is also subject to the approval of the dean of the school or college in which the applicant plans to enroll.

ADMISSION FROM SCHOOLS AND COLLEGES IN FOREIGN COUNTRIES

The credentials of an applicant for admission from a foreign country, either in undergraduate or graduate standing, are evaluated in accordance with the general regulations governing admission. An application, official certificates and detailed transcripts of record should be submitted to the Director of Admissions several months in advance of the opening of the semester in which the applicant hopes to gain admittance. This will allow time for exchange of necessary correspondence relative to entrance and, if the applicant is admitted, will assist him in obtaining the necessary passport visa.

An applicant from a foreign country whose education has been conducted in a language other than English may be admitted only after demonstrating that his command of English is sufficient to permit him to profit by instruction in this University. An applicant's knowledge of English is tested by an oral and written examination given by the University of California. This regula-
Late Admission; Admission in Graduate Standing 29

tion applies to both graduate and undergraduate foreign students. Admission of an applicant who fails to pass this examination will be deferred until he has acquired the required proficiency in the use of English.

Language Credit for a Foreign Student.—College credit for the mother tongue of a foreigner and for its literature is given only for courses taken in native institutions of college level, or for upper division or graduate courses actually taken in the University of California, or in another English-speaking institution of approved standing.

College of Engineering.—An applicant for admission to the College of Engineering who is outside the United States must pass with satisfactory scores the Scholastic Aptitude Test (verbal and mathematics sections) and achievement examinations in English composition, physics, and advanced mathematics of the College Entrance Examination Board before a letter of admission to the College of Engineering may be issued. Arrangements to take the tests in another country may be made directly with the College Entrance Examination Board, P.O. Box 592, Princeton, New Jersey. A fee of $16 is charged for these examinations and should be forwarded to the College Entrance Examination Board, not to the University of California. An applicant should request that his scores in the tests be forwarded to the Office of Admissions.

Foreign Student Adviser.—Advisers are appointed by the President of the University to assist foreign students in all matters pertaining to their attendance at the University. Every student from another country is urged, upon his arrival at the University, to consult Mr. W. Sheridan Warrick, Foreign Student Adviser, International House, University of California, Berkeley 4.

LATE ADMISSION AND REGISTRATION

The student or prospective student should consult the Registration Circular for the semester he plans to attend, and acquaint himself with the dates upon which students are required to register and file their study lists. Failure to register on the scheduled date will make it necessary for the student to seek special approval for late registration from the dean of his college, school, or the Graduate Division; such approval will be granted only when the student's reasons for lateness are acceptable to the dean.

In no event will a student be permitted to register or file his study list after Friday of the third week of instruction. If a prospective entrant or reentrant seeks to register late, it will be necessary for him to qualify for admission or readmission ten days before the proposed date of registration.

A student will not be permitted to enroll in or attend classes unless he is currently registered or holds a temporary permit to visit classes. New graduates seeking permits to attend classes apply to the Dean of the Graduate Division; new undergraduates to the Director of Admissions; reentrants graduate and undergraduate, to the Registrar.

Every student who registers late is charged a fee of $10 for lateness. Moreover, the late registrant is subject to unusual difficulty in arranging a suitable program of studies and may not plead lateness as an excuse if, subsequent to late registration, he is found to be deficient in his work.

ADMISSION IN GRADUATE STANDING

Holders of the bachelor's degree from institutions of acceptable standing, representing the usual college course of four years, may, provided their scholarship is satisfactory, be admitted to the Graduate Division (Northern Section) of the University of California. Application for admission should be accompanied with official transcripts of record covering all college or univer-
Admission to the University

University work completed, together with official evidence of the degrees conferred. The University of California may deny admission to graduate standing, however, if the scholarship record has not been satisfactory or if the undergraduate program has not been of such character as to furnish an adequate preparation for advanced work leading to the academic or professional degree or certificate desired. This proviso applies to college and schools within the University of California as well as to those outside. Registration will not in any case be permitted until all official records and official evidence of degrees conferred have been received.

Transcripts of students' records and all other official credentials are retained permanently in the files of the office of the Dean of the Graduate Division. The student must have an official transcript of his record (in addition to the record sent to the Dean of the Graduate Division) in his possession for conference with departmental advisers and for his own reference in planning a program of study. The Graduate Division office copy may not be borrowed for this, or for any other purpose. Admission to the Graduate Division does not necessarily carry with it the privilege of proceeding to candidacy for a higher degree on the basis of minimum residence and subject requirements.

A formal application is required of all persons seeking admission to the Graduate Division (Northern Section) of the University of California. The application blank may be obtained by addressing the Dean of the Graduate Division, 250 Sproul Hall, University of California, Berkeley 4, and must be filed at the office of the Dean of the Graduate Division, preferably twelve weeks prior to the date of registration and in no case later than July 15 for the fall semester and December 15 for the spring semester; it should be accompanied by a money order or bank draft for $5 in payment of the application fee. Please note that the application fee is chargeable to every person who files an application, and is not returnable under any circumstances. (For readmission of former graduate students, see below.) In cases where applications and complete records are filed after July 15 for the fall semester and December 15 for the spring semester, registration may be delayed, and the applicant made liable for the late registration fee of $10.

Every new student must present at the time of his medical examination by the University medical examiners, a certificate establishing the fact that he has been successfully vaccinated against smallpox within the last seven years. Vaccination should be completed prior to registration. A form for this purpose will be furnished by the University.

Applicants for admission to the graduate years in the School of Medicine should file their credentials with the Dean of the School of Medicine, University of California Medical Center, San Francisco 22, and should accompany them with a money order or bank draft for $5 in payment of the application fee.

Applicants for admission to graduate work at Davis, the Lick Observatory on Mount Hamilton, the Hooper Foundation in San Francisco, the academic departments of the School of Medicine in San Francisco, and the School of Nursing or the School of Dentistry in San Francisco must first secure admission to the Graduate Division and authorization to pursue work in these branches of the University from the Dean of the Graduate Division, Northern Section.

The level of work to which graduate students are assigned, and their standing as candidates for degrees, depends upon the extent and character of their undergraduate courses. If, in the opinion of any department, the preliminary training of an applicant has not been sufficient to qualify him for graduate work, he may be admitted to undergraduate courses suited to his needs.

Foreign Students.—Applicants for admission to the Graduate Division on credentials from universities and colleges in foreign countries are required to appear for the Examination in English for Foreign Students described in
Admission in Graduate Standing

the preceding section, to demonstrate whether or not their command of English is sufficient to enable them to profit by instruction in this University.

Readmission.—An application for readmission is required of persons formerly registered as graduate students in a regular session who wish to return after an absence. The form for this purpose is obtainable from the Registrar, and no fee is charged. It must be filed with the Graduate Division at least two months before the opening of the semester in which the student wishes to be readmitted. Applicants for readmission must present at the time of medical examination by the University Medical Examiners, a certificate establishing the fact that they have been successfully vaccinated against smallpox within the last seven years. Vaccinations should be completed prior to registration. A form for this purpose will be furnished by the University.

Study Lists.—After admission to the Graduate Division, every graduate student is required to file with the Registrar on a specified date a study list containing his program of courses (or statement of other graduate work, including thesis and research), approved by the graduate adviser in the department of his major subject. Study-list changes for graduate students are subject to the regulations applying to undergraduates.

For further information on all matters pertaining to the Graduate Division at Berkeley, see the Announcement of the Graduate Division, Northern Section, which is obtainable from the Dean of the Graduate Division, University of California, Berkeley 4.

For regulations concerning graduate study at Los Angeles, consult the Announcement of the Graduate Division, Southern Section, which may be obtained upon request from the Dean of the Graduate Division, University of California, Los Angeles 24.
GENERAL REGULATIONS

Certain general regulations govern residence and study in the academic departments. These regulations, unless otherwise stated, concern both graduate and undergraduate students.

ROUTINE OF REGISTRATION

No student in the departments of the University at Berkeley may undertake any work or examination with a view to credit toward a University degree without registration for the work or examination with the Registrar; such registration must be accepted by the proper faculty before the work proposed is undertaken.

Students of good standing carrying a limited amount of regular classwork may be permitted, on the basis of private study outside of University classes, to take certain University examinations for the purpose of gaining advanced standing, but the authorization of the proper faculty must be obtained by written petition before preparation for the examination is begun.

All students must register with the Registrar their choice of courses to be pursued in any semester, on blanks provided for the purpose, at the times and place designated. Continuing students in good standing may now register by mail. For full particulars see placards posted on University bulletin boards. Registration at a later date requires special permission. For further information, see under Late Admission and Registration, page 29.

Students in year courses must register with the Registrar for these courses at the beginning of each semester. They are sometimes permitted to register for year courses in the second semester without having been registered in the first semester. When this is done, credit is given for the work of the second semester only.

No person will be admitted as a student to any course, except as authorized by the official certificate of registration and the student's duplicate of the official study card supplied to each student by the Registrar, subject to the approval of the appropriate study-list officer.

Concurrent enrollment in resident courses and in extension courses is permitted only when the entire program of the student has received the approval of the proper dean or study-list officer and has been registered with the Registrar before the work is undertaken.

After the study cards are filed, students may make changes in their programs by formal petition, which must be approved by the instructors concerned and by the deans or other proper officers of the students' colleges.

Every regular student must include in his study list all required work appropriate to the college and year of his course. (The rules governing the choice of studies of regular students are stated in the description of the curricula of the several colleges.)

The names of students who fail to comply with the regulations governing registration will not appear on the official class rolls.

MEDICAL AND PHYSICAL EXAMINATION

All new students (graduate and undergraduate) must pass a medical and physical examination at the Student Health Service, to the end that the health of the University community, as well as the individual student, may be safeguarded. An appointment for this examination will be given to each student at the time of the registration. Every new student (graduate and undergraduate) entering the University must present at the time of medical examination by the University medical examiner a certificate establishing
the fact that the student has been successfully vaccinated against smallpox within seven years. Vaccination should be completed prior to registration. A form for this purpose is furnished by the University. Tests for tuberculosis are a part of the examination of all new students. Applicants for admission who have contagious diseases will be excluded. Those having physical conditions which grossly disturb the classwork of other students, should not apply for admission.

Before coming to the University, every student is urged to have his own physician examine him for fitness to carry on University work, and to have all defects capable of remedial treatment, such as diseased tonsils or imperfect eyesight, corrected. This will prevent possible loss of time from studies.

Students returning after an absence must comply with the University requirements regarding smallpox vaccination and evidence of freedom from active tuberculosis as well as have a health evaluation at the Student Health Service.

**STUDENT HEALTH SERVICE**

The purpose of the Student Health Service is to conserve the time of students for their classwork and studies, by preventing and treating acute illnesses. This service is made possible by the general funds of the University and is not a total health insurance plan; therefore, the services are limited by the staff and facilities available.

Any physically handicapped student is invited to communicate with the Director of the Student Health Service, Cowell Hospital, before registration, for the purpose of facilitating orientation to the campus.

Each student registering in the fall and continuing through the spring semester, and each student registering in the spring semester may, at need, have such medical care as the campus health service is staffed and equipped to provide from the first day of the semester in which the student first registers during the academic year to the last day of the spring semester of the same academic year, or to the date of official withdrawal from the University. Additional service may be provided for seven days after the last day of the semester at the discretion of the Director of the Student Health Service. Any prospective registrant who receives health service and who does not register for the next following semester shall be required to pay toward the cost of the service rendered him (up to the amount of the incidental fee).

During any semester, hospital care for a period up to thirty days may be given in the event of serious illness, on the recommendation of the Director of the Health Service. Surgical treatment within certain limitations is also included in the services offered when, in the opinion of the Director of the Health Service, this service is necessary. If at the end of the semester the patient is still ill he will be released from the hospital to the care of his home or community as soon as the Director considers it safe. Also, if injuries or illnesses are of a nature requiring long continued care which will obviously prevent the continuance in college in the current semester, the patient will be returned to his community or home for definitive treatment. No surgical diagnostic procedures will be done (for example, tumors of the bone) where the procedure will prevent the student from returning to college the same semester or which may of necessity have to be followed by immediate definitive treatment where the student may not be returned to college. Charges will be made for unusual appliances or remedies not ordinarily available or for hospitalization in excess of thirty days.

The Health Service does not assume responsibility for the correction of chronic physical defects or illnesses present at the time of entrance to the University (for example, hernias, chronic bone and joint diseases or deformities, chronic gastrointestinal disorders, fibroids of the uterus, chronically
infected tonsils, malignant diseases, etc.). Furthermore, it does not take responsibility for any injury or illness wherein definitive treatment has been initiated elsewhere, with the exception of first aid and emergency care. It does not take responsibility where medical or surgical treatment is elective and not of an emergency nature, and where the best interests of the student will be served by treatment during vacation. It does not take care of industrial injuries covered by compensation insurance, except first aid.

**Dental Service.**—The hours of 8–10:30 a.m. and 1–3:30 p.m. are reserved for emergency dental examinations and treatments, X rays, and consultation. Emergency treatment of fractured jaws is also included in the service. After dental examination, some appointments for general dentistry and cleaning may be scheduled for the remaining time in accordance with a schedule of rates approved by the President of the University.

**PHYSICAL EDUCATION**

**Required Meeting of New Undergraduates.**—All men and women students are required, at the time of first registration in the University, to attend a group meeting regarding participation in physical education activities and athletic sports. At this meeting, students will be informed concerning the opportunities available to them and the values of participation in organized courses of the department, in intramural athletics, in intercollegiate athletics, and in nonorganized recreational activities.

**Use of Facilities.**—The physical education facilities are available to students who wish an opportunity for exercise and recreation, either with or without instruction.

Harmon Gymnasium, including the swimming pool, courts and sports fields, is available to all men students of the University. Further information may be obtained from the Secretary, Room 103, Harmon Gymnasium.

The Hearst Gymnasium rooms, courts, swimming pools and sports fields are available to all women students of the University. The Women's Athletic Association, A.S.U.C., and the Department of Physical Education cooperate in furthering opportunities for participation in a wide variety of activities.

The Lucie Stern pool, the Elise and Walter Haas Clubhouse, courts, and fields located in Strawberry Canyon, are available to men and women students, their spouses and families. Further information may be obtained from the Coordinator of Recreation, Room 143, Harmon Gymnasium.

**SUBJECT A: ENGLISH COMPOSITION**

With the exceptions noted below, every undergraduate entrant must, at the time of his first registration in the University, take an examination known as the *Examination in Subject A*, designed to test his ability to write English without gross errors in spelling, grammar, sentence structure, and punctuation.

The examination in Subject A is given at the opening of the fall and spring semesters (see the REGISTRATION CIRCULAR, to be obtained from the Registrar) and at the opening of each of the summer sessions. A second examination for late entrants is given not later than two weeks after the first examination in each semester; for this examination, a fee of $1 is charged.

The results of the first examination will be made known not later than the day preceding the date set for the filing of study cards for the current semester. Papers submitted in the examination are rated as either “passed” or “not passed.” A student who is not present at the examination in Subject A which he is required to take will be treated as one who has failed. Every student who does not pass in the examination in Subject A must, immediately after his failure, enroll in a course of instruction, three hours weekly for one
American History and American Institutions

semester, known as the Course in Subject A, without unit credit toward graduation. Should any student fail in the course in Subject A he will be required to repeat the course in the next succeeding semester of his residence in the University.

A student who maintains in the course in Subject A a grade of A is permitted, on recommendation of the Committee on Subject A, to withdraw from the course at a date determined by that committee and is given credit for Subject A.

Every student who is required to take the course in Subject A is charged a fee of $35, and the charge will be repeated each time he takes the course. This fee must be paid before the study list is filed.

No student will be granted the bachelor's degree until he has satisfied the Subject A requirement.

In respect to grading, conditions, and failure, the course in Subject A is governed by the same rules as other University courses.

A student who, at any time, has failed in the University examination in Subject A does not have the privilege of taking a second examination except that if he has subsequently taken and passed an equivalent college course elsewhere, he may apply to the Committee on Subject A for special permission to take the examination again.

Exceptions

A student who has passed an examination in Subject A given by the University at Los Angeles or given under the jurisdiction of the University at various centers in the State annually in May will be exempt from the Subject A requirement.

A student who has received a satisfactory score in the College Entrance Examination Board Achievement Test in English Composition taken not earlier than the senior year of high school will be exempt from the Subject A requirement.

A student who enters the University of California with credentials showing the completion elsewhere with a grade not lower than C of one or more acceptable college courses in English composition (totaling at least 3 semester units, or the equivalent, of transferable college credit) will be exempt from the requirement in Subject A.

Exemption from the Subject A requirement as provided above will be determined by the Office of Admissions, which will notify the student whether or not he must take the examination.

AMERICAN HISTORY AND AMERICAN INSTITUTIONS

All students who are candidates for the bachelor's degree must demonstrate a knowledge of (1) American History, and (2) the principles of American Institutions under the Federal and State constitutions. Beginning with the academic year, 1958-1959, satisfaction of this requirement on the Berkeley campus is to be met by examination only. A transfer student who presents a transcript from a California institution carrying the certification, "State requirement in American History and American Institutions satisfied" will be exempted from the requirement.

All foreign students in attendance at the University of California on student visas, who are candidates for the bachelor's degree, are advised to see the Supervisor of the American History and American Institutions Requirements early in their academic work at the University.

Further information regarding these requirements, and the examination necessary to meet them, may be obtained from the Supervisor, Room 204, Building T-9. For office hours, see official announcements on campus bulletin boards.
THE RESERVE OFFICERS’ TRAINING CORPS

Under the Act of Congress establishing land-grant colleges, it is required that military training be included in the curricula. The Board of Regents of the University of California has therefore directed that every male student, unless excused, must pursue a course of military training during his first two years of residence. This is in accordance with instructions contained in the CIRCULAR FOR NEW UNDERGRADUATES or announcements which may be posted on the University bulletin boards. Enrollment in the basic course of the Reserve Officers’ Training Corps satisfies this requirement of the Board of Regents for first- and second-year undergraduate male students. At the University of California this military requirement is fulfilled by enrollment in the Department of Air Science, the Department of Military Science and Tactics, or in the Department of Naval Science.

First-year students will be permitted to elect either Air Science or Military Science in accordance with their personal preferences. First-year students interested in Naval Science should consult the section on Naval Science.

Students must list the prescribed courses in military training on their study cards with other University courses. A petition for excuse from, or deferment of, military training must be filed within two weeks of the date of registration. Exception will be made where illness or physical disability occurs after that date. Further information about the requirement of military training, including a statement of grounds upon which students may be excused from this work, may be obtained from the Registrar.

If a student subject to this requirement lists the prescribed course on his study card, and thereafter without authority fails to appear for work in the course, his neglect will be reported to the Registrar, who, with the approval of the Chancellor, will notify the student that he is dismissed from the University. The Registrar will then inform the dean of the student’s college or other officer in charge of the student’s program of his dismissal. Reinstatement will be made only upon approval of the Chancellor with the concurrence of the chairman of the appropriate department.

The United States Government furnishes arms, equipment, uniforms, and textbooks for the use of all students formally enrolled in military training courses. Certain monetary advantages accrue to advanced course (third- and fourth-year) students. As described in the following sections, with the exceptions noted for the separate services, students who successfully complete the advanced course are eligible for a reserve commission in one of the armed forces of the United States. They are also eligible to be commissioned by the Governor of the State of California in the University Cadets.

Air Science

The Department of Air Science (Air Force R.O.T.C.) provides courses of instruction to meet in part, the University requirement for lower division military training. Students electing to satisfy this requirement through the Department of Air Science must satisfactorily complete all lower division Air Science courses. Concurrent with courses 1A and 21B, respectively, students must satisfactorily complete an elective course chosen from the following list of courses:

- Any lower division course in astronomy; business administration; chemistry; economics; engineering; English; geography; geology; history; mathematics; philosophy; physics; political science; statistics; Social Science 1A–1B (Introduction to Social Science); Sociology and Social Institutions 1 (Man and Society), 30 (Society and Personality), 40 (Introductory Statistics in Sociology); Speech 1A–1B (Elements of Speech).

An additional two-year program in the upper division provides preprofessional education for officers of the United States Air Force. The primary
objectives of all courses offered by the department are to develop the student's leadership skills and an understanding of the elements, development and implications of aero-space power in contemporary society, to arouse in the student a desire to meet his future military service obligation by service in the United States Air Force, to select for the advanced course those who are potentially best qualified to serve as future officers of the Air Force, and to develop the student's understanding of the application of his over-all education in the role of a leader.

With this mission and these objectives in view, the over-all course of study has been divided into three phases: (1) the basic course, (2) the advanced course, and (3) summer training.

The lower division courses are designed to increase understanding of the elements and potentials of aero-space power, the military instruments of national security, employment of air forces, and space operations, together with instruction in and practice of basic direct leadership skills and military training. Selected courses from other departments supplement this program to broaden the base of the student's education.

The upper division program is open to students who have completed all lower division Air Science requirements (or who have received credit in lieu thereof) and who have been selected for enrollment. Opportunity exists both for students physically qualified for, and desirous of, flying training after graduation and for students majoring in engineering, certain basic sciences, or the management fields. These latter groups need not meet the flight physical requirements. The advanced course includes an introduction to leadership and management principles, practices and tools, human relations, creative thinking and communication with extensive application of problems and case studies. A general survey of the elements of international relations offered by the Department of Political Science; a survey of military aspects of world political geography, an introduction to meteorology, navigation and further instruction in and practice of direct leadership skills comprise the remainder of the upper division program.

Summer training consists of a four-week program conducted on an Air Force base between the junior and senior years. It is devoted to orientation in air base functions and activities, familiarization flying, field exercises, and individual participation in various officer positions.

At the beginning of the advanced course (junior year), an officer-type uniform is furnished each student, which becomes his personal property upon his successful completion of the advanced course. During this two-year period, each student also receives a daily monetary allowance totaling approximately $548 for the two years.

Successful completion of the advanced course and receipt of the bachelor's degree qualifies the student for appointment as a Second Lieutenant in the Air Force Reserve.

Students who are designated "Distinguished Air Force Graduates" are eligible for appointment as Second Lieutenants in the Regular Air Force and selection for graduate education under Air Force auspices.

Military Science

The mission of the Army Reserve Officers' Training Corps is to produce junior officers who by their education, training, and inherent qualities are suitable for continued development as officers in the Reserve and Regular components of the United States Army.

The Army R.O.T.C. program consists of three phases: 1) the basic course, 2) the advanced course, and 3) summer camp. Military leadership is emphasized throughout the course. Instruction is given in subjects common to all branches of the army. The complete course of instruction covers four broad and distinct areas of military knowledge and skill: American military history
and the role of the Army in national defense; operations, tactics, and technique; logistics and matériel; and leadership, drill and command.

The lower division (basic) course includes an introduction to the mission and organization of the Army, a study of American military history, and basic military instruction.

The upper division (advanced) course is open to enrollment by students who successfully complete the basic course or who have received credit for military service in lieu thereof, and who have attained upper division standing in the University. In general, students selected for this course are those who have shown potentialities for leadership and command, and whose aptitude ensures their development into efficient officer material. The advanced course includes instruction in tactics, communications, logistics, operations, military teaching methods, military administration, and personnel management. The summer camp consists of a six weeks' program conducted on an army post. Its objective is to familiarize the student with army life and to afford practical training not available at the University. Advanced course students are paid approximately $600 for two years of participation in this program.

Successful completion of the Army R.O.T.C. course and four years' education of the college level qualify the student for appointment as a Second Lieutenant in the United States Army Reserve. Students who are designated "Distinguished Military Graduates" are given the opportunity of applying for commissions in the Regular Army.

**Naval Science**

The mission of the Naval Reserve Officers’ Training Corps is to provide by a permanent system of instruction in essential naval subjects at civil educational institutions a source from which qualified officers may be obtained for the Navy and the Marine Corps, and the Naval Reserve and the Marine Corps Reserve.

The Naval R.O.T.C. is made up of two types of students: contract students and regular students. Candidates for enrollment in the contract program of the N.R.O.T.C. are selected locally by the chairman of the Department of Naval Science from male students who voluntarily apply at the beginning of the fall semester. Selection is normally made just prior to or during registration week, and is based on an applicant's high school record, an aptitude test, two interviews by officers, and a physical examination. The best qualified candidates will be accepted to the limit of the quota established each year by the Navy Department. Applications will be accepted from entering students and from other students who have a minimum of eight semesters of college work remaining on this campus as undergraduates.

Regular N.R.O.T.C. students are selected by the Navy Department based on annual nation-wide competitive examinations. The regular program supplements the Naval Academy as a source of regular officers. Successful candidates within the established quota are sent to an N.R.O.T.C university or college with tuition, books, and certain other fees paid by the Navy. Regular students take the same Naval Science courses as the contract students, except that they must complete three summer cruises, whereas contract students complete only one summer cruise.

The curriculum of the Department of Naval Science includes 24 units of Naval Science studies in eight semesters, one course of 3 units being taken each semester. In addition, students take one hour of drill and one hour of laboratory or practical work each week. The first two years of study cover naval orientation, history, leadership psychology, and weapons. Commencing with the third year, students have the option of taking the Line Officers' course, Marine Corps course, or Supply Corps course. The Line Officers' course
includes naval engineering, navigation, operations, administration and leadership, while the Marine Corps course and Supply Corps course offer equivalent training. Upon successful completion of the 24 units of Naval Science courses and after earning a bachelor's degree in certain fields of study, regular students are commissioned Ensign, U.S.N. or Second Lieutenant, U.S.M.C., and contract students are commissioned Ensign, U.S.N.R. or Second Lieutenant, U.S.M.C.R. After graduation and commissioning, contract students are required to serve two years on active duty, and regular students to serve four years on active duty. Physically qualified graduates are also eligible for flight training leading to a designation as Naval Aviator.

For further information and application to the Naval R.O.T.C., students should consult the Chairman of the Department of Naval Science, Room 47, Harmon Gymnasium. Due to the limited quotas, this should be done as soon as possible, but not later than the week of registration.

**STUDY-LIST REGULATIONS**

At the beginning of each semester every student is required to file with the Registrar, upon a date to be fixed by the Registrar, a detailed study list bearing the approval of a faculty adviser or other specified authority. The presentation of a study list by a student and its acceptance by the college is evidence of an obligation on the part of the student to perform faithfully the designated work to the best of his ability. Withdrawal from, or neglect of, any course entered on the study list, or a change in program without the formal permission of the dean of the college, makes a student liable to enforced withdrawal from the University, or to other appropriate disciplinary action.

The various colleges observe certain study-list limits with which the student must comply. For detailed regulations, see the announcements of the respective colleges in later pages of this bulletin.

*Authority of Instructors.—* No student will be permitted to enter upon or to continue the study of any subject if, in the opinion of the instructor, he lacks the necessary preparation to ensure competent work. Every student is required to satisfy the instructor in each of his courses of study, in such ways as the instructor may determine, that he is performing the work of the course in a systematic manner. Instructors may report to the Dean of Students the names of students whose attendance or work is unsatisfactory.

*Other General Requirements.—* The attention of the student is directed to further University regulations concerning the requirements in scholarship, and for candidacy for degrees. The student should plan his program of studies carefully in relation to these requirements, and consult promptly with his adviser or the dean of the college or school concerning any irregularities in the program that may require special approval.

**CANDIDACY FOR DEGREES**

Every student who intends to become a candidate for a bachelor's degree must file with the Registrar, on a date to be fixed by the Registrar, an announcement of candidacy for the degree. For filing this announcement later than the appointed date, a fee of $3 is charged. In 1960-1961 these dates are: Monday, October 3, for candidates who expect to complete their work in January, 1961; and Tuesday, February 21, for candidates for graduation in June, 1960.

All candidates for the bachelor's degree are required to have been enrolled throughout the senior or final year of residence in that college of the University in which the degree is to be taken. This regulation applies both to stu-
General Regulations

... students entering this University from other institutions and to students transferring from one college to another within this University. Of the 120 (or more) units required for the bachelor's degree, at least 24 units must have been completed at this University in resident courses of instruction taken in the final or senior year.

All graduates of any one calendar year—January 1 to December 31—are considered as belonging to the "class" of that year.

CHANGE OF COLLEGE OR MAJOR

A student may be transferred from one college (major or department) of the University to another upon the approval of the dean or other responsible officer or committee of the college (or department) to which admission is sought. A form of petition for transfer is supplied by the Registrar.

No student is permitted to transfer from one major department to another after the opening of the last semester of his senior year.

HONORS

Honor students include those who receive honorable mention upon attaining junior standing in the colleges of Agriculture, Chemistry, Engineering, and Environmental Design, or in the schools of Business Administration, Criminology, Forestry, Optometry, and Public Health. Honors are granted also with the bachelor's degree. For regulations concerning honors, see the sections explanatory of the curricula of the various colleges, in later pages of this bulletin.

CREDIT AND SCHOLARSHIP

In both the University and the high school the student is credited, in respect to amount of work accomplished, in terms of units; and in respect to quality of scholarship, in terms of grades. In a further, more exact determination of the student's scholarship, the University assigns a numerical value in points to each scholarship grade. These points are called grade points and are more fully described below.

High school credit, when it is offered in application for admission to the University, is reckoned in matriculation units; one matriculation unit represents one year's work in a given subject in the high school.

High school credit, when it is offered in satisfaction of high school graduation requirements, is measured in standard secondary units; that is, the credit granted for the study of a subject throughout the school year of from thirty-six to forty weeks is stated in terms of the standard secondary unit. Each unit represents approximately one-quarter of a full year's work in high school; in other words, four standard secondary units represents one full year's work in high school.

Relation between High School Matriculation Units and University Units.—One year's work in the high school is considered to be equivalent to one University semester's work of college level; that is, a student who desires to make up any high school subject deficiency by offering work of college level can, in one University semester, earn credit equivalent to the credit of one year's work in high school.

The value of a course in units is reckoned at the rate of one unit for three hours' work per week per semester on the part of the student. The credit value assigned to a course is not determined by the number of class meetings per week, but by the number of hours of work required of the student. For most courses, it is expected that the average student will spend two hours in preparation for one hour of lecture or recitation.
GRADES OF SCHOLARSHIP; GRADE POINTS

In the University (except in the Schools of Dentistry and Medicine in San Francisco), the result of the student's work in each course (graduate and undergraduate, including courses in which credit is sought by examination) is reported to the Registrar in one of six scholarship grades, four of which are passing, as follows: A, excellent; B, good; C, fair; D, barely passing; E and F, not passing. Grades are not otherwise defined, as for example, by percentages, or by a rule stipulating the manner in which the several grades shall be distributed.

Grade E (not passed) or grade X (not passed) indicates a record below passing, but one which may be raised to a passing grade without repetition of the course by passing a further examination or by performing other tasks required by the instructor. Grade F (not passed) denotes a record so poor that it may be raised to a passing grade only by repeating the course.

The term "incomplete" is not used in reporting the work of students. The instructor is required to assign, for every student, a definite grade based upon the work actually accomplished, irrespective of the circumstances which may have contributed to the results achieved.

Course reports filed by instructors at the end of each semester are final, not provisional.

Grade points are assigned to the respective scholarship grades as follows: for each unit of credit, the scholarship grade A is assigned 4 points; B, 3 points; C, 2 points; D, 1 point; E and F, no points.

In order to qualify for the bachelor's degree in the College of Letters and Science, the College of Agriculture, the College of Chemistry, the College of Engineering, or the College of Environmental Design, the School of Business Administration, the School of Criminology, the School of Forestry, the School of Nursing, the School of Optometry, the School of Pharmacy, or the School of Public Health, the student must have obtained at least twice as many grade points as there are units in the total credit value of all courses undertaken by him in the University of California.

For the grading systems in the schools of Dentistry and Medicine, see the Announcement of the School of Dentistry and the Announcement of the School of Medicine.

Every student who desires to obtain his scholarship grades at the end of the semester may call in person at the time and place announced by the Registrar for their distribution, or deposit a self-addressed stamped envelope at the Office of the Registrar and the report will be mailed to the student.

MINIMUM SCHOLARSHIP REQUIREMENTS

Any student who receives a notice of dismissal from the University may petition the dean of his college or school for a hearing. Ordinarily, however, students dismissed for unsatisfactory scholarship will be excluded from the University for an indefinite period, with the presumption that their connection with the University will be ended by such exclusion. The conditions under which students may be dismissed follow.

College of Letters and Science—

Probation.—A student will be placed on probation if at the close of any semester his grade-point average is less than two (a C average), computed on the total of all courses undertaken in this University for which he has received a final report.

Dismissal.—A student will be subject to dismissal from the University
(1) if during any semester he fails to pass with a grade of C or higher courses totaling at least 4 units; or
(2) If, after one semester of probationary status, he has not obtained a grade-point average of two (a C average), computed on the total of all courses undertaken in this University for which he has received a final report.

Colleges of Agriculture and Environmental Design; also Schools of Business Administration, Criminology, Forestry, and Public Health—

Probation.—A student will be placed on probation
(1) If at the close of his first semester his record shows six or more grade points less than twice the number of units undertaken; or
(2) If at the close of any subsequent semester his grade-point average is less than two (a C average), computed on the total of all courses undertaken in this University for which he has received a final report.

Dismissal.—A student will be subject to dismissal from the University
(1) If during any semester he fails to pass with a grade of C or higher courses totaling at least 4 units; or
(2) If while on probation his grade-point average for the work undertaken during any semester falls below two (a C average); or
(3) If after two semesters of probationary status he has not obtained a grade-point average of two (a C average), computed on the total of all courses undertaken in this University for which he has received a final report.

A student who becomes subject to the provisions of this regulation will also be subject to such supervision as the faculty of his college or school may determine. The faculty may dismiss from the University students under its supervision or may suspend the provisions of this regulation and permit the retention in the University of the students subject to dismissal, and the return to the University of students who have been dismissed under this regulation.

Colleges of Chemistry and Engineering—

A student will be subject to dismissal from the University (a) if during any semester or summer session he fails to attain at least a grade C average in all courses for which he was enrolled; or (b) if at the end of any semester or summer session he has failed to attain at least a grade C average in all courses undertaken in the University. A student who becomes subject to the provisions of this regulation will be under the supervision of the faculty of the college concerned. The faculty of the college may dismiss from the University students under its supervision, or may suspend the provisions of this regulation and permit the retention in the University of the students subject to dismissal, and the return to the University of students who have been dismissed under this regulation.

School of Optometry—

Probation.—A student will be placed on probation if at the close of his first semester in the School of Optometry his record falls below a grade C average.

Dismissal.—A student will be subject to dismissal from the University
(1) If at the end of any semester subsequent to his first, he has failed to maintain a grade-point average of two (a C average), computed on the total of all courses taken subsequent to his admission to the School of Optometry for which he has received a final report; or
(2) If during any semester he fails to pass with a grade of C or higher courses totaling at least 4 units.
A student in the School of Optometry who becomes subject to the provisions of this regulation will be under the supervision of the faculty of the School. The faculty may dismiss from the University students under its supervision, or at its discretion may suspend the provisions of this regulation and permit the retention in the University of students thus subject to dismissal, and the return to the University of students who have been dismissed under this regulation.

**Graduate Division—**

The action to be taken in respect to students in graduate status who acquire scholarship deficiencies is left to the discretion of the Dean of the Graduate Division.

**CREDIT BY EXAMINATION**

Provision is made whereby an undergraduate student in residence and in good standing may under certain conditions take examinations for degree credit either (a) in courses offered in the University, without formal enrollment in them, or (b) in subjects appropriate to the student's curriculum but not offered as courses by the University. The results of all such examinations, with grades and grade points, are entered upon the student's record in the same manner as for regular courses of instruction (see Grades of Scholarship, page 41). No fees are required.

The privilege of taking an examination for credit will ordinarily be granted only to students who have at least a grade B average for all courses undertaken in the University.

Arrangements must be made in advance with the dean of the student's college or school; his approval, and that of the instructor who is appointed to give the examination, are necessary before an examination can be given.

The application form for examinations may be obtained from the Registrar.

**FINAL EXAMINATIONS**

Final examinations are obligatory in most undergraduate courses. Each course in which a final examination is not required is so indicated in the Schedule of Classes at the beginning of the semester in which the course is given. All examinations will, so far as practicable, be conducted in writing, and a maximum time will be assigned beforehand for each examination which no student will be allowed to exceed. The time for examination sessions will not be more than three hours. Leave to be absent from a final examination must be sought by written petition to the proper faculty.

If a final examination is one of the regular requirements in a course, there can be no individual exemption from the examination, except as provided in the preceding paragraph.

Any department may examine a student, at the end of the semester immediately preceding his graduation, in the major subject in which the department has given instruction; and a student to be examined in a major subject may, at the discretion of the department, be excused from all final examinations in courses in the department of the major subject in which he has been enrolled during the semester. Credit value may be assigned to this general examination in the major subject.

In the year courses of the professional curriculum in law, mid-year reports may be made without formal examinations, and these reports will be final. Reexaminations are permitted only for the purpose of raising grade E or X (not passed) to a passing grade. A student who received grade B, C, or D in any course is not allowed a reexamination for the purpose of raising the
grade. Concerning methods of raising nonpassing grades to passing grades, see under Removal of Deficiencies, below.

Application for examination for advanced standing on the basis of work done before entrance to the University should be made to the Director of Admissions upon entrance to the University.

REMOVAL OF DEFICIENCIES

The following rules for removal of deficiencies are effective for all work completed on and after July 1, 1957.

In this section, whenever reference is made to removal of grade E (not passed), the statement applies also to grade X (not passed).

A student who receives a grade lower than C in a lower division course may repeat the course. The units will count only once toward the degree; however, he will be charged with the units undertaken on each attempt. Upon repetition of the course, the student will receive the grade assigned by the instructor and grade points appropriate to that grade. The foregoing privilege does not apply to grades received in upper division or graduate courses. A student who receives grade E or F in an upper division or graduate course may repeat the course. The units will count only once toward the degree; however, he will be charged with the units undertaken on each attempt. Upon repetition, the student will receive the grade assigned by the instructor but for the repetition cannot receive more than two grade points per unit. (For exceptions, see below.)

Special provision is made for students whose university work has been interrupted by one year or more of service with the armed forces of the United States and who, prior to such service, had undertaken one or more courses forming part of an announced sequence of courses. Such a student may, with the approval of the dean of his college or school (or, in the case of graduate students, with the approval of the Dean of the Graduate Division), be permitted to repeat any course previously undertaken in the sequence, irrespective of the grade previously assigned, and to receive the new grade assigned by the instructor and grade points appropriate thereto; provided, however, that for a course so repeated, the student may receive unit credit toward graduation, or toward the satisfaction of major requirements, only in an amount not to exceed the difference between the full unit value of the course and the number of units, if any, which he has previously received from the same course.

For the purpose of raising grade E to a passing grade, the student may, with the consent of the instructor concerned and of the dean or director of the appropriate school, college, or division, have the privilege of a "condition examination."

Any examination, term paper, or other exercise which the instructor may require of the student in order to raise grade E to a passing grade in a course is a "condition examination." For every such examination, a formal permit, to be obtained in advance from the Registrar, must be shown to the instructor in charge of the examination; otherwise, he will lack authority to consider and report upon the work submitted by the student. The fee for a permit is $4, regardless of the number of courses entered thereon. A form of petition for a special examination or for admission to an examination with a class, with instructions concerning procedure, may be obtained from the Registrar. Grade E in a course in which a final examination is regularly held can be raised to a passing grade only by passing a satisfactory final examination in the course.

If a student who has received grade E in any course fails to raise it to a passing grade by the end of the next semester of his residence in which the course is regularly given, then the grade shall be changed to F. If in the
meantime, however, the student has repeated the course and has again re­ceived grade E, his grade in the course will remain grade E, as it would be
if he were taking the course for the first time. A student who fails to attain
grade D or a higher grade in any course following a reexamination for the
purpose of raising grade E to a passing grade, will be recorded as having
received grade F in the course.
A student who raises a grade E or F, incurred in an upper division or gradu­ate course, to a passing grade by successful repetition of the course will
receive the grade assigned by the instructor but can not receive more than
two grade points per unit. A student who raises a grade E, incurred in any
course, lower division, upper division, or graduate, to a passing grade by examination or by performing other tasks required by the instructor (short
of actual repetition of the course), shall ordinarily receive no grade points.
An exception to this rule is permitted, however, when the deficiency consists
solely in the omission of the final examination or other required exercise on
account of illness or other unavoidable circumstances, the student’s perform­ance in all other respects having been satisfactory. In such circumstances the
student may petition to have that grade assigned which he would have
received had the work been completed without delay, together with the
appropriate number of grade points. His petition must set forth in detail the
reasons for his failure to complete the course within the usual limit of time.
The petition must be endorsed by the instructor concerned, and must be
submitted for final approval as follows: by undergraduate students (except
students in the School of Pharmacy), to the Dean of Students; by students
in the School of Pharmacy, to the Dean of that School; by graduate students,
to the Dean of the Graduate Division.

TRANSCRIPT OF RECORD

Each student will be provided, upon request to the Registrar, with one
official transcript (copy) of his University record, without charge. After the
first request a minimum charge of $1 is made for each additional transcript
of record. Students who plan to enter the teaching profession or to seek other
employment following graduation, should provide themselves with one or
more transcripts of their records so as to be ready at all times to show official
evidence of attendance at the University.
Application for a transcript of record should be made directly to the
Registrar well in advance of the time when the record will be needed by the
applicant.

LEAVE OF ABSENCE AND HONORABLE DISMISSAL

Excuses for absence from classes because of extenuating circumstances are
issued by the Dean of Students, on request. A brief leave of absence is issued
in lieu of an excuse when the absence covers five days or more. Absences of
less than one full day are to be arranged for by the student with his indi­vidual instructors.
It is the student’s responsibility to notify the Registrar immediately in
writing whenever circumstances prevent further class attendance. An under­graduate student who finds it necessary to withdraw from the University prior
to the end of a semester will be granted an honorable dismissal only upon
the written approval of the dean of the school or college and the Dean of
Students. Graduate students require the approval of the Dean of the Gradu­ate Division. In addition, all men students must secure the written approval
of the Supervisor of Special Services. Permission to withdraw from the Uni­versity without scholarship penalty is usually not granted after the first few
weeks of the semester except under unusual circumstances over which the
student has no control.
An **honorable dismissal** may be granted, upon written petition, at the close of any semester to a student in good standing. Students dismissed because of scholarship deficiencies, students on scholastic probation, and students under censure or suspension are not regarded as being in good standing.

An **honorable dismissal** will not be granted during or at the close of a semester until all accounts due the University have been satisfactorily adjusted, and all University property returned (laboratory equipment, uniforms, gymnasium clothing and equipment, keys, books).

*Discontinuance without notice.* Students who discontinue their work without formally withdrawing do so at the risk of having their registration privileges curtailed or entirely withdrawn.

**STUDENT CONDUCT AND DISCIPLINE**

When a student enters the University it is taken for granted by the University authorities that he has an earnest purpose and that his conduct will bear out this presumption. If, however, he should be guilty of unbecoming behavior or should neglect his academic duties, the University authorities will take such action as, in their opinion, his conduct warrants. Students who fail to make proper use of the opportunities freely given to them by the University must expect to have their privileges curtailed or withdrawn.
MISCELLANEOUS INFORMATION

SITE, CLIMATE, AND TRANSPORTATION

The Berkeley campus of the University of California is situated on the eastern shore of San Francisco Bay, directly opposite the Golden Gate. The University grounds comprise five hundred and thirty acres, rising in gentle slopes to the Berkeley hills. From almost every part of the campus—and the city of Berkeley—there is a magnificent view over the bay and city of San Francisco, the neighboring plains and mountains, the Pacific Ocean, and the Golden Gate.

Berkeley has a climate well suited for university work throughout the year. Extremes of heat and cold, such as are experienced in many other parts of the country, are unknown in Berkeley. The average temperature for the winter months is about 53 degrees; from May to October, about 60 degrees. Temperatures as high as 85 degrees are of infrequent occurrence and brief duration.

The average annual rainfall is 24 inches, of which about three-fourths comes in the four months, December to March, when approximately one day out of three is rainy. Throughout the rest of the school year on an average one-fifth of the days are rainy. In the rainy season, fogs are infrequent. Fully half the foggy days of the year come in the summer months.

From the business center of Oakland, it is about thirty minutes' ride by bus to the University, and from San Francisco about thirty-five minutes by bus. Motorists from San Francisco may come by way of the San Francisco-Oakland Bay Bridge.

EXPENSES OF STUDENTS

General Expenses and Fees*

A table of estimated basic expenses for a college year of two semesters for a student who will enroll in a nonpreprofessional or nonprofessional course and who has been classified as a resident of the State is as follows:

Principal Items of Expense Estimated for a College Year (Two Semesters)

<table>
<thead>
<tr>
<th>Expense Item</th>
<th>Minimum</th>
<th>Moderate</th>
<th>Liberal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
</tr>
<tr>
<td>Incidental Fee</td>
<td>$120.00</td>
<td>$120.00</td>
<td>$120.00</td>
</tr>
<tr>
<td>Books and Supplies</td>
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<td>80.00</td>
<td>90.00</td>
</tr>
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<td>11.00</td>
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<td>Student Union</td>
<td>12.00$</td>
<td>12.00$</td>
<td>12.00$</td>
</tr>
<tr>
<td>† Athletic Privilege Card</td>
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<td>10.00</td>
</tr>
<tr>
<td>Board and Room</td>
<td>450.00$</td>
<td>450.00$</td>
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</tr>
<tr>
<td>Total</td>
<td>$683.00</td>
<td>$683.00</td>
<td>$1023.00</td>
</tr>
</tbody>
</table>

* All fees are subject to change.
† Optional.
‡ Minimum price includes five hours work per week.
§ Graduate students are not members of the A.S.U.C., but each graduate and undergraduate student must pay a student union fee of $6 per semester to provide funds to amortize a portion of the construction cost of the new student union.
The question of expense while attending the University is of importance to every student. It is difficult, however, to give specific information about yearly expenditure. In a student body of some twenty thousand members there are so many different tastes, as well as such a wide range of financial resources, that each student must determine his budget in keeping with his own needs and financial condition. It is possible to live simply, and to participate moderately in the life of the student community, on a modest budget. The best help the University authorities can offer the student in planning his budget is to inform him of certain definite expense items, and acquaint him with others that he will in all probability have to provide for.

**Incidental Fee.**—The incidental fee is $60 each semester, for both undergraduate and graduate students and is payable at the time of registration. It covers certain expenses of students for laboratory costs, for athletic and gymnasium facilities and equipment, for counseling and placement as provided on the local campus, and for such consultation, medical advice, and hospital care or dispensary treatment only as can be provided at the Cowell Memorial Hospital by the local campus Student Health Service. No part of this fee is remitted to students who may not desire to make use of all or any of these privileges. Payment by check, draft, or money order must be for the exact amount for all fees, and should be made payable to The Regents of the University of California. If a student withdraws from the University within the first five weeks from the first day of classes for the semester, a part of the incidental fee may be refunded.

Students who are classified as nonresidents of the State are required to pay each semester, in addition to the incidental fee, a tuition fee of $250. It is important for every prospective student to note carefully the rules governing legal residence in the University, which are stated on page 50. For conditions governing the commutation of the nonresident tuition fee for graduate students, see the Announcement of the Graduate Division, Northern Section.

**Laboratory Fees.**—There are no laboratory fees.

**Living Expenses.**—The main item of expense for students living away from home is room and board. A detailed statement of prices will be found below, under Living Accommodations.

**Other Expenses.**—Books and stationery for a student in the liberal arts courses average about $80 to $90 a year. Books and special equipment for students in the preprofessional and professional schools cost from $50 to $200. Exact information on these items may be obtained by writing directly to the school or department. Women students taking physical education are required to buy shoes which cost about $4. Students failing the required examination in Subject A must pay a fee of $35 for the course in Subject A (see page 35).

Membership in the Associated Students of the University of California for each undergraduate student costs $5.50 each semester (fall and spring) and is payable at the time of registration. This membership entitles undergraduate students to reduced rates on a number of student activities, including dances, dramatic presentations, and musical productions, etc.; a subscription to the student newspaper, the *Daily Californian*; use of the Henry Morse Stephens Memorial Student Union; and active participation in student government, including the privilege of voting and holding office. Graduate students pay a fee of $2.25 each semester (fall and spring) for the *Daily Californian* and use of the nonrevenue-producing areas of the existing Student Union.

In addition, voluntary purchase of the athletic privilege card for $10 for the entire year (fall and spring semesters) entitles the student to free admission to most athletic contests, and reduced admission to others.

It is impossible to include in the foregoing figures miscellaneous items such as cleaning, laundry, clothes, transportation to and from home, or fees other
Expenses of Students

than the incidental fee. Students classified as nonresidents of the State must also add to their estimated budgets the tuition fee of $250 a semester.

Tuition.—The University charges a tuition fee to every student who has not been a legal resident of the State of California for a period of one year immediately preceding the opening day of the semester during which he proposes to enroll. Such a student is classified as a nonresident. A student entering the University for the first time should read carefully the rules governing determination of residence, as quoted below, that he may be prepared, in the event of classification as a nonresident, to pay the required tuition fee. This fee must be paid at the time of registration. The attention of the prospective student who has not attained the age of 22 years and whose parents do not live in the State of California, is directed to the fact that presence in the State of California for a period of more than one year immediately preceding the opening day of the semester during which he proposes to attend the University, does not, of itself, entitle the student to classification as a resident. The attention of a veteran, who was not a resident of the State of California at the time of his entrance into the armed forces, is directed to the fact that residence in California under military orders does not, of itself, entitle the student to classification as a resident. Every alien student shall be deemed to be a nonresident student unless he has been lawfully admitted to the United States for permanent residence in accordance with all applicable provisions of the laws of the United States.

Tuition in the academic colleges is free to students who have been residents of the State of California for a period of one year immediately preceding the opening day of the semester during which they propose to attend the University. Students who are classified as nonresidents are required to pay a tuition fee of $250 each semester. This fee is in addition to the incidental fee. Exceptions will be limited to graduate students who are unable to devote more than half time to academic study 1) for reasons of health as certified by the Student Health Service, or 2) for reason of full-time employment in salaried positions as certified by a statement from the employer. Where exceptions are made on the foregoing bases, the student's program will be limited to 4 units of course work in the "200" series or the equivalent thereof, and the nonresident tuition fee will be $125 a semester. Petition for half fee based on the above criteria must be submitted to the office of the Dean of the Graduate Division; otherwise, all students are presumed to be full-time students, irrespective of the number of units for which they are enrolled. On the approval of the Dean of the Graduate Division, the nonresident tuition fee may be remitted in the case of graduate students in the academic departments who are admitted without deficiencies, who have proved that they are distinguished scholars, and who are carrying full programs toward the fulfillment of requirements for academic higher degrees. See further the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION.

If the student is in doubt about his residence status, he may communicate with the Attorney for The Regents in Residence Matters, 590 University Hall, University of California, Berkeley 4, California.

Special Commutation of Nonresident Tuition Fee.—Exemption from payment of the nonresident fee may be granted to an unmarried minor whose parent is in the active military service of the United States and is stationed in California on the opening day of the semester during which the unmarried minor proposes to attend the University. A student who believes he qualifies under this measure should request further information from the Attorney in Residence Matters.

The eligibility of a student to register as a resident student may be determined only by the Attorney for The Regents in Residence Matters. Every entering student, and every student returning to the University after an
absence is required to make a "Statement as to Residence" on the day of
registration, upon a form which will be provided for that purpose, and his
status with respect to residence will be determined by the Attorney soon after
registration. Application for a change of classification with respect to some
preceding semester will not be received under any circumstances.

*Refunds.*—For students who withdraw with official approval during the
first few weeks of the semester, part of the fees enumerated above may be
refunded. A schedule of refunds and other information will be found in a
separate circular (*Student Fees and Deposits*) which may be obtained from
the Registrar, University of California, Berkeley 4.

**Rules Governing Residence**

The term "nonresident student" is construed to mean any person who has
not been a bona fide resident of the State of California for more than one
year immediately preceding the opening day of a semester during which he
proposes to attend the University.

The residence of each student is determined in accordance with the rules
for determining residence prescribed by the provisions of Section 244 of the
Government Code of California, and Sections 20005 and 20007 of the Educa-
tion Code of California, provided, however:

That every alien student who has not been lawfully admitted to the United
States for permanent residence in accordance with all applicable provisions
of the laws of the United States, or whose status, he having been so admitted,
has been changed, is deemed to be a nonresident student.

Every person who has been, or who shall hereafter be classified as a non-
resident student shall be considered to retain that status until such time as
he shall have made application in the form prescribed by the Registrar for
reclassification, and shall have been reclassified as a resident student.

Every person who is classified as a resident, but who becomes a nonresident
at any time by virtue of a change of domicile by his own action or by the
person controlling his domicile, is obliged to notify the Attorney in Residence
Matters at once.

Every person who has been classified as a resident student shall, neverthe-
less, be subject to reclassification as a nonresident student and shall be re-
classified as a nonresident student whenever there shall be found to exist
circumstances which, if they had existed at the time of his classification as a
resident student, would have caused him to be classified as a nonresident stu-
dent. If any student who has been classified as a resident student shall be
determined to have been erroneously so classified, he shall be reclassified as a
nonresident student, and if the cause of his incorrect classification shall be
found to be due to any concealment of facts or untruthful statement made
by him at or before the time of his original classification, he shall be required
to pay all tuition fees which would have been charged to him except for such
erroneous classification, and shall be subject also to such discipline as the
President of the University may approve.

**LIVING ACCOMMODATIONS**

Advice and information about all types of living accommodations may be
obtained from the Housing Services, University of California, 2620 Bancroft
Way, Berkeley 4, California. Lists of privately operated student residences
that have been inspected and approved by the University are available for
single men and women. This office also maintains card files of accommodations
for single men, for single women, and for married students. All registered
students are eligible to use the listing files. They should use them with the
understanding that no listings are accepted which are restricted because of
race, color, or creed. These accommodations have not been inspected, and
students must call in person at the Housing Services in order to make arrange­ments for rentals through the card file. The Housing Services maintains a waiting list for accommodations for married students in the University Village, Albany. Applications for these apartment units may be made by calling in person or writing to the Housing Services.

The price of room and board depends upon the type of accommodations desired. In the Residence Halls, owned and operated by the University, the estimated price is between $380 and $435 a semester. This price includes three meals per day. In the boarding houses for men, the price is between $310 and $447 a semester; and in the boarding houses for women, between $345 and $425 a semester. The prices quoted for most boarding houses do not include the price of lunches and Sunday meals, which average $125 to $150 a semester. In cooperative houses for single men, the price is between $225 to $235 a semester plus five hours of work a week. In cooperative houses for single women, the price is approximately $225 to $250 a semester plus five hours of work a week. All cooperative houses serve three meals a day, seven days a week.

Householders and students are expected, at the time arrangements are made for accommodations, to have a contract in writing covering terms of payment, indicating whether or not rent is to be paid during vacations, what laundry facilities are available, stating the number of meals served per day, and including any other matters which would affect their business relations. Students should read with care any contemplated contract, in order that no mis­understanding may arise either on the part of the householder or the student. Contracts for residence are for the period of a semester in the University Residence Halls and the approved houses.

All undergraduate students will be required to file a residence card. Any change of address during the semester must be filed in the office of the Registrar. No approval is required for the college residence of men students. New undergraduate women students who do not live in their own homes are expected to live in houses approved by the University. Every undergraduate woman under 21 years of age not living in an approved house must have not only the permission of the Dean of Women for her college residence, but also the permission of her parents or guardian, whose approval must be indicated by signature on the residence card which she will receive at registration.

The University operates nine residence halls for women accommodating a total of 1,252 undergraduate students. Stern Hall was a gift of Mrs. Sigmund Stern; it has single and double rooms accommodating 136 women. The semester charge is $435. The four Fernwald Halls, namely, Mitchell, Oldenberg, Peixotto, and Richards accommodate 276 women. Two of the halls have 78 women each, the other two accommodate 40 and 80 students, the semester charge is $380. The four new halls, south of the campus, Cheney, Cunningham, Davidson, and Freeborn accommodate 210 women each. All of these halls have double rooms. The semester charge is $390, payable in full at the beginning of the semester or in five equal installments.

There are six University Residence Halls for men which accommodate 1,252 undergraduate men. Bowles Hall has 204 men and was a gift in memory of Philip Ernest Bowles. The men live in suites accommodating four men. Smyth Hall, 208 men, has double rooms. The four new halls, located adjacent to the four new women's halls: Deutsch, Ehrman, Griffiths, and Putnam, accommodate 210 men each. The price, per semester, for room and board in Bowles and Smyth Halls is $380; in the four new halls $390, payable in full at the beginning of the semester or in five equal installments.

Applications for residence halls will be available on November 1 for the spring semester, and April 1 for the fall semester. During the first week (November 1-8 and April 1-8) they may be obtained and will be accepted by mail only. After these dates, applications may be secured or submitted in
person at the Housing Services. Applications will be mailed to the student on request. Completed applications should be returned as soon as possible after these dates. Two letters of recommendation, one from an official of the school last attended, and a $25 deposit are required. Students who are planning to participate in sorority or fraternity rushing at the beginning of the 1960 fall semester should not apply for accommodations in a University Residence Hall. Residents of the halls may not participate in sorority or fraternity rushing during the semester except at the periods specified by the Dean of Students during December for the sororities and December and May for the fraternities. Members of local chapters of social sororities and fraternities may not live in University Residence Halls. Questions on this subject should be addressed to the Dean of Women or the Dean of Men.

International House is a residential and social center for American and foreign students. The residence facilities for men and for women are separate, the social halls and dining rooms being used in common. Ordinarily, residence is open only to graduate and upper division students; however, application from all foreign and American students will be given careful consideration. Applications and requests for information should be sent directly to International House, University of California, Berkeley 4.

Fraternities and Sororities.—Membership in these organizations is by invitation. Men students who are interested in fraternity membership should request a rushing registration form from Interfraternity Council, Stephens Union. The majority of the national sororities maintain chapters here, and there are also several local sororities and clubs. Women students who are interested in sorority membership may obtain general information by writing to the Dean of Women. Information about average monthly rates, and initiation and pledge fees of the fraternities and sororities may be obtained by calling in person at the Office of the Dean of Students, 201 Sproul Hall.

Men students who anticipate living in fraternity houses during their first semester should make temporary living arrangements at hotels or with friends for the rushing period. Women students participating in sorority rushing which takes place in the fall semester only must make housing arrangements for this rushing period through the Panhellenic Association, Office of the Dean of Students, 201 Sproul Hall. Rushees may not sign contracts for the fall semester with the University Residence Halls and other approved houses.

PLACEMENT SERVICE

The Student and Alumni Placement Center assists students interested in part-time, temporary and summer work, and graduating students and alumni seeking career positions in business, industry and government. There is no charge for this service. Teacher placement is handled by a separate office and is described below. The Placement Center operates on a twelve-month basis, with the exception of recognized legal holidays. The office is open for student interviews from 9:00 to 11:00 a.m. and from 1:00 to 4:00 p.m. The remaining hours are used to contact employers. The Student and Alumni Placement Center is located in South Hall Annex, just west of the Campanile.

STUDENT EMPLOYMENT

Students seeking part-time, temporary, odd jobs or summer employment are eligible for the services of the Student and Alumni Placement Center as soon as they have been admitted to the University. A current registration card or a letter of admission from the University should be presented at the time of application.

In most cases, it is advisable for students to visit the Student and Alumni Placement Center after they have arranged their class schedules. Each student
registered with the placement center is assigned to a placement counselor. Students should check frequently with their placement counselor until they are suitably employed.

While students are eligible to use the services of the Student and Alumni Placement Center as soon as they have been admitted to the University, whenever possible, finances should be planned to avoid the necessity for part-time work during their first semester at Berkeley. Students should avoid carrying too strenuous a load of work and study. Rather than endanger health or handicap the academic program, students who are largely self supporting may wish to consider taking five or six years to complete the requirements for graduation.

A variety of part-time employment opportunities are available to students registered on the Berkeley campus. Positions for men include gardening, maintenance, night watchman, and such meal jobs as dishwashing and waiting on table. Among the employment possibilities for women are housecleaning, baby-sitting, and waiting on table. There is also a limited number of opportunities for sales positions with stores in the campus area, and students are also used periodically for checking inventory. Some office positions are available both on and off campus, particularly for women with good secretarial skills. Students in science and engineering are eligible for positions as laboratory assistants on and off the campus.

Women students are often able to secure positions in private homes working approximately 18 hours a week in exchange for room and board, bus fare and $10 a month. Some of these positions offer room and board and bus fare only in exchange for 15 hours of work a week. There is also a limited number of room and board jobs for men.

There are usually not sufficient opportunities to provide immediate employment for all those who apply at the beginning of a semester. Students whose job interests are flexible and whose schedules permit 20 hours of work a week find it easier to secure part-time employment.

**SENIOR AND ALUMNI PLACEMENT**

The Student and Alumni Placement Center engages actively in the full-time placement of University of California graduates from all campuses. Seniors and graduate students should register with the center early in their final year at the University. Alumni are eligible and encouraged to make use of the services and facilities of the center for career consultation and placement assistance at all times.

The center arranges interviews for degree candidates with employer representatives who visit the campus each fall and spring. Throughout the year, the center also receives information on a large number of employment opportunities open to recent or experienced graduates.

**SCHOOL AND COLLEGE PLACEMENT SERVICE**

The School and College Placement Service has as its chief function the coordination, under one executive officer, of the teacher placement activities on the Berkeley, Davis, Los Angeles, Santa Barbara, and Riverside campuses. Through offices on the various campuses, graduates, students, and former students are recommended for positions in universities, colleges, junior colleges, high schools, and elementary schools, and for educational research, thereby assisting qualified candidates to obtain permanent employment or promotion in the work for which they have prepared themselves.

The University reserves the right to recommend only those persons who are considered to be fully qualified. In every recommendation the aim is to keep in mind the best available persons, remembering candidates already employed as well as those who may be out of employment.
Communications should be addressed to the Manager of the School and College Placement Service, 192 University Hall, University of California, Berkeley 4.

**COUNSELING CENTER**

The Counseling Center of the University offers vocational, educational and personal counseling to all regularly enrolled students of the Berkeley campus throughout their college careers.

Many students face such problems as choice of major or future vocation; questioning of ability to complete the work necessary for a degree in a chosen field; how to study effectively; adjustment to college life; lack of knowledge concerning personal interests and aptitudes as they relate to the requirements of a vocational field, or perhaps knowledge of the field itself.

Any student may arrange to talk with a professionally trained and experienced counselor regarding his particular situation. Where appropriate, psychological tests, individually selected according to the student’s needs, are provided to give information about such factors as interest, academic aptitude, personality traits.

A library of occupational literature is also available to provide necessary knowledge of all aspects of the world of work, including educational requirements.

For assistance with specific course selection and academic planning, students should consult with faculty advisers.

The Counseling Center is located in Building T-5, just north of the Campanile. Further inquiry or appointments for service may be made at Building T-5.

**VETERANS INFORMATION**

Dean of Students—Special Services maintains liaison between certain veterans and veterans’ dependents and the Veterans Administration, the State Department of Veterans Affairs, and other agencies offering veterans educational benefits; and assists veterans in becoming assimilated into the life and spirit of the University. On the Berkeley campus, this office is located in Room 313, Sproul Hall. Offices of the United States Veterans Administration are located as follows: Regional Office, 49 Fourth Street, San Francisco 3, California; Regional Office, 1380 South Sepulveda Boulevard, Los Angeles 25, California.

Veterans wishing to enroll under the provisions of Public Law 550 (“Korean” G. I. Bill) should first obtain from the United States Veterans Administration a Certificate for Education and Training which should be filed with the Dean of Students—Special Services after completion of registration and filing of the study list. These veterans must be prepared to pay all fees and educational costs at the time of registration as education and training allowances are paid to the veteran by the Veterans Administration. The first monthly payment will normally be received 60 to 75 days after compliance with the above.

Information regarding educational benefits available from the State of California (CVEI) may be obtained from the State Department of Veterans Affairs, Division of Educational Assistance, P. O. Box 1559, Sacramento 7, California; or Room 225, 542 South Broadway, Los Angeles 13, California; or 515 Van Ness Avenue, San Francisco 2, California.

**SELECTIVE SERVICE**

Matters relating to the deferment of students eligible under Selective Service are handled by the Dean of Students—Special Services, Room 311, Sproul Hall. Certifications regarding enrollment, class standing, and other pertinent
information will be submitted to the student’s Selective Service Board upon request. To be considered for deferment by Selective Service, the student must be pursuing a full-time course of instruction which, for undergraduates, consists of at least 15 units. This does not include noncredit courses such as Subject A. Students who plan to seek deferment continuously until qualified for the bachelor's degree should understand that present policies of Selective Service permit continuous deferment only through the eighth semester of college residence, including not only the period of residence at the University of California but also all semesters spent at junior colleges or other collegiate institutions. Students should plan course sequences for several semesters ahead so that prerequisites for all desired advanced courses can be satisfied within the eight-semester period. To qualify as a full-time graduate student, the student must be in residence, actually spend full time on his studies, and meet the criteria generally applied for normal progress toward the degree—i.e., two years or less for the master’s degree and four years or less for the doctor’s degree (including time spent working toward the master’s degree, if taken). Students desiring deferment on the basis of enrollment in the University R.O.T.C. programs should consult the proper R.O.T.C. department.

**SCHOLARSHIPS, PRIZES, LOANS**

Through the generosity of alumni and friends of the University, scholarships, fellowships, prizes, and loan funds have been established which are available to undergraduate and graduate students in accordance with the conditions laid down by the donors.

**Scholarships and Fellowships.**—A circular giving information about undergraduate scholarships may be obtained from the Committee on Undergraduate Scholarships and Honors, Room B-1, 2251 College Avenue. Students who maintain a good scholarship standing are eligible to make application. Awards are made on the basis of scholarship, financial need, and character and promise. Holders of undergraduate scholarships must carry a minimum of 12 units a semester. Applications for scholarships must be filed with the Committee on Undergraduate Scholarships and Honors by mail or in person for the succeeding academic year (September through June), or either semester thereof, during the following periods: Applicants in residence at the University file applications between December 1 and January 10 (January 11 when January 10 falls on Sunday). Entering students file applications between December 1 and March 1 (March 2 when March 1 falls on Sunday). In addition to filing a scholarship application form by March 1, 1961, entering scholarship applicants for the academic year 1961–1962 must take the Scholastic Aptitude Test of the College Entrance Examination Board not later than the February 4, 1961, administration. Applicants must register for the February 4 test not later than January 7, 1961 (or January 21 if a $3 late registration fee is paid), with the Educational Testing Service, Box 27896, Los Angeles 27, California (or Box 592, Princeton, New Jersey, if the student's home is in Eastern United States). Information as to the centers where the Scholastic Aptitude Tests are given may also be obtained from Educational Testing Service. **Applicants who have already taken this test may submit scores from any administration since January 1, 1958.**

Under no circumstances will applications be accepted after these dates. Application forms are available in the office of the Committee on Undergraduate Scholarships and Honors, Room B-1, 2251 College Avenue, each year from the beginning of the last week in November.

Information about fellowships for graduate students may be obtained from the Dean of the Graduate Division. Fellowships and graduate scholarships are ordinarily awarded as a mark of honor, on the basis of scholarship, not of need. The holders of fellowships or graduate scholarships are expected to de-
vote all their time to graduate study and research in the University. Applications for fellowships and graduate scholarships must be filed with the Dean of the Graduate Division on or before February 7 (February 8 if the 7th falls on Sunday) preceding the academic year for which awards are to be made.

Prizes.—A complete list of available prizes, together with the regulations governing each competition, may be obtained from the Registrar.

Loans.—University and National Defense Education Act loan funds for both graduate and undergraduate students are administered in the Office of the Dean of Students. University loans are not available to students in their first semester of residence at the University. Applicants are required to have a creditable scholarship record and must present a satisfactory repayment program. Applicants for NDEA loans must be United States citizens or immigrants to the United States. The maximum loan is $1,000 per fiscal year, $500 per semester, or $200 per summer session—the total grant to any one student for his college education not to exceed $5,000. Repayment may be extended over a period not to exceed 10 years after separation from the University. Up to 50 per cent of the loan can be written off for those planning to teach at the rate of 10 per cent for every year of teaching completed in a public school. Deadlines for returning completed applications are: Applications for fall semester, last Friday in April; applications for spring semester, third Friday in November; applications for Summer Sessions I and II, second Friday in March. NDEA loans are available to entering and continuing students.

RELIGIOUS FACILITIES

Many religious centers and clubs are located close to the campus, offering programs of interest to students of various nationalities and creeds: Bahai, Buddhist, Jewish, Protestant, Roman Catholic, Vedanta.

Within a few blocks of the campus, for example, are the following:

- Baptist Student Center (Southern Baptist)
- Calvin Club (Presbyterian)
- Campus Crusade for Christ
- Canterbury Association (Episcopal)
- Channing Club (Unitarian)
- Disciples Club (Christian)
- Hillel Foundation (Jewish)
- Institute of Religion (Latter-Day Saints)
- Inter-Varsity Christian Fellowship
- Lutheran Student Center
- Newman Hall (Roman Catholic)
- Organization at the University (Christian Science)
- Plymouth House (Congregational)
- Roger Williams Club (American Baptist)
- Wesley Foundation (Methodist)
- Westminster House (Presbyterian)
- University YMCA and YWCA

At these centers are held discussion groups, religious study classes, luncheons, dinners, social gatherings, and other student meetings.
REQUIREMENTS IN THE SEVERAL COLLEGES, SCHOOLS, AND CURRICULA

COLLEGE OF LETTERS AND SCIENCE

Students to Whom This Statement Applies—

This statement of requirements for the A.B. degree in the College of Letters and Science is referred to as the "New Plan." It is the plan to be followed by all students who enter the College of Letters and Science, Berkeley, in September, 1960, or later, and to certain students admitted between September, 1958, and September, 1960; the New Plan will also apply to some students who withdrew from the College of Letters and Science before September, 1958, and who return in September, 1960, or later. Classification of such students will depend on the amount of credit the student has completed and the date of his readmission.

Each student can determine his classification under the "Old Plan" or the "New Plan" from his registration card; an asterisk before "LS" on the card means that the student is under the "Old Plan"; absence of the asterisk means that he is under the "New Plan." A student who is in doubt should consult the Dean of the College, Room 210 Sproul Hall.

"Old Plan" students must follow the A.B. degree program as set forth in the 1959-1960 Circular of Information, Berkeley. A copy of this program is available on request in Room 210 Sproul Hall.

The College of Letters and Science is the four-year, undergraduate, nonprofessional college on the Berkeley campus of the University of California. This definition makes two important points. First, it states that the student who completes a program normally taking four years of attendance at regular sessions will receive a bachelor's degree. He may shorten this period of time, of course, if he takes a heavier than normal program and attends Summer Sessions, but otherwise he will come to graduation at the end of his eighth semester. Secondly, the definition states that the program is "nonprofessional," that is to say, it does not prepare him for a specific profession or vocation; this point is so important that it requires very careful discussion and consideration.

Most students come to college for more than one reason, but central in the thinking of many is the belief that with a college education they will have much improved opportunities to establish themselves economically and socially after they are graduated. This is a sound belief; our society sets a high value on the possession of a college degree, because it rightly believes that college graduates have developed their talents and abilities in ways that are of great value to themselves and to their society. We must not suppose, however, that there is one prescribed program which every student should follow, in order to produce the desired effect. It is the fundamental belief of the faculty of the College of Letters and Science that students differ one from another in many ways, and that educational programs must take these differences into account if the objective of producing an educated person is to be reached. Thus, some students will go directly from high school to a professional college such as Agriculture or Engineering; others will spend a year or two in the College of Letters and Science, and then take professional studies, for example, in Business Administration or Dentistry or Pharmacy, but the great majority of undergraduates remain in the College of Letters and Science for the full four years. This College is stated to be nonprofessional in its objectives; how then does it prepare its students for their places in today's world?
Requirements of Colleges, Schools, and Curricula

The College believes that it can accomplish this purpose if it requires (a) the attainment of a certain degree of proficiency in the use of English and of at least one foreign language; (b) the exploration of the significant broad fields of human knowledge; and (c) the acquisition of a certain amount of specialized knowledge, of a limited but (so far as it goes) thorough command of one specific subject of knowledge. Items (a) and (b) of this program will be discussed below under the heading “Breadth Requirements,” and item (c) under “Major Requirements.” The faculty of the College believes that the student who completes the program explained below will have developed (a) an awareness, some understanding, and an appreciation of the intellectual achievements of mankind, (b) an awakened intellectual interest in man and the nature of the world in which he lives, (c) an aroused curiosity about some specific body of knowledge which he will be prepared to continue to cultivate throughout his adult life, (d) a disciplined and intellectual approach to the problems of individuals and society, and (e) a preparation (broadly conceived) for the career he makes for himself, whether he enters upon it directly after graduation or seeks further training in a graduate or a professional school. The framework of requirements is sufficiently broad so that within it the student may cultivate his specific intellectual interests, whether for their own sake or as preparation for advanced study.

Admission—

Students who meet the requirements for admission to the University, as set forth in the ADMISSIONS CIRCULAR, are eligible for enrollment in the College of Letters and Science. Courses in high school mathematics, science and foreign language particularly, beyond the minimum required for admission, will provide more adequate background for college study. In some areas of study, such as the majors in sciences, lack of sufficient high school preparation may delay graduation from the University.

Attendance at a junior college or another four-year college need not delay completion of the requirements for graduation at the normal time, if care is taken to select courses that are equivalent to those which would be taken if the student were enrolled in the College. A change in objective or proposed major after a college program has been begun, may, of course, delay graduation.

Preparation for Admission to Undergraduate Professional Schools—

The schools of Business Administration, Criminology, Dentistry, Nursing, Optometry, Pharmacy, and Public Health require 57–60 units of credit, including certain courses, for admission. The School of Medicine requires 90 units of credit. While a student is enrolled in the College, he must select programs of study which will satisfy College requirements, but courses can be included which will also satisfy prerequisites for admission to a school. However, if a student does not transfer to a school at the end of his sophomore year (upon completion of 60 units of credit), he must declare a major for the A.B. degree and work toward completion of that major. The specific requirements for admission to each School are set forth in the Announcement of the School, which may be obtained from the Registrar. The Dean of the School may be consulted for further information.

Summary of Requirements for the A.B. Degree—

General University Requirements

Subject A. (See page 34)
American History and American Institutions. See page 35)
Military Training (male undergraduates only). (See page 36)
College of Letters and Science Requirements

Breadth Requirements (See page 60 for details)

1. English Reading and Composition (English 1A-1B or Speech 1A-1B) ................................................ 6 units
2. Foreign language (in one language) ..............................................12 units
3. Mathematics
4. Natural Science (including 2 units laboratory, and at least 3 units in physical science and 3 units in biological science) ..............................................12 units
5. Social Science ........................................................................12 units
6. Humanities ................................................................................12 units

Major Requirements (See page 65 for details)

Total of 120 units, including at least 36 units in upper division courses on the Letters and Science List and not more than 12 units in courses not on the Letters and Science List. (The 12 non-Letters and Science units may include not more than 6 units in courses numbered 300-499.)

Classification of Students—

Regular Students.—Regular students are classified as freshman, sophomore (upon completion of 30 units), junior (upon completion of 60 units), or senior (upon completion of 90 units).

Special Students and Limited Students.—Students admitted to the College in Special or Limited status are under the direct supervision of the Dean of the College. Study lists must be presented for approval each semester to the Dean in Room 210 Sproul Hall.

Faculty Advisers and Study List Regulations—

The purpose of the faculty adviser in the College of Letters and Science is to counsel the student with respect to his over-all program to see that he acquires a meaningful liberal education, makes normal progress toward completion of the degree requirements, and undertakes an appropriate program of studies each semester. The adviser and the Dean of the College may be consulted about any other problems the student may have.

The signature of the faculty adviser must appear on the study list each semester before it can be filed with the Registrar. An adviser may refuse to sign a study list of which he does not approve.

After the approved study list has been filed with the Registrar, it can be changed only if a petition for change is approved by the adviser and the Dean of the College. Each student in the College is assigned to an area adviser or a major adviser.

As part of the registration procedure, each new student is assigned to an area adviser, who will continue to be his faculty adviser until the assignment is changed by the Dean of the College or until the student has filed an approved Designation of Major petition.

The student normally will remain with the same area adviser until junior standing is attained. At the beginning of each semester after the first, the name of the area adviser will appear on the stub of the student's study list.

In his first semester after registration, the new junior or senior student, or the continuing student in the last semester of his sophomore year, must file a Declaration of Major petition (the form may be obtained from the Dean's Office, 210 Sproul Hall). After the petition has been filed with the Registrar, the student's faculty adviser will be his major adviser.

Study lists aggregating 12 units or more a semester may be presented without special permission in respect to quantity of work except that during the...
freshman year or, in the case of transfer students, the first semester of residence at the University, the maximum is 16 units. Requests for exceptions must be approved by the Dean of the College.

Two lower division courses in physical education activities may be included in a student's academic program to the extent of not more than 1 unit in any semester or session, in addition to the above study-list limits, and with degree credit totaling not more than 4 units.

American Studies.—The American civilization honors course, American Studies, is offered in the College of Letters and Science through the departments of English, History, and Political Science. For further information see the departments of English, History, and Political Science in the Announcement of Courses, Departments at Berkeley.

Summer Session and University Extension Courses—

Students who desire to satisfy specific subject requirements in the Summer Session, or who propose to undertake courses in University Extension, should consult the Dean of the College, 210 Sproul Hall.

BREADTH REQUIREMENTS

The College of Letters and Science has two kinds of breadth requirements. One kind is designed to extend the power to engage in intellectual experience and profit thereby; to this end, work is required in English reading and composition and in foreign language. The other kind requires acquisition of at least some knowledge in each of the three main fields into which human knowledge is usually divided: the humanities, the social sciences, and the natural sciences.

1. English Reading and Composition. A year course in English reading and composition is required. This requirement can be satisfied by completion of English 1A–1B or Speech 1A–1B. The course is required in order that the student will develop a facility in reading and writing beyond that demonstrated by the requirement in Subject A. To be eligible to take the required year course, the requirement in Subject A must have been satisfied. Normally this year course will be taken in the freshman year. The faculty adviser will not approve deferment of it until later except for compelling reasons. A freshman student who has not passed the examination in Subject A, however, will be required to take the course in Subject A and will then have to postpone the course in reading and composition.

2. Foreign Language. Each student is expected to complete the foreign language requirement before the beginning of his junior year, so that he may be able to use a foreign language in the advanced courses of the last two years. The faculty adviser will not approve deferment until later without sufficient justification.

The equivalent of 12 units in one foreign language must be completed. "Equivalent of 12 units" means a level of achievement represented by the completion of course 3 in departments such as French, German, Italian, and Spanish and Portuguese, which offer a sequence of 4-unit courses in the first two years. A student who wishes to satisfy the requirement in a language other than those just named must complete a course which, with its prerequisites, will yield 12 units in that language.

A placement examination will be given at the beginning of each semester to entering students who wish to continue in the College a foreign language studied only in high school or in a college summer session, to determine what course or courses, if any, must be completed in order to satisfy the 12-unit foreign language requirement.
A student may decide, however, to begin a new language in the College, for example, because a certain language is needed for advanced study to be undertaken later in a chosen field. If a new language is begun, all 12 units will be taken in the College.

Whether to continue with a language already studied in high school or to begin a new one is a problem to be discussed with the faculty adviser.

Under special circumstances, for valid reasons, a student may be authorized to offer the equivalent of 8 units in each of two foreign languages. The Dean will have the final decision in such cases.

3. Mathematics. Students who enter the University in freshman standing in September, 1960, or later, or students who graduate from the College of Letters and Science in June, 1964, or later, must meet this requirement in one of the following ways: (a) by passing the mathematical section of the College Entrance Board Scholastic Aptitude Test with a score of 400 or higher out of 800; (b) by passing any course given on this campus by the Department of Mathematics or Department of Statistics, or an equivalent course elsewhere; (c) by passing the Qualifying Examination in Mathematics with a score of 20 or higher out of 40.

Students who entered the University in the academic years 1958-1960 and who graduate before June, 1964, may meet this requirement by satisfactory completion of the high school courses in elementary algebra, 1 unit, and plane geometry, 1 unit.

4. Natural Sciences; 5. Social Sciences; 6. Humanities. Over the four years of the undergraduate course at least 12 units must be completed in each of these three broad fields of knowledge: the natural sciences, the social sciences, and the humanities. The requirement in the natural sciences has further specifications: (a) the completion of at least one course of not less than 3 units in a biological science, and at least one course of not less than 3 units in a physical science; (b) completion of at least 2 units of laboratory work. Particular courses may satisfy part of (a) and (b) at the same time. A high school record showing completion of an advanced (eleventh or twelfth grade) course with laboratory in biology, chemistry, or physics, will excuse the student from the laboratory requirement. However, 12 units of science in the College must still be completed.

No course offered to satisfy the English reading and composition requirement or the foreign language requirement will count toward requirements in the three fields, natural sciences, social sciences, humanities, but an appropriate upper division course may be offered as part of the breadth requirement in natural sciences, social sciences, or humanities, as well as toward completion of a major requirement and/or the requirement for 36 units in upper division courses.

Since the major program elected (to be described below under the heading "Major Requirements") will normally fall into one of the three fields of knowledge, one of the three field requirements will be satisfied for the most part, in the course of satisfying the major requirement. The faculty adviser will assist the student in selecting his programs of study. The adviser, however, does not assume responsibility for the student's compliance with all requirements for the degree.

Programs should be planned so as to spread the requirements in the three fields over the whole four years of the college course. At the same time, a substantial advance toward satisfying the breadth requirements should be made each semester so that progress will be made in meeting these requirements and a proper balance maintained between breadth and the special interest represented by the major program.
Courses Acceptable for the Breadth Requirement in Natural Sciences

Satisfaction of the natural sciences breadth requirement shall be by completion with a passing grade of at least 12 units of courses from those specified below. At least 3 units must be offered from group A and at least 3 units from group B. This requirement shall include, except as provided below, 2 units of laboratory science.**

** Group A—Physical Science
- Chemistry 1A‡, 4A‡
- Physics 2A, 4A† or 10

** Group B—Biological Science
- Biology 11A, 11B‡§
- Botany 1‡ or 10
- Zoology 1A‡ or 10

** Group C—Additional Physical and Biological Science
- Anatomy 25
- Anthropology 1
- Astronomy 1, 7A†, 7B†
- Bacteriology 1 and 4‡ or 2 and 4‡
- Botany 108†, 115, 115C‡
- Chemistry 1B‡, 4B‡, 8
- Entomology 100‡
- Genetics 10, 100
- Geography 1, 108, 111
- Geology 3, 6‡, 10
- Mathematics 5, 11, 16A, 16B, 3A, 3B, 3H
- Paleontology 1 or 10
- Philosophy 12A
- Physics 2B, 3A†, 3B†, 4B†, 4C†, 132
- Physiology 1, 1L‡
- Statistics 1, 2, 3, 12, 130A, 130B, 131, 168A, 168B
- Zoology 1B‡, 114, 115

Courses Acceptable for the Breadth Requirement in Social Sciences

Each student must complete 12 units in social sciences; however, the 12 units may include not more than 6 units in courses designated by an asterisk in parentheses (*). No special honors courses (marked H) may be included.

** The requirement of a laboratory science course shall be waived for any student who presents, at the time of admission, a transcript showing completion of an advanced (eleventh or twelfth grade) high school year course with laboratory in chemistry, physics, or biology. Such waiver shall not reduce the requirement of 12 units of college courses in natural science, or the specific requirement of 3 units in physical science and 3 units in biological science.

† Any two courses will satisfy the laboratory requirement.
‡ Any course will satisfy the laboratory requirement.
§ Will be accepted as credit toward the natural science requirement only if both parts are completed. Students offering Biology 11A, 11B may not offer any other course from group B in satisfaction of the natural science requirement.
Courses listed as “Recommended” have been chosen as particularly suitable for satisfaction of this requirement.

**Agricultural Economics**

112A, 112B.

**Anthropology**

All courses except 1, 152, 152L, 153, 153L, 199.


**Economics**

All courses except 2, 10, 142, 199.

Recommended: 1A or 103A, 1B or 103B, 100A–100B or 104, 112 or 113 [included in limitation (*) above], 121A, 121B, 130, 135, 150.

**Geography**

2, 5A, 5B, 141, 142, 155, 176.

Recommended: 2, 176.

**History**

All courses except 199, but History courses are included in the limitation (*) above.

**Journalism**

141, 147, 196.

**Philosophy**

147, included in limitation (*) above.

**Political Science**

All courses except 199, but 33A and 33B are included in the limitation (*) above.

Recommended: 1, 2, 110A, 120A, 163 or 181.

**Psychology**

All courses except 5, 107, 108A, 108B, 199.

Recommended: 1A, 33, 100A, 100B, 145, 150A, 150B.

**Social Science**

Recommended: 1A, 1B.

**Sociology and Social Institutions**

All courses except 40, 114, 199, but 141 is included in limitation (*) above.

Recommended: 1, 30, 108, 130, 132.

**Speech**

12, 119, 121A, 121B.

Courses Acceptable for the Breadth Requirement in Humanities

Each student must complete 12 units in the humanities. Items preceded by an asterisk in parentheses (*) indicate courses in the performing arts; students may not offer more than 4 units of performing arts in fulfillment of the humanities breadth requirement. No special honors courses (marked H) may be included. Courses listed as “Recommended” have been chosen as particularly suitable for satisfaction of this requirement.

**Architecture**

All courses on the Letters and Science List.

Recommended: 110, 121, 122, 126, 127.

**Art**

All courses except 195, 199, but note (*) limit in performing courses.


(*)Performing: 2A, 2B, 3A, 3B, 14A, 14B, 100 through 129, 140 through 143, 148, 149.

**Classics**

All courses except Greek 1, 1A, 1B, 100, 150A, 150B, 199; Latin 1, 1A, 1B, 2, 9A, 9B, 109A, 109B, 166, 199; Sanskrit 190A, 190B, 199.

Requirements of Colleges, Schools, and Curricula

Comparative Literature
Recommended: 121, 151A, 151B.

Decorative Art
All courses except 190, 199, but note limit (*) in performing courses.
Recommended: 1A, 1B, 127A, 193A, 193B, 195A, 195B.

Dramatic Art
All courses except 110, 115, 190, 191, 192, 199, but note limit (*) in performing courses.
Recommended: 20A, 20B.

English
All courses except 1A, 1B, 106L, 106M, 198, 199, but note limit (*) in performing courses.

French
All courses except 1, 2, 3, 12, 20, 25, 101A, 101B, 125, 130A, 130B, 199.
Recommended: 4R, 39A, 39B, 39C, 142A, 142B, 146A, 146B.

German
All courses except 1, 2, 3, 3S, 4S, 4M, 12, 130A, 130B, 140, 199.
Recommended: 4, 39A, 39B, 39C, 39D.

History
All courses except 199, but a maximum of 6 units.
Recommended: 4A, 4B.

Italian
All courses except 1, 2, 3, 13, 101A, 101B, 199.
Recommended: 4, 39A, 39B.

Journalism
151, 195.

Linguistics
All courses except 199.

Mathematics
3 units from 111B, 115A, 115B, 125A, 125B, 130A, 130B, 135A, 135B.

Music
All courses except 10, 198, 199, but note limit (*) in performing courses.
(*) Performing: 40 through 48, 140 through 149.

Near Eastern Languages

Oriental Languages
All courses except 1, 2, 3, 4, 7A, 7B, 8, 9, 13G, 14G, 18, 19, 39, 103, 107, 118, 123, 133A, 133B, 134A, 134B, 135, 139, 143, 149A, 149B, 154, 164, 174A, 174B, 175, 198, 199.

Philosophy
All courses except 199.

Political Science
33A, 33B.
SCANDINAVIAN
Recommended: 100A, 100B, 100C, 107, 125.

SLAVIC LANGUAGES AND LITERATURES
Recommended: 39, 133C, 133D, 180A, 180B, 182, 188.

SPANISH AND PORTUGUESE
All courses except Spanish 1, 2, 3, 116A, 116B, 125, 199; Portuguese 1, 2, 21A, 21B, 199.
Recommended: Spanish 4L, 39A, 39B, 39C, 39D.

SPEECH
All courses except 1A, 1B, 12, 24, 26, 40, 103, 106, 119, 121A, 121B, 152, 198, 199.
Recommended: 2A, 2B, 10A, 10B, 111A, 111B, 141A, 141B.

MAJOR REQUIREMENTS
In addition to meeting the breadth requirements, a major program must be completed also. The object of this program is to give a limited experience in specialization. The student will not necessarily become a specialist, but he will acquire advanced knowledge of a particular subject or field, presented in an organized course of study which will explore the subject or field systematically. By completing the major program, the student will prepare himself for graduate study in the subject or to cultivate it independently in adult life.

Four types of major programs are available.

(1) Departmental Major Programs. These are designed and administered by the separate departments. They are listed below, and each is described in detail in the departmental sections of the Announcement of Courses, Departments at Berkeley. Departmental major programs lead naturally to graduate study, but this is not their only purpose or use: they also serve the student who has a strong interest in a particular subject but who does not intend to enter upon graduate study; such a student will be prepared to cultivate the subject as an intellectual interest in adult life.

(2) Group Major Programs. These interdepartmental programs are included in the list of majors, and they are described following the list of majors. Some look forward to training in a graduate professional school; others reflect specialized interests somewhat broader in scope than those served by the departmental major.

(3) Field Major Programs. Four field major programs have been established: (a) the biological sciences field major, (b) the humanities field major, (c) the physical sciences field major, and (d) the social sciences field major. These programs are designed for students whose intellectual interests are of broader scope than the major programs described above will provide. They will serve both the student who does not have a particular specialized interest and the student who looks forward to teaching in the schools but who does not wish a more specialized departmental or group major program. The details of the field majors follow the descriptions of group majors, page 70.

(4) Individual Major Programs. Not all possible or desirable major programs are listed below. The College recognizes that there are a few students who will find their intellectual needs better satisfied by a special program designed for the individual student. Consequently, provision is made for individual major programs which the student himself designs, with the help
of a member of the faculty or of the Dean's staff. A program of this type
must be submitted to the Dean for approval by the Executive Committee of
the College. The student should, of course, have sound reasons to justify his
proposed program. The College recommends that he discuss his proposed
program with one of the assistant deans of the College before he formally
submits it.

In choosing a major program from among the possibilities described above,
the student should keep in mind his own intellectual interests and the use he
wishes to make of his education in later life. Before making a decision he
should discuss the matter with his faculty adviser.

A student may indicate his proposed major program as early in his college
course as he wishes, even at the beginning. He must designate his major by
the beginning of his junior year. To accomplish this, he should consult his
faculty adviser and the major adviser. The names of major advisers will be
found in the appropriate departmental section of the Announcement of
Courses, Departments at Berkeley (for a departmental major program)
or in the description of the group major or field major below. A student who
wishes to propose an individual major program, should inquire at the Dean's
Office, Room 210, Sproul Hall. In the last semester of the sophomore year,
application should be made at the Dean's Office for the Declaration of Major
petition on which to declare the major. When the petition is approved, the
student will be formally enrolled in the major of his choice, and he will be
assigned to the proper faculty adviser. This adviser will be qualified to advise
him both on the breadth requirements and on the specific requirements of
the major program.

A change from one major program to another may be made with the
permission of the major adviser of the program desired and of the Dean of
the College. A change of major may not be made after the opening of a
student's last semester.

A student in a major program must not only meet specified course require­
ments, but must also attain a C average in all the courses required in the
major. If a student falls below a C average, the department or committee
in charge has the option of dropping him from its major program. He must
then be accepted in another major program in order to continue in the College.

**ORGANIZED MAJORS**

Detailed descriptions of the departmental major programs designated below
will be found under their respective departments in the Announcement of
Courses, Departments at Berkeley. Descriptions of the group majors and
field majors will be found on pages 67-74 of this circular.

**Departmental Majors**

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Physical Education
Physics
Physiology
Political Science
Psychology
Scandinavian
Slavic Languages and Literatures
Sociology and Social Institutions
Spanish
Speech
Statistics
Zoology

Group Majors
Child Development
Communication and Public Policy
Dramatic Literature
Genetics
Medical Sciences (open only to qualified students who enter University of California School of Medicine in senior standing in September, 1960)
Social Welfare
Wildlife Conservation

Field Majors (New Plan students only)
Biological Sciences Field Major
Humanities Field Major
Physical Sciences Field Major
Social Sciences Field Major

DESCRIPTION OF GROUP MAJORS

Biology, Physics, and Medicine

Students interested in the physical sciences and their applications to biology and the medical sciences may elect to major in one of the physical or biological sciences, adding appropriate electives to the program, or they may propose an individual group major, selecting courses from the physical and biological science departments. See above; see also the Department of Physics in the Announcement of Courses.

Child Development

Group Major Adviser: Miss Landretth.

The Major.—Psychology 1A; one course selected from Economics 2, Mathematics 5, Psychology 5, Sociology and Social Institutions 40, Statistics 2; Physiology 1; one course selected from Anthropology 2B, Anthropology 3, Psychology 1B, Sociology and Social Institutions 1.

Home Economics 132 or Psychology 112; Psychology 113 or 113N; Home Economics 135 or Psychology 114 or Psychology 117; Home Economics 138 or Sociology and Social Institutions 130; 5 or 6 units from Physiology 102, 104, Public Health 125; 3 units from Anthropology 119, 170, Sociology and Social Institutions 104, Home Economics 139; 3 units from Psychology 148A, 148B, 161; 3 units from Genetics 100, Nutrition 111, Zoology 100, Anthropology 118, Economics 105, Psychology 141, 145, Sociology and Social Institutions 132, 178.

Communication and Public Policy

Advisers: Mr. Barnhart, Mr. Belknap.

The group major in communication and public policy is designed to contribute to an understanding of the role of mass communication in society. It introduces the student, in general, to the study of the nature, function, content, values, and effects of communication in society and directs his attention specifically to the effects of communication on public policy and opinion. The courses selected cover both these interrelated fields of study—the nature of language, and the nature of the media of mass communication: radio, press, film, as well as the role played by informative and persuasive communication in modifying the character of public opinion and public institutions.

Students preparing for employment in propaganda analysis or related fields in governmental agencies are urged to discuss their program with the advisers.
The Major.—Required: English 1A–1B or Speech 1A–1B; Speech 12; Psychology 1A. Recommended: Economics 1A–1B; History 4A–4B, 17A–17B; Sociology and Social Institutions 1, 30; Speech 10A; Psychology 5; Economics 2 or Statistics 2.

Required: 18 units from Philosophy 108 or 104 or 128; Political Science 161A; Psychology 145; Speech 119; Speech 137 or 135 or 138; Speech 131B; and 6 units from Anthropology 118; Business Administration 150, 163; Journalism 141, 190A; Political Science 161B or 162A or 160A–160B; Sociology and Social Institutions 104, 141, 175; Speech 117A–117B, 121A, 139, 141A–141B, 147.

Dramatic Literature

Group Major Adviser: Mr. Rosenberg.

The major is concerned with the drama primarily as literature and as a manifestation of human culture. But since all plays are written for production on a stage, the relation of the drama to the theater is also emphasized, and candidates for graduation in this major should have acquired such practical experience in the theater, amateur or professional, as will enable them to recognize a play's theatrical as well as its literary value.

The Major.—Classics 35 (if offered) and 6 units from the following: English 1A–1B; Dramatic Art 10A–10B. Thirty additional units, of which the comprehensive examination counts for 3 units, including English 114A–114B, and one of the Shakespeare courses (English 117A–117B, 117E); Dramatic Art 123A–123B, 160A–160B; 6 units selected from the following: Dramatic Art 120, 125, 159A, 159B; Scandinavian 106, 107, 108, 109; Slavic 135; or the following courses in the foreign language departments which, it should be noted, are not given in English: French 115A–115B; Greek 103; Latin 108; German 104B, 106, 109; Spanish 105, 109A–109B. Recommended related courses (the following courses are recommended as supplementary to, but not required for, the major): Philosophy 136A–136B, 137, 146A–146B; Dramatic Art 110, 130A–130B–130C–130D, 140A–140B, 180A–180B; Music 127A, 117B, 118B, 118D.

The student must, at the end of the senior year, satisfy with a grade of C or higher either (1) an examination consisting of two three-hour papers, or (2) an examination of one three-hour paper and the submission of an original, sustained piece of research or criticism, developed after conference with the adviser. The student's preparation for 1 or 2 should extend through his junior and senior years. Credit: 3 units.

Genetics

Adviser: Mr. Dempster.

Genetics deals with the study of fundamental properties common to all forms of life—heredity, variation, and evolutionary change. The group major in genetics therefore cuts across departmental lines in order to provide students both with a broad background in general biology and an understanding of the principles and experimental methods of genetics. Students completing the major should be qualified to enter graduate study in genetics whether their interests lie in a particular branch of the subject (behavioral, biochemical, biometrical, developmental, ecological, physiological, population genetics) or in a particular kind of organism (microorganisms, plants, animals, man).

The Major.—Bacteriology 2 and 4 (can be satisfied by Bacteriology 1 and 4, or 104), Botany 1, Chemistry 1A, 8, Physics 2A, 2B, Statistics 2, Zoology 1A. Recommended: Mathematics 3A, 3B, or 16A, 16B, or 190A, 190B.

Genetics 100 or Zoology 114, Genetics 100C, Botany 130 or Zoology 107, 107C; 10 units of electives from the following group: Bacteriology 107, Genetics 101, 102, 103A, 103B, 104, 105, Zoology 115; 6 units of upper division electives approved by the major adviser from one of the following departments (courses must be on the Letters and Science List): Anatomy
and Physiology, Anthropology, Bacteriology, Biochemistry, Botany, Entomology and Parasitology, Medical Physics, Psychology, Zoology.

Medical Sciences

The major in medical sciences is open only to students with full senior standing in the College of Letters and Science, Berkeley, who completed at least the junior year in residence in the College of Letters and Science, Berkeley, and who enter the University of California School of Medicine in September, 1960. The major in medical sciences in the College of Letters and Science will be discontinued in June, 1961.

Religion

Students interested in the study of religion, either from the standpoint of liberal education, or of preparation for the ministry or some other phase of religious education, may select a major in one of the departments germane to the purposes of the student, or they may propose an individual group major (see page 65).

Courses appropriate for such purposes may be found in a number of departments, such as Anthropology, Classics, Economics, Education, English, History, Oriental Languages, Philosophy, Psychology, Near Eastern Languages, Sociology and Social Institutions, Social Welfare. Particular attention is directed to the following courses: History 122, 131A-131B; Near Eastern Languages 100A-100B, 102A-102B; Philosophy 104, 112.

Social Welfare

Group Major Advisers: Mr. Hearn (spring semester), Mr. Piliavin, Mrs. Taylor, Mr. Wiltse.

The group major in social welfare is designed to meet the needs of three classes of students:

(a) Those who propose to take graduate professional education in social welfare, by providing for them an integrated program of preprofessional preparation for graduate study;

(b) Those who look forward to positions in public assistance, social security administration, employment services, recreation, group work, correctional and other branches of the social services for which graduate education in social welfare is not now always required, by providing for them an orientation to the social services through a broad background in the social sciences;

(c) Those who, having no specific vocational objectives, desire to become familiar with a wide range of social problems as a contribution to their general education, by offering them a general acquaintance with the contributions of several fields of social science.

The Major.—Economics 1A-1B; Psychology 1A, 33; one course selected from Economics 2, Psychology 5, Sociology and Social Institutions 40, Statistics 2; and 6 units selected from History 4A-4B, Anthropology 2A-2B, Sociology and Social Institutions 1, 2, Physiology 1, Zoology 10.

36 units of upper division work, including (a) the following courses, to the value of 9 units: Social Welfare 102, 110A-110B; and (b) 27 units selected from the following courses (with the permission of the faculty adviser and to meet the specific needs of individual students, some upper division courses may be substituted): 6 units from Home Economics 132, Psychology 141, 161, and 168; 3 units from Economics 120A, Political Science 102, 104A, 175, 181; 9 units consisting of Psychology 145, 3 units from Business Administration 150, Economics 150, 152, 180, and 3 units from Anthropology 118A-118B, Economics 106A-106B, Sociology and Social Institutions 142, 148, 175, 178; 9 units from City and Regional Planning 111, Criminology 100A—
Wildlife Conservation

Group Major Adviser: Mr. Leopold.

The curriculum in wildlife conservation, leading to the A.B. degree, is designed to offer sound preparation in the several basic sciences that collectively underlie the field of wildlife ecology. It combines foundation courses in the life sciences and earth sciences to give the student somewhat more breadth of background than can be achieved with a major in any one scientific discipline.

However, to become professionally prepared for a career in wildlife or fisheries conservation, the student is advised to pursue further study leading to a higher degree in zoology or one of the other relevant fields of science. The same is true of students who may wish to teach biology and conservation in high schools or junior colleges. The emphasis in the present curriculum is on basic grounding rather than terminal professional training.

The Major.—Botany 1; Chemistry 1A and 8; Geology 1 or Geography 1; Statistics 1 or 2 or equivalent; Zoology 1A-1B; Botany 108; Geography 153; Zoology 116, 145, 138 and 113; one course from each of the following groups:
2. Entomology: Entomology 100 or 133.
3. Parasitology: Entomology 117 or Zoology 111.

Honors Program.—A candidate for honors must complete (1) field course in wildlife and fisheries ecology and management at Sage Hen Creek Station near Truckee (Zoology 146, First Summer Session, 4 units); (2) special field project conducted at Sage Hen Creek Station under the guidance of the staff, results to be written up and submitted in the form of a thesis (Zoology 199, First Summer Session, 2 units); (3) proseminar (Zoology 198, fall semester, 1 unit). In lieu of the 7 units required of an honor student, one of the required courses will be dropped from the major program; selection of the course to be omitted will be determined by the faculty adviser in consultation with the student.

FIELD MAJORS

Field Major in Biological Sciences

Advisers: Plan A, Mr. Hackett; Plan B, Mr. Proskauer, Mr. Stebbins; Plan C, Mr. Pitelka.

Lower Division Courses

Group 1.—Required of all students in the major:
Chemistry 1A, 8 ...................................................... 8 units
Physics 2A, 2B ..................................................... 6 units
Botany 1, Zoology 1A ........................................... 9 units

Group 2.—At least one course selected from this group:
Bacteriology 1 ...................................................... 4 units
Chemistry 1B, or 5, or 9 ......................................... 5 or 3 units
Paleontology 1 ..................................................... 3 units
Physiology 1–1L ................................................... 5 units
Zoology 1B .......................................................... 4 units

Upper Division Courses

General Requirements
Genetics 100, or Zoology 114 or 115 .................. 3 units
History of Biology (course not yet offered) .......... 3 units

1 In exceptional cases, Biology 11A–11B may be accepted in place of Botany 1 and Zoology 1A.
Plan A.—Specialization in the area of functional biology.
A study of the physiological and biochemical aspects of living things.

Biochemistry 102 .......................................................... 3 units
Physiology 100A-100B or Zoology 101-102 ..................... 6 or 4 units
Biochemistry 102L or Physiology 100L or Zoology 101C .... 3 or 2 units
Bacteriology 100 or Botany 111 or Physiology 110A and 112 or Zoology 124 ................................................................. 4 to 6 units

Additional upper division courses in biological sciences to complete 30 units under Plan A ......................................................... 6 to 11 units

Plan B.—Specialization in the area of morphology and taxonomy.
A study of the structure, classification, and evolution of living things.

Botany 100 and 103 or 108 ................................................. 8 units
Zoology 113 and 108 or 112 or Entomology 100 ................. 8 units

An upper division course in physiology and additional upper division courses in biological sciences to complete 30 units under Plan B 8 units

Plan C.—Specialization in the area of ecology.
A study of the relations between living things and their environment.

Botany 108 ................................................................. 4 units
Zoology 108 or 112 or 113 ............................................... 4 units
Forestry 103 or Botany 151, and Zoology 125-125C ............. 7 or 8 units

An upper division course in physiology and additional upper division courses in biological sciences to complete 30 units under Plan C 8 to 9 units

Field Major in Humanities

The program of studies described below has been designed for students who have a strong interest in the humanities, but whose interests would not be well served by majoring in a single department within this group of studies. This could come about, for example, if a student wished to immerse himself in the culture of a particular period, exploring the diverse manifestations of this culture through a study of the paintings, the music, the literature, and the philosophy which it has produced. Or it could arise, for another example, in the case of a student who was interested in relating the esthetic systems of certain philosophers to the particular works of art with which they must have had contact.

The student will begin his studies by acquiring a broad background of information and a first contact with basic works of art, literature, and philosophy. He will then go on to concentrate his attention on some special domain which attracts his interest; at the same time, he will increase his appreciative power through the study of critical procedures and will enlarge his understanding of the creative process through an investigation of its techniques. In the final stage, giving a characteristic flavor to the field major program, the student will attempt to perceive patterns of understanding which lie athwart the traditional boundaries of study, and he will strive to relate the knowledge acquired in his area of concentration to principles and viewpoints which originate in other domains or disciplines.

Advisers: Mr. Muscatine, Mr. Scaglione.

Lower Division Courses
Background information and first contact with basic works of art, literature, and philosophy.

Chemistry 1B prerequisite may be waived.
Chemistry 5 is a prerequisite.
Bacteriology 1 prerequisite may be waived.
Zoology 1B is a prerequisite.
Senior standing in the major is a prerequisite.
Zoology 108 or 113 and Botany 108 are prerequisites.
History 4A-4B .................................................. 6 units
Philosophy 20A-20B ........................................ 6 units
English 44A-44B ............................................. 6 units
Foreign language, fourth semester ..................... 4 units
   The language must be chosen from the following: Greek, Latin, French, German, Italian, Spanish.*
Art 1A, 1B, 1C, 1D, or 10, or Decorative Art 1A .......... 3 units
   Students who have a basic knowledge of the technical vocabulary employed in the analysis of art may elect any 3-unit course in art or music in place of this requirement.
Music 27A or 27B ........................................... 3 units
   Students who have already acquired a basic knowledge of the technical vocabulary employed in the analysis of music may elect any 3-unit course in music or art in place of this requirement.

UPPER DIVISION COURSES
Concentration of interests, increased appreciative power, improved understanding of method.
Specialized study ........................................... 12 units
   The student must select a coherent program which will permit him to penetrate to some depth in an area of special interest to him. Ordinarily these courses will be selected within a single department. The program must be approved by the committee.
An upper division reading course in the literature of a foreign language (following four semesters of lower division preparation) 3 units
Selection from among two of the following three groups ........ 5 units
   (a) Any upper division English course
   (b) Any Group C course in Art
   (c) Any 127 course in Music
Four 3-unit core courses, all to be taken in the senior year. Details will be announced in the ANNOUNCEMENT OF COURSES, DEPARTMENTS AT BERKELEY.

Fall Semester
   (a) The Arts.—Analytical and critical methods in music and the visual arts exemplified through the careful study of selected masterpieces; comparison of the arts; the roles of form and content related to different media.
   (b) Literature.—Study of selected masterworks in English and in translation. Discussion of critical criteria; universality, individuality, and literary tradition; the forms, functions, and limitations of language.

Spring Semester
   (c) Theories of ethics and of knowledge. A study of the interrelation of the metaphysical and moral ideas of a few selected philosophers.
   (d) Topics in the history of culture. An analysis of the historical contexts in which were produced some of the works of art, literature, and philosophy which form the subject of courses (a), (b), and (c).

Field Major in Physical Sciences
This field major program is designed for students who can profit from a broader training in the physical sciences than is possible in a departmental major. To this end it includes a group of elementary courses in at least four fields, a core of upper division courses in physics and chemistry, and a carefully planned program of related upper division courses in the several de-

* The purpose of this restriction is to ensure that the student will study a language related to the mainstream of Western culture.
College of Letters and Science

departments. The required courses are such that students may transfer between the field major and one of the departmental majors during the first three years with a minimum of difficulty. Although the requirements for a teaching credential may be different, some prospective teachers may nevertheless find this to be a suitable major.

Adviser: Mr. N. E. Phillips.

Required Lower Division Courses
Mathematics 3A–3B, 4A–4B or 14A ........................................ 11 or 12 units
Physics 4A, 4B, 4C ......................................................... 12 units
Chemistry 1A–1B, 8 ...................................................... 13 units
Astronomy 1 or Geology 5 .............................................. 3 or 4 units

Required Upper Division Courses
Chemistry 102 or 110A ..................................................... 3 units
Physics 121 ................................................................. 3 units
Physics 108B ............................................................... 3 units

Elective Upper Division Courses* (at least 15 units):
Astronomy 104A, 104B. Courses with additional prerequisites: 117A, 117B.
Geography 111, 113.
Statistics 130A, 130B. Courses with additional prerequisites: 113, 120A, 132, 166, 168A, 168B.

Field Major in Social Sciences

The field major in social sciences may serve the needs of four groups of students: (1) those seeking to prepare to teach in elementary schools, high schools, and junior colleges who desire a broad training in the social sciences; (2) those generally interested in social science, but who have not chosen a field of specialization; (3) those who intend to do graduate work in a specific discipline, but who want a broad undergraduate training; and (4) those intending to enter professional schools (e.g., the School of Law or the School of Social Welfare) which do not require training in a special discipline, but recommend broad training in the social sciences.

To facilitate these objectives, students in the field major in social sciences should take several courses in one department, so that if they later decide to do graduate work they will not be greatly handicapped as compared with students who majored in that department.

Adviser: Mr. Selvin, Mr. M. B. Smith, Mr. Feuer (spring semester).

Courses Required in the First Two Years

Social Science 1A–1B .................................................... 6 units
One of the following: .................................................. 3 units

1 Astronomy 7A–7B are desirable for students who will undertake further courses in astronomy.
2 Chemistry 5 is a prerequisite.
3 Certain courses not listed here may be approved as electives by the adviser.
4 Mathematics 101A–101B are of interest for students anticipating satisfaction of requirements for the teaching credential. The minimum requirements of the field major in physical sciences are not the equivalent of the curriculum for the teaching major in physical science. For information about several additional requirements for the latter, prospective teachers should consult the Announcement of the School of Education.
Economics 2, Psychology 5, Sociology and Social Institutions 40, Statistics 2

History, a two-semester sequence ......................................................... 6 units

Two-semester sequence courses elected from the following, one sequence to be completed in the first two years; two sequences may be taken in the last two years .................................................. 18 units

- Anthropology 118—125
- Economics 103A—103B
- Political Science: any two from 110A, 120A, 163, 181
- Psychology 100A—100B
- Sociology and Social Institutions 108—109

**Courses Required in the Last Two Years**

Methods (elect one or two of the following): ...................................... 3 to 6 units

- History 101, Psychology 104, Psychology 106A, Psychology 144, Sociology and Social Institutions 105, Sociology and Social Institutions 114

Additional upper division courses in one department ...................... 9 units

Two-semester upper division sequence course (to be announced later) .................................................. 6 units

**UNIT AND SCHOLARSHIP REQUIREMENTS**

Besides the breadth requirements and the major requirements, certain other requirements for the Bachelor of Arts degree must be met.

**A. Unit Requirement.** At least 120 units of courses must be completed. Each course carries a certain amount of unit credit which is stated along with the course description in the Announcement of Courses, but there are certain limits on how courses may be chosen. Selection cannot be made from among all the courses offered on the Berkeley campus.

1. At least 108 units must be completed in courses listed on the Letters and Science List of Courses, including at least 36 units in upper division courses (courses on the Letters and Science list numbered 100-199). This is a list of undergraduate courses selected for their nonprofessional or nonvocational value. The Letters and Science List of Courses will be found on pages 75, 76. The listings of each department in the Announcement of Courses also give this information.

2. Of the 12 units permitted from courses not on the Letters and Science list, not more than 6 units may be included from courses numbered 300—499.

3. Not more than 30 units of upper division courses (numbered 100—199) in any one department may be counted toward the A.B. degree. Certain students are exempted from this rule: see “Honor List” page 76.

4. A transfer to the College from a junior college must complete at least 54 units after leaving the junior college.

5. **College Senior Residence Requirement.** All candidates for the A.B. degree shall complete the final 24 units in the College during the senior year in residence courses of instruction. For continuing students in the College, at least 6 units in the major must be distributed between the semesters of the final or senior year. Students who are admitted to senior standing in the College on the basis of credit from other institutions must include in the final or senior year at least 18 units of work in upper division courses chosen from the Letters and Science List of Courses, including at least 12 units in the major program.

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1 Social Science 1A—1B will serve in lieu of the prerequisites stated in the Announcement of Courses, Departments at Berkeley.
B. Scholarship Requirement. The grades received in the University are counted in terms of “grade points.” These are explained on page 41. A record in the University must show at least twice as many grade points as units as one of the qualifications for graduation. This is the same as a grade C average. The probation and dismissal rules are stated on page 41.

**LETTERS AND SCIENCE LIST OF COURSES**

At least 108 units offered for the degree of Bachelor of Arts must be in courses chosen from the Letters and Science List of Courses.

Courses not on the list, but taken for credit to satisfy a general University requirement established by the Board of Regents, will be accepted as equivalent to courses on the Letters and Science list up to a maximum of 8 units.

Any course not included on the Letters and Science List of Courses, but required, or accepted, as part of a major or group major or as a prerequisite thereof, shall, for students offering that major or group major at graduation, but for no others, be treated as if it were on the Letters and Science List of Courses.

Thirty-six units of upper division courses must be selected from the following list:

- Agricultural Economics 112A, 112B, 120.
- Anatomy. All undergraduate courses.
- Anthropology. All undergraduate courses.
- Architecture 110, 121, 122, 126, 127.
- Art. All undergraduate courses.
- Astronomy. All undergraduate courses.
- Bacteriology. All undergraduate courses.
- Biochemistry. All undergraduate courses.
- Botany. All undergraduate courses except 155.
- Business Administration 1A, 1B, 10, 18, 100 (formerly 101), 150.
- Chemistry. All undergraduate courses except 125, 125L.
- City and Regional Planning. All undergraduate courses.
- Classics. All undergraduate courses.
- Comparative Literature. All undergraduate courses.
- Decorative Art. All undergraduate courses.
- Dramatic Art. All undergraduate courses except 30, 190, 191, 192, 193.
- Economics. All undergraduate courses.
- Education 100A and not more than 3 units from 101, 102, 105.
- English. All undergraduate courses.
- Forestry 1, 103, 122, 125.
- French. All undergraduate courses except 20.
- Genetics. All undergraduate courses.
- Geography. All undergraduate courses.
- Geology. All undergraduate courses except 150.
- German. All undergraduate courses.
- Greek. All undergraduate courses.
- History. All undergraduate courses.
- Italian. All undergraduate courses.
- Journalism 21, 121, 140, 141, 145, 147, 151, 165, 190A-190B, 195, 196, 199.
- Latin. All undergraduate courses.
- Linguistics. All undergraduate courses.
- Mathematics. All undergraduate courses.
- Medical Physics (see Physics).
- Music. All undergraduate courses; a total of not more than 8 units from the following courses will be accepted as Letters and Science credit: 42, 43, 46, 48, 142, 143, 146, 148.
- Near Eastern Languages. All undergraduate courses.
- Optometry (see Physiological Optics, below).
- Oriental Languages. All undergraduate courses.
- Paleontology. All undergraduate courses.
- Philosophy. All undergraduate courses.
- Physical Education 105.
- Physics. All undergraduate courses except 126, 126L, 131.
Physiological Optics 105A, 105B, 106A, 106B.
Physiology. All undergraduate courses.
Plant Nutrition 115, 117.
Political Science. All undergraduate courses except 183.
Psychology. All undergraduate courses except 104, 114, 116, 117, 184, 185, 186, 187.
Sanskrit. All undergraduate courses.
Scandinavian. All undergraduate courses.
Slavic Languages and Literatures.

All undergraduate courses.
Social Science 1A–1B.
Social Welfare 100, 106, 110A, 110B.
Sociology and Social Institutions. All undergraduate courses.
Spanish and Portuguese. All undergraduate courses.
Speech. All undergraduate courses.
Statistics. All undergraduate courses except 142A, 142B, 142C, 142D, 144.
Virology. All undergraduate courses.
Zoology. All undergraduate courses except 109, 116, 119A–119B, 120, 145, 146.

HONORS PROGRAMS

Special honors programs for honor students will be established in connection with the major programs. These are described following the statement of requirements for each major. Interested students may inquire also of major advisers.

A candidate for honors with the bachelor's degree must complete the honors program in his major in order to be graduated with honors. An honor student may enroll as a candidate for honors with the bachelor's degree in his elected major program at any time not later than the first semester of his senior year, upon approval of his major adviser. In special cases, a student not an honor student may so enroll by permission of the major adviser and the Dean. Candidates for honors shall have all the privileges of honor students.

Honors with the Bachelor's Degree. The Committee on Honors will consider for honors at graduation students recommended by major advisers after completion of the honors program. Honors with the bachelor's degree shall be of three kinds: (1) Honors, for completing an honors program to the satisfaction of the major adviser concerned; (2) High Honors, for completing an honors program with distinction; (3) Highest Honors, for completing an honors program with great distinction. The award of honors shall be designated on the student's diploma, and the list of students who are awarded honors at graduation shall be published in the Commencement Program.

Distinction with the Bachelor's Degree. Candidates for graduation who are not enrolled in an honors program, but who complete their work with distinction may be awarded the bachelor's degree with Distinction, upon recommendation of the major adviser and the Committee on Honors. Such awards shall be designated on their diplomas and shall be published in the Commencement Program.

The Honor List. Each semester an Honor List will be published. This list will include all students who have completed at least one semester of 12 units or more and have an average of grade B or better for all work undertaken in the College. Certain other students specially approved will also be included. The students whose names appear on the Honor List are known as Honor Students.

An Honor Student gains certain privileges not granted to other students:
1. He is eligible to enroll in an honors program.
2. He is eligible, if the instructor consents, to elect special courses otherwise available only to students in honors programs.
3. He may make study-list changes, on approval of the Dean, in respect to the special course for honors programs after the time for study-list changes has expired, and he will not be charged a fee for such changes.
4. He may elect, on approval of the instructor and the Dean, one course each semester, in the junior and senior years, to be marked "Passed" or "Not Passed" without affecting his grade-point average. This may not be done, however, with courses which are a part of the major program, or courses offered for the breadth requirements.

5. He is eligible to take examinations for unit and grade-point credit. (See page 43.)

During the senior year, an honor student who has attained at least an average of B in the junior year has additional privileges:

1. He may take less than 12 units a semester, on approval of the Dean.
2. He may count more than 30 units of upper division courses in one department for credit toward the bachelor's degree.
3. If his major department or committee consents, he may be exempted from requirements concerning specific courses or sequences of courses in the major program.

**College of Agriculture**

The prospective student should read the requirements and recommendations for admission on pages 19–31. Entrants will be seriously handicapped in undertaking most of the lower division courses required in the various curricula of the College of Agriculture unless they have completed as a part of, or in addition to those subjects required for admission, the following subjects in high school: algebraic theory, ½ or 1 year; trigonometry, ½ year; physics, 1 year; and chemistry, 1 year. Students proposing to major in agricultural engineering, forestry, irrigation science, or range management should have in addition 1 year of mechanical drawing. Failure to take the proper subjects in high school may delay completion of the University course beyond the usual four-year period.

Students are advised to read the detailed information concerning instruction in agriculture on the Berkeley, Davis, and Los Angeles campuses, including the various curricula and suggested programs of study for the freshman and sophomore years, found in the *Bulletin of the College of Agriculture*.*, obtainable without charge from the Dean of the College of Agriculture, University of California, Berkeley 4.

**Freshman and Sophomore Years**

The first two years of all curricula offered by the College of Agriculture may be undertaken on the Berkeley campus. As soon as the student has selected a curriculum, he obtains the name of his major adviser from the office of the Dean of the College of Agriculture, 101 Giannini Hall. Each semester the major adviser is consulted for guidance in following the requirements of the curriculum chosen. Students who are unable to meet the suggested programs of study during the first two years may take some of the requirements in their junior or senior years. It should be noted, however, that any great departure from the recommended programs may delay graduation beyond the normal four-year period.

**Junior and Senior Years**

The schedule for the junior and senior years is determined by the major subject requirements, supplemented by optional courses selected by the student, with the consent of the major adviser. Not all curricula may be completed on the Berkeley campus.

* Also known as the *Prospectus of the College of Agriculture*. 
Approval of Study Lists

Before the study list is filed with the Registrar, it must be endorsed by the major subject adviser and approved by the Dean of the College of Agriculture. The student must also obtain from his adviser a second study-list form which will be filed in the office of the Dean at the time the study list is approved. Students will not be permitted to enroll for fewer than 12, nor more than 18 units a semester without special approval of the Dean of the College of Agriculture.

Honors

Honors are granted to the graduating student who has completed his major with distinction and whose general record is satisfactory to the Study-Lists and Courses of Instruction Committee. The student who has done work of unusual excellence may be recommended for highest honors.

The list of students to whom honors or highest honors have been awarded is published in the Commencement Program.

Requirements for the Degree of Bachelor of Science

The degree of Bachelor of Science is awarded to those candidates who:
1. Satisfy the general University requirements as follows:
   (a) Subject A.—The Subject A examination in English composition is required of every undergraduate student at the time of his first registration in the University (see page 34).
   (b) Air, Military, or Naval Science (for male students) (see pages 36, 37 and 38).
   (c) American History and American Institutions (see page 35).
   (d) Residence in the University during the senior or final year in the college in which the degree is to be taken (see page 39), and completion of at least the last 24 units of credit.
   (e) Attain at least twice as many grade points as units of credit in courses undertaken at this University.
   (f) File notice for candidacy with the Registrar on scheduled dates (see page 39).
2. Satisfy the general requirements of the College of Agriculture as follows:
   (a) At least 154 units of University work. Not more than 4 units may be in lower division physical education courses.
   (b) Thirty-six units of the above total in upper division courses (courses numbered 100–199).
   (c) Nine units of mathematics. Matriculation work may be offered toward this requirement, counting each year of high school work as 3 units. Trigonometry taken in high school is recommended as partial satisfaction of this requirement. Normally this can be satisfied by the end of the sophomore year.
3. Satisfy the requirements of one of the curricula in the College of Agriculture.

For curricula offered by the College at Davis and Los Angeles, see the Bulletin of the College of Agriculture. The following curricula are the only ones with majors which can be completed on the Berkeley campus for the Bachelor of Science degree:

**Curriculum in Agricultural Economics**

(Major: Agricultural Economics)

1. General University requirements (see 1 above).
2. College of Agriculture requirements (see 2 above).
3. Curriculum requirements:
(a) General Units
Accounting ................................................................. 3
Analytic geometry and calculus and/or linear algebra. 6
Chemistry ................................................................. 5
English and/or speech ..................................................... 6
Physics ........................................................................ 3
Principles of economics .................................................. 6
Statistical methods ....................................................... 3

(b) Agriculture
Agriculture, other than agricultural economics .............. 8
Upper division agricultural economics ...................... 18

(c) Electives (restricted)
Anthropology, geography, history, philosophy, political science, psychology, or sociology and social institutions ...................... 12
Bacteriology, botany, geology, physiology, zoology; or additional chemistry, mathematics, and physics (beyond that specified in 3 (a) ) ......................... 10

4. Additional courses chosen by the student, with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.) ...................... 44

5. Certain courses are required for the major and where applicable may be used in partial satisfaction of 3 (b) above. See the BULLETIN OF THE COLLEGE OF AGRICULTURE for details.

To graduate with a major in agricultural economics, a student must have at least a grade C average in all upper division courses taken in agricultural economics. Students who do not maintain such an average may be required to withdraw from the major at any time.

CURRICULUM IN AGRICULTURAL BUSINESS MANAGEMENT
(Major: Agricultural Business Management)

1. General University requirements (see page 78).
2. College of Agriculture requirements (see page 78).
3. Curriculum requirements:
   (a) General Units
   Accounting ................................................................. 3
   Anthropology, geography, history, philosophy, political science, psychology, or sociology and social institutions 12
   Bacteriology, botany, geology, physics, physiology, or zoology or additional chemistry or mathematics.... 7
   Business law ............................................................. 3
   Chemistry ................................................................. 5
   English and/or speech ..................................................... 6
   Mathematics ............................................................. 3
   Principles of economics ................................................. 6
   Statistics ....................................................................... 3

   (b) Agriculture
   Agriculture (other than agricultural economics and botany) .................................................. 12

   (c) Electives (restricted)
   Additional upper division work in agricultural economics, economics or business administration ...... 24
4. Additional courses chosen by the student, with approval of major adviser. (These may be used to satisfy the requirements under 1 and 2 above.) .............................. 40

5. Certain courses or their equivalents are required for the curriculum and where applicable may be used toward satisfaction of 3 above. See the BULLETIN OF THE COLLEGE OF AGRICULTURE for details.

CURRICULUM IN AGRICULTURAL ENGINEERING
The curriculum in agricultural engineering is offered in the College of Engineering (see page 93).

CURRICULUM IN ANIMAL SCIENCE
(Majors: Animal Husbandry, Animal Physiology, Genetics, Poultry Husbandry)
1. General University requirements (see page 78).
2. College of Agriculture requirements (see page 78).
3. Curriculum requirements:
   (a) General
       Bacteriology ................................................. 4
       Botany ..................................................... 4
       Chemistry and/or biochemistry ..................... 16
       Economics ............................................... 3
       English and/or speech ................................. 6
       Physics .................................................. 4
       Zoology .................................................. 10
   (b) Agriculture
       Animal nutrition ....................................... 3
       Animal pathology, parasitology, or additional zoology 3
       Animal physiology .................................... 5
       Genetics ................................................ 4
       Upper division courses in either the major or a closely related field, with approval of major adviser .............. 12

4. Additional courses chosen by the student, with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.) ....................... 50

5. Certain courses are required for the four majors and where applicable may be used in partial satisfaction of 3 above. See the BULLETIN OF THE COLLEGE OF AGRICULTURE for details.
Only the genetics major can be completed on the Berkeley campus.

CURRICULUM IN ENTOMOLOGY AND PARASITOLOGY
(Major: Entomology and Parasitology)
1. General University requirements (see page 78).
2. College of Agriculture requirements (see page 78).
3. Curriculum requirements:
   (a) General
       Bacteriology ................................................. 4
       Botany and zoology ...................................... 20
       Chemistry ................................................ 13
       English and/or speech .................................. 6
       Geography, geology, or paleontology ............... 3
       Physics .................................................. 3
## College of Agriculture

### (b) Agriculture

<table>
<thead>
<tr>
<th>Units</th>
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<tbody>
<tr>
<td><strong>Agriculture (other than entomology and parasitology) and/or forestry</strong></td>
</tr>
<tr>
<td>Genetics</td>
</tr>
<tr>
<td>Plant or animal pathology</td>
</tr>
<tr>
<td>Plant or animal physiology, nutrition, or biochemistry</td>
</tr>
<tr>
<td>Entomology and parasitology courses for the major</td>
</tr>
<tr>
<td>Summer practice course</td>
</tr>
</tbody>
</table>

4. Additional courses chosen by the student, with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.) ........................................ 36 or 37

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5. Certain courses are required for the major and where applicable may be used in partial satisfaction of 3 above. See the BULLETIN OF THE COLLEGE OF AGRICULTURE for details.

### CURRICULUM IN FOOD SCIENCE

(Majors: Dairy Industry, Enology, Food Technology)

1. General University requirements (see page 78).
2. College of Agriculture requirements (see page 78).
3. Curriculum requirements:
   - (a) **General**
     - Bacteriology ........................................ 4
     - Biochemistry and/or physiology ...................... 6
     - Botany or zoology ..................................... 5 or 3
     - Chemistry ............................................. 16
     - Economics ............................................ 3
     - English and/or speech ................................ 6
     - Mathematics (including differential calculus) ........ 6
     - Physics (including laboratory) ...................... 8
   - (b) **Agriculture**
     - Courses in either the major or closely related fields, with approval of major adviser .......................... 20
   - (c) **Electives (restricted)**
     - Anthropology, art, economics, English, foreign language, geography, geology, history*, music, political science*, philosophy, psychology, or sociology .............. 6

4. Additional courses chosen by the student, with approval of the major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.) ......................... 44 or 46

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5. Certain courses are required for the three majors and where applicable may be used in partial satisfaction of 3 above. See the BULLETIN OF THE COLLEGE OF AGRICULTURE for details.

Only the food technology major can be completed on the Berkeley campus.

### CURRICULUM IN PREFORESTRY

Until the student is admitted to the School of Forestry, he is enrolled in the College of Agriculture as a preforestry major. For details, see "School of Forestry," page 126, or the ANNOUNCEMENT OF THE SCHOOL OF FORESTRY, which is available without charge from the School of Forestry, University of California, Berkeley 4.

* In addition to University requirements.
**Requirements of Colleges, Schools, and Curricula**

**Curricula in Home Economics**

The majors offered in the curricula listed below are subject to revisions currently under consideration. It is anticipated that beginning with the fall semester, 1962, only majors in nutrition, dietetics, and foods will be offered on the Berkeley campus. September, 1958, was the last date for admission of freshmen to Curricula A and C; therefore, June, 1962, will be the last date for graduation under these curricula.

**Curriculum A**

(Major: Preteaching, Extension, and General Home Economics)

1. General University requirements (see page 78).
2. College of Agriculture requirements (see page 78).
3. Curriculum requirements:

   
<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) <strong>General</strong></td>
</tr>
<tr>
<td>Bacteriology or epidemiology</td>
</tr>
<tr>
<td>Chemistry (general, organic)</td>
</tr>
<tr>
<td>Economics</td>
</tr>
<tr>
<td>English and/or speech</td>
</tr>
<tr>
<td>Physiology</td>
</tr>
<tr>
<td>Psychology</td>
</tr>
<tr>
<td>Statistics</td>
</tr>
<tr>
<td>(b) <strong>Home Economics or related fields</strong></td>
</tr>
<tr>
<td>Decorative art</td>
</tr>
<tr>
<td>Lower division home economics</td>
</tr>
<tr>
<td>Upper division home economics or allied subjects, selected with the approval of the major adviser</td>
</tr>
<tr>
<td>(c) <strong>Electives (restricted)</strong></td>
</tr>
<tr>
<td>Anthropology (cultural), political science and/or sociology</td>
</tr>
</tbody>
</table>

4. Additional courses chosen by the student, with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.) | 40 |

5. Certain courses are required for the major and where applicable may be used in partial satisfaction of 3 above. See the Bulletin of the College of Agriculture for details.

**Curriculum B**

(Majors: Nutrition, Dietetics, Foods, Textile Science)

1. General University requirements (see page 78).
2. College of Agriculture requirements (see page 78).
3. Curriculum requirements:

   
<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) <strong>General</strong></td>
</tr>
<tr>
<td>Bacteriology</td>
</tr>
<tr>
<td>Chemistry</td>
</tr>
<tr>
<td>Economics</td>
</tr>
<tr>
<td>English and/or speech</td>
</tr>
<tr>
<td>Physics</td>
</tr>
<tr>
<td>Psychology</td>
</tr>
<tr>
<td>(b) <strong>Home Economics or related fields</strong></td>
</tr>
<tr>
<td>Lower division home economics</td>
</tr>
<tr>
<td>Upper division home economics or allied subjects, selected with the approval of the major adviser</td>
</tr>
</tbody>
</table>
(c) Electives (restricted)  
Art, foreign language, history, music, and/or philosophy 9
Botany, physiology, public health, and/or zoology 4

4. Additional courses chosen by the student, with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.) 46

124

5. Certain courses are required for the majors and where applicable may be used in partial satisfaction of 3 above. See the BULLETIN OF THE COLLEGE OF AGRICULTURE for details.

Curriculum C

(Majors: Child Development, Clothing Design, Family Economics, Family Sociology)

1. General University requirements (see page 78).
2. College of Agriculture requirements (see page 78).
3. Curriculum requirements:
   (a) General  
   English and/or speech 6
   Statistics 3
   (b) Home economics or related fields  
   Upper division home economics or allied subjects, selected with approval of major adviser 27
   (c) Electives (restricted)  
   Anthropology (cultural), economics, political science, psychology, and/or sociology 12
   Anthropology (physical), chemistry, physiology, and/or zoology (laboratory required in at least one course) 12
   Art, foreign language, history, music, and/or philosophy 9

4. Additional courses chosen by the student, with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.) 55

124

5. Certain courses are required for the majors and where applicable may be used in partial satisfaction of 3 above. See the BULLETIN OF THE COLLEGE OF AGRICULTURE for details.

NUTRITION (See Curricula in Home Economics, page 82)

CURRICULUM IN PLANT SCIENCE

(Majors: Agronomy, Botany, Floriculture and Ornamental Horticulture, General Horticulture, Genetics, Landscape Horticulture, Plant Pathology, Pomology, Subtropical Horticulture, Vegetable Crops, Viticulture)

1. General University requirements (see page 78).
2. College of Agriculture requirements (see page 78).
3. Curriculum requirements:
   (a) General  
   Botany and plant physiology 9
   Chemistry 13
   Economics 3
   English and/or speech 6
   Physics 3
(b) **Agriculture**

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entomology and parasitology</td>
</tr>
<tr>
<td>Genetics</td>
</tr>
<tr>
<td>Irrigation, plant nutrition, or soils</td>
</tr>
<tr>
<td>Plant pathology</td>
</tr>
<tr>
<td>Upper division courses in either the major or a closely related field, with approval of major adviser</td>
</tr>
</tbody>
</table>

(c) **Electives** (restricted) selected from the two areas listed below:

### Natural sciences:
- At least 9 units to be selected from animal physiology, bacteriology, biochemistry, botany or plant physiology, chemistry, entomology, geology, irrigation, mathematics*, physics, plant pathology, plant nutrition, soils, or zoology.

### Social sciences and foreign languages:
- At least 3 units to be selected from economics, English, foreign language, history or political science†, philosophy, psychology, sociology, or speech.

4. Additional courses chosen by the student, with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.) 47

5. Certain courses are required for the majors and where applicable may be used in partial satisfaction of 3 above. See the **Bulletin** of the **College of Agriculture** for details.

Only the genetics and plant pathology majors can be completed on the Berkeley campus.

**CURRICULUM IN RANGE MANAGEMENT**

(Major: Range Management)

1. General University requirements (see page 78).
2. College of Agriculture requirements (see page 78).
3. Curriculum requirements:
   (a) **General**
<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botany</td>
</tr>
<tr>
<td>Chemistry</td>
</tr>
<tr>
<td>Economics</td>
</tr>
<tr>
<td>Engineering</td>
</tr>
<tr>
<td>English and/or speech</td>
</tr>
<tr>
<td>Physics</td>
</tr>
<tr>
<td>Zoology</td>
</tr>
</tbody>
</table>
   (b) **Agriculture**
<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agronomy and range management</td>
</tr>
<tr>
<td>Animal husbandry</td>
</tr>
<tr>
<td>Soil science and/or geology</td>
</tr>
<tr>
<td>Summer field practice course</td>
</tr>
</tbody>
</table>
   (c) **Electives** (restricted)
<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genetics, statistical methods; or additional units in botany, chemistry, geology, and zoology</td>
</tr>
</tbody>
</table>
   | Anthropology, art, foreign language, geography, history‡, music, philosophy, political science‡, psychol-

---

* Not including Mathematics C or D.
† In addition to University requirements.
‡ In addition to courses in these fields used at Davis in fulfillment of University requirements.
College of Agriculture

ogy, sociology; or additional units in economics, English, and speech ........................................... 9

4. Additional courses chosen by the student, with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.) ............................................. 31

5. Certain courses are required for the major and where applicable may be used in partial satisfaction of 3 above. See the BULLETIN OF THE COLLEGE OF AGRICULTURE for details.

Either the junior or senior year must be completed at Berkeley and the other at Davis.

CURRICULUM IN SOIL SCIENCE


1. General University requirements (see page 78).
2. College of Agriculture requirements (see page 78).
3. Curriculum requirements:
   (a) General
      Bacteriology ......................................................................... 4
      Botany (including plant physiology) ................................... 9
      Chemistry ............................................................................. 16
      English and/or speech ................................................. 6
      Geology ................................................................................. 3
      Physics ................................................................................... 8
   (b) Agriculture
      Crop science (i.e., agronomy, horticulture, pomology, vegetable crops, viticulture) or plant ecology .......... 3
      Soil science courses required for major.....................20 to 27
   (c) Electives (restricted)
      At least 18 units selected from major requirements listed under 5 and with approval of major adviser....24 to 18
      Anthropology, art, classics, decorative art, dramatic art, economics, English, foreign languages, geography, history*, music, philosophy, political science*, psychology, sociology or speech ....................... 6

4. Additional courses chosen by the student, with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.) ....................... 25 to 24

5. Certain courses are required for the majors and where applicable may be used in partial satisfaction of 3 above. See the BULLETIN OF THE COLLEGE OF AGRICULTURE for details.

CURRICULUM IN PREVETERINARY MEDICINE

Until the student is admitted to the School of Veterinary Medicine, he may be enrolled in the College of Agriculture as a preveterinary medicine major. For details, see the BULLETIN OF THE COLLEGE OF AGRICULTURE or the ANNOUNCEMENT OF THE SCHOOL OF VETERINARY MEDICINE. Specific questions should be directed to the School, which is located at the University of California, Davis.

* In addition to University requirements.
COLLEGE OF CHEMISTRY

The College of Chemistry offers two majors, one in basic chemistry and one in chemical engineering. The preparation and most of the program for the first two college years is the same for both majors. A major in chemistry is also offered in the College of Letters and Science. (See ANNOUNCEMENT OF COURSES, DEPARTMENTS AT BERKELEY).

Preparation.—Students who propose to enter the College of Chemistry must include in their high school programs physics (1 unit), chemistry (1 unit), mathematics, including trigonometry and two years of algebra (3½ units), and foreign language (2 units). German is to be preferred as the foreign language, with French second choice. It is strongly recommended that analytical geometry and calculus (if available) and mechanical drawing (1 unit) be included. Additional foreign language is also desirable. Students with serious deficiencies in this preparation will ordinarily not be allowed to enroll in the College of Chemistry.

Approval of Programs.—Students in the College of Chemistry are required to submit their proposed schedules to their advisers. A list of the advisers in the College of Chemistry is posted on the bulletin board in Gilman Hall. It is desirable that a complete schedule of courses, chosen with a definite purpose and free from conflicts, should be arranged at the earliest possible date.

Graduation.—The degree of Bachelor of Science is granted upon the completion of a curriculum approved by the Study-Lists Committee of the College of Chemistry. The equivalent of four years of residence and 124 units are minimum requirements. However, many students must complete additional units and in some cases an additional semester in order to fulfill the specific requirements stated below. The student must have obtained twice as many grade points as there are units of credit in all courses which he has taken in the University. The first two years may be completed in a junior college or in any college or university of approved standing. Any student who hopes to complete the requirements for graduation in the minimum time of eight semesters should plan to transfer to this University not later than the end of his fourth semester.

Minimum Scholarship Requirements. (See page 41.)

Study-List Limits.—Ordinarily, students will not be permitted to enroll for fewer than 12 or more than 18 units a semester.

Language Requirements.—Reasonable proficiency in the use of English is a requirement for graduation in the College of Chemistry. This requirement may be satisfied by a grade of C or better in English 1A or Speech 1A, or by special examination. The major in basic chemistry requires a reading knowledge of scientific German for the work of the senior year. A reading knowledge of French is recommended.

Honor Students in the Upper Division.—Students who in the first two years of their college work have attained an average of at least three grade points for each unit undertaken will receive honorable mention with junior standing. These students are entitled to register as candidates for honors. After the first semester of the junior year, the Committee on Honors of the College of Chemistry will determine which students shall remain in the honors group and which students shall be promoted thereto. Honor students will be given a larger share of personal instruction and a greater opportunity to choose courses and work within courses, in the manner best suited to individual needs and aims. Students not in the honors group will not, except in unusual circumstances and with the express permission of the instructor, be permitted to enroll for honors courses (marked H) or for undergraduate research. Students will not ordinarily be recommended for honors at graduation unless their work includes advanced courses approved by the committee. Normally these courses are Chemistry 114H and 180H for students in basic chemistry and either
College of Chemistry

Chemical Engineering 149H or Chemical Engineering 180H for students in chemical engineering. Subject to the approval of the study-list adviser and of the instructor in the course concerned, students in honors status have the privilege of taking each semester one course not offered by them in satisfaction of subject requirements for the curricula of the College of Chemistry in which they shall be marked “passed” or “not passed.” In calculating the grade-point standing, units gained in this way are not counted. Students in the honors group in basic chemistry should confer with Mr. Jura, 117 Lewis Hall, with respect to their plans for the last two years of college work. Those in the curriculum in chemical engineering should confer with Mr. Bromley, 220 Gilman Hall. The list of students upon whom honors and highest honors are conferred appears in the annual COMMENCEMENT PROGRAM.

Specific Requirements.—Before graduation, the following specific requirements must be satisfied:

(a) Mathematics 3A, 3B, 4A, 4B or 14A, 14B.
(b) Physics 4A, 4B, 4C.
(c) Chemistry 1A, 1B, 5, 12, 112*, 110A, 110B, 111, and at least 6 additional units of advanced quantitative analysis or advanced inorganic chemistry.
(d) Satisfactory proficiency in the use of English.
(e) The general University requirements in military science, American History and American Institutions.
(f) A program of 18 units of restricted electives in the humanities and social sciences (in addition to the foreign language requirement for students majoring in basic chemistry). Normally 12 of these units should be in English, speech and the social sciences. The remaining units may be chosen from the fields of philosophy, the fine arts and literature.

Lower Division.—The following program is recommended for students with normal preparation:

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall Units</th>
<th>Spring Units</th>
<th>Sophomore Year</th>
<th>Fall Units</th>
<th>Spring Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 1A–1B</td>
<td>5</td>
<td>5</td>
<td>Chemistry 5, 12</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Mathematics 3A–3B</td>
<td>3</td>
<td>3</td>
<td>Mathematics 4A–4B</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physics 4A</td>
<td>4</td>
<td>4</td>
<td>Physics 4B, 4C</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Restricted elective†</td>
<td>3</td>
<td>3</td>
<td>Restricted elective</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Engineering 20§ or elective</td>
<td>2–3</td>
<td></td>
<td>Chemistry 110A or Engineering 25§</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Military Science</td>
<td>2</td>
<td>2</td>
<td>Military Science</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>15–16</td>
<td>17</td>
<td></td>
<td>18</td>
<td>17</td>
</tr>
</tbody>
</table>

Upper Division.—The student must have completed that portion of the specific requirements (a) to (f) listed above, which are included in the normal curriculum for the first two years, or their equivalent, in order to obtain upper division standing.

Unless a student has a grade-point average of at least 2.5 in these specific lower division courses, he is seldom successful in the upper division. Admission to the upper division with a lower average will be allowed only with the special approval of the Dean, who may require a comprehensive examination.

In addition to completing the specific requirements (a) to (f), each student

* Students in the chemical engineering curriculum may elect 112C instead of 112 if they have received at least a C grade in course 12 in this University.
† Suitable courses in the social sciences are included in such subjects as anthropology, economics, geography, history, political science, psychology, sociology and social institutions.
‡ Normally English 1A or Speech 1A is taken the first semester.
§ The engineering courses are required only for chemical engineering students. Those majoring in basic chemistry may substitute electives. Students planning to take upper division biochemistry courses should include one of the following courses in the sophomore year: Bacteriology 1, Physiology 1, Zoology 1A.
shall complete either the major in basic chemistry or the curriculum in chemical engineering.

**Major in Basic Chemistry**

This program offers a wide latitude of individual choice which will enable the student to prepare for graduate study or directly for industrial employment in laboratory syntheses, quality control, research on physical and chemical properties of materials, product development, chemical marketing, or for high school teaching of chemistry. Students receiving the degree of Bachelor of Science with Honors are in a position to continue graduate study in preparation for the highest type of fundamental research. A reading knowledge of German is prerequisite for the senior level work in the basic chemistry major. Satisfactory completion of German 1 and 2 will be deemed to meet this requirement. Students should include German in the program for the junior year unless the requirement has already been satisfied.

A comprehensive program of advanced work in chemistry and related subjects should be planned for the junior and senior years, and each program must be approved by a study-list officer of the College of Chemistry. Such programs will normally include a group of upper division courses totaling 17 units, of which half may be taken in closely related departments. The 17 units are in addition to the specific courses required in (a) to (c) above. Thus a student preparing for research in the field of physical chemistry should include upper division courses in physics and mathematics. A course leading to research in organic chemistry should include work in biochemistry, bacteriology, or physiology. A course preparing for quality control may include work in electronics, optics, introductory chemical engineering, and practice in analytical techniques developed for various technological fields.

It is permissible to complete a biochemistry major (as outlined in the Announcement of Courses) in the College of Chemistry within the major in basic chemistry. For such students, Biochemistry 100A–100B will be considered as a course in chemistry.

**Curriculum in Chemical Engineering**

This curriculum equips the student for professional work in the development, design, and operation of chemical processes and of process equipment. It includes the subjects common to all engineering curricula, together with thorough fundamental training in chemistry, and specialized advanced courses in chemical engineering. Restricted electives are provided during the senior year to orient each student toward particular types of work and particular industries. Additional training is offered at graduate level, leading to the M.S., Ph.D., and Doctor of Engineering degrees in chemical engineering. Although frequently it will not be possible to conform to the semester schedules shown below, completion of the listed subjects is required for graduation in the chemical engineering curriculum.

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Fall Units</th>
<th>Spring Units</th>
<th>Senior Year</th>
<th>Fall Units</th>
<th>Spring Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 112</td>
<td>5</td>
<td></td>
<td>Chem. Eng. 144</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Chemistry 110B, 111</td>
<td>6</td>
<td></td>
<td>Chem. Eng. 145A, 145B</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Chem. Eng. 143, 146A</td>
<td>3</td>
<td>4</td>
<td>Chem. Eng. 145D or 148</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Civil Eng. 130</td>
<td>3</td>
<td></td>
<td>Chem. Eng. 146B, 149</td>
<td>4</td>
<td>2–3</td>
</tr>
<tr>
<td>Electrical Eng. 101B or Chem. Eng. 152*</td>
<td>3</td>
<td></td>
<td>Chem. Eng. 147</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Engineering 35 (or Chemistry 110A)</td>
<td>3</td>
<td></td>
<td>Chem. Eng. 152* or Elect. Eng. 101</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Materials Science 121</td>
<td>2</td>
<td>3</td>
<td>Mathematics, technical, business electives</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Restricted elective</td>
<td>3</td>
<td></td>
<td>Mech. Eng. 107</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>16</td>
<td>Restricted electives</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

* Chemistry 104, 105 or 106 may be substituted for Chemical Engineering 152.
Technical electives in this curriculum will normally be chosen from the following list:

Bacteriology 1; Biochemistry 102; Ceramic Engineering 101, 102, 190; Chemical Engineering 145C, 148, 244; Chemistry 114H, 118, 120, 122, 123; Civil Engineering 144, 147; Electrical Engineering 102, 106; Engineering 230; Food Technology 112, 113; Materials Science 103, 104, 122, 132, 133; Mechanical Engineering 106A, 110, 152, 161, 163, 164, 181; Petroleum Engineering 169; Physics 121; Process Engineering 100; Nuclear Engineering 165, 166; Public Health 170.

Suitable business and mathematics electives are the following:

Business Administration 100, 140; Mathematics 110A, 110B, 119, 122; Statistics 130E.

Since the four-year chemical engineering curriculum offers little opportunity for the student to explore additional areas of knowledge of his own choosing, a five-year curriculum in chemical engineering is recommended to students who can afford the extra time. The extra year makes it possible for the student to include electives in the humanities or social sciences in addition to some more advanced work in chemistry and chemical engineering.

In the fifth year there are two programs outlined. The honor student who can meet Graduate Division requirements may take the B.S. degree in basic chemistry at the end of the fourth year and then the M.S. degree in chemical engineering at the end of the fifth year. The non-honor student will not ordinarily be allowed to undertake the graduate courses or research, but may receive his degree in both chemical engineering and basic chemistry by postponing his B.S. degree until after all undergraduate requirements in chemical engineering have been completed. Recommended course schedules for the five-year curriculum are given in the Announcement of the College of Chemistry.

COLLEGE OF ENGINEERING

Admission.—As a general rule the College of Engineering will admit students only as beginning freshmen or in advanced standing at the junior or senior level. All applicants must satisfy the general requirements for admission to the University (see pages 19-31). Note also the special requirements for admission to engineering, page 26. Students who attend a California junior college or other educational institution for one semester for the purpose of making up high school subject deficiencies or prerequisites for the beginning engineering courses at the University will be considered for admission in freshman standing. A student who begins a regular engineering program at a junior college or other educational institution, however, will be expected to complete all lower division subject requirements before he will be considered for admission to the College of Engineering.

For date of application for admission, see Calendar on pages 2-4.

Preparation for Admission in Freshman Standing.—It is important for high school students who plan to study engineering at the University to include the following subjects in their high school programs:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra</td>
<td>2</td>
</tr>
<tr>
<td>Plane geometry</td>
<td>1</td>
</tr>
<tr>
<td>Trigonometry</td>
<td>1/2</td>
</tr>
<tr>
<td>Chemistry or physics</td>
<td></td>
</tr>
<tr>
<td>Mechanical drawing</td>
<td></td>
</tr>
<tr>
<td>Mechanical drawing</td>
<td></td>
</tr>
</tbody>
</table>

These subjects are prerequisite to the regular courses in the freshman engineering program and the student who is admitted without one or more of them will be obliged to defer the courses to which they are prerequisites, and thereby will become irregular and probably will be delayed in advancement to upper division status and in graduation.

Laboratory courses in the various curricula of the College of Engineering require manual skills in the operation and testing of machines and equip-
ment. These courses are planned on the assumption that the student has had some previous work which will develop the skills. Unsatisfactory laboratory performance frequently results when such skills are absent, and this can usually be traced to the fact that the student has had no prior manual training. It is recommended, therefore, that students wishing to enter the College of Engineering elect shop courses in high school, preferably machine shop, for at least one semester.

Engineering, like other professional work, requires oral and written communication. Strong courses in English composition and in supporting skills such as typing greatly facilitate efficient college study, and should be elected, if possible, by students planning to enter the College of Engineering.

Admission to the lower division of the College of Engineering does not necessarily imply admission to the upper division at some future date.

**Upper Division Status.**—Students who are admitted to the College of Engineering in lower division status will be advanced to upper division status after they have completed the lower division program with satisfactory grades and have achieved a satisfactory score on the Upper Division Engineering Examination (taken in the last semester of the sophomore year). Students are not permitted to enroll in upper division engineering courses until they have been advanced to upper division status. Students admitted in advanced standing—including those transferring from the California junior colleges or other educational institutions—will be advanced to upper division status at the time of admission provided they have completed the following minimum lower division subject and unit requirements and have achieved a satisfactory score in the Upper Division Engineering Examination.

<table>
<thead>
<tr>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>12</td>
</tr>
<tr>
<td>Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>Physics</td>
<td>10</td>
</tr>
<tr>
<td>*Nontech­nical subjects</td>
<td>6</td>
</tr>
<tr>
<td>†Engineering</td>
<td>10</td>
</tr>
<tr>
<td>Unspecified subjects</td>
<td>10</td>
</tr>
</tbody>
</table>

Total ................ 56

**Engineering Examinations.**—There are two engineering examinations: the Lower Division Engineering Examination is required of all applicants for admission prior to the junior year. This examination is an aptitude test and includes sections on technical vocabulary, mathematical reasoning, and scientific relationships. The Upper Division Engineering Examination is required of applicants for admission at and above the junior level, and must be passed

* Exclusive of military science, physical education, Subject A, or any course equivalent to matriculation subjects.
† Must include some units in each of the four subject areas indicated.
College of Engineering

satisfactorily by all continuing students prior to beginning the work of the upper division and by all upper division applicants prior to admission. This examination is an achievement test and includes sections on English, mathematics, chemistry, physics, and lower division engineering subjects. The same examinations are required for admission to the College of Engineering at Berkeley, Davis, or Los Angeles. A list of the places and times for the examinations may be obtained from the Office of Admissions at any of the three campuses. Application blanks for these examinations should be obtained by the prospective student early in the semester previous to that in which he plans to enroll in the University.

Both examinations will be given in November, 1960, and April, 1961. For date of application for the examinations, see Calendar on pages 2-4. No fee is charged for the Lower Division Engineering Examination if the applicant is also required to take the scholastic aptitude test. The applicant of whom the scholastic aptitude test is not required is charged a $5 fee if the test is taken with a group of three or four persons or at the regularly scheduled times and locations; otherwise, the fee is $10. A $5 fee is charged for the Upper Division Engineering Examination if taken with a group of three or more persons at the regularly scheduled times and locations; otherwise, the fee is $10.

Transfer from Other Colleges.—Students who wish to transfer from other colleges within the University to the College of Engineering must make application to the Dean of the College of Engineering for such transfer (see Calendar, pages 2-4, for application dates). Students on the Berkeley campus may secure petitions to change college from the Engineering Undergraduate Office, 308 Engineering Building, or the Office of the Registrar, 120 Sproul Hall. Students from campuses other than Berkeley may secure petitions from the Office of Admissions, 127 Sproul Hall, Berkeley 4. Students who wish to transfer to the College of Engineering are required to take the appropriate examination noted on page 90.

Scholarship Requirements.—A student in the College of Engineering must meet the following scholarship requirements:

1. Satisfy the requirement in English. Each candidate for a degree must demonstrate reasonable proficiency in the use of English. Any student who does not receive a satisfactory score on the English portion of the Upper Division Engineering Examination, or whose use of English in subsequent course work is unsatisfactory, will be reported to the Dean of the College of Engineering for assignment of supplementary course work to be added to the normal program of study.

2. Maintain a grade C average each semester in all courses for which he is enrolled.

3. Maintain a grade C average in all courses undertaken in the University.

4. Attain for the B.S. degree a grade C average in all courses of upper division level taken in satisfaction of technical subject requirements and technical electives in his program of study.

Curricula in Engineering.—A student in the College of Engineering must elect, at the time he applies for admission to the upper division, one of the following curricula:

At Berkeley—agricultural engineering, civil engineering, electrical engineering, engineering science (engineering physics), industrial engineering, materials science (ceramic engineering, metallurgy), mechanical engineering, mineral engineering (geological engineering, mining engineering, petroleum engineering), and process engineering.

At Davis—engineering in the areas of agricultural power and machinery, structures, and processing; irrigation, drainage, and water resources; and food processing.

Each is a four-year curriculum leading to the Bachelor of Science degree.
upon completion of the specified program of study. Each curriculum consists of a group of subjects, the study of which gives preparation for the beginning of professional engineering work in the designated field.

Requirements for the Degree of Bachelor of Science.—The degree of Bachelor of Science in the College of Engineering is awarded to those candidates who:

1. Satisfy the general University requirements:
   a. Military science. See page 36. Eight units of credit toward the degree will be allowed those students who are required to take military science.
   b. Subject A. See page 34.
   c. American History and American Institutions. See page 35.
   d. Residence during the senior year. See page 39.

2. Satisfactorily complete the subjects and units prescribed in one of the engineering curricula.

3. Satisfy the requirement in English. See page 91.

4. Attain a grade C average in all courses of upper division level offered in satisfaction of technical subject requirements and technical electives taken in the program of study.

Honors with the Bachelor's Degree.—Upon the recommendation of the Committee on Graduation Matters of the College of Engineering, a student may receive honors with the bachelor's degree for outstanding scholarship in all work undertaken after admission to the upper division. A student who, in the judgment of the Committee on Graduation Matters displays marked superiority may be recommended for the special distinction of highest honors.

Passed or Not Passed Grades.—Subject to the approval of the Committee on Undergraduate Study and of the instructor concerned, students may choose elective courses from any department of the University. A student who has an average grade of B or better for all work undertaken in the University shall have the privilege of taking each semester one elective course in which he shall be marked "passed" or "not passed." In calculating grade-point standings, units gained in this way shall not be counted.

Programs of Study.—For the guidance of students, courses satisfying the subject requirements of each curriculum have been selected and are listed on the following pages. These have been arranged in sequences which insure that course prerequisites are satisfied. Other sequences are possible in some cases but should be carefully checked with the faculty adviser in order to avoid delay caused by the lack of prerequisites.

A student who gives full time to University responsibilities is expected to enroll for the number of units required in his program of study (see pages 93–104). A student who engages in part-time employment should plan to spend more than four years by enrolling each semester for fewer than the required number of units. In such cases, course sequences must be carefully planned. Programs which include more than 18 units or less than 12 units must be approved by the Dean of the College of Engineering.

Upon admission to the College, engineering students are assigned to a faculty adviser, and are under the guidance of the Dean of the College of Engineering and the Committee on Undergraduate Study. Study programs are arranged in conference with the adviser and must be approved by him. The student is held responsible for planning his program and for the satisfactory completion of graduation requirements. Questions regarding irregularities should be discussed with the adviser and settled at the earliest possible date.
Programs in Nontechnical Studies.—In each of the several curricula in engineering, provision is made for 18 units of study in the humanities and social sciences (exclusive of military science, physical education, Subject A, and any matriculation subjects), 6 units of which (Social Science 1A–1B) are prescribed. These studies are considered to be an integral part of each engineering curriculum and are intended to help the student gain an understanding and appreciation of the importance of human values in our society. These nontechnical studies are to be undertaken concurrently with the technical studies in order to achieve a balanced program. The nontechnical units must be chosen from at least two of the following groups and at least 6 units must be completed while the student is enrolled in the lower division, and at least 9 units of upper division courses must be completed after the student has been advanced to upper division status in the College of Engineering:

1. English, speech.
2. Foreign languages.
3. Business administration, economics, political science.
4. Anthropology, history, sociology and social institutions, psychology.
5. Life and natural sciences.
6. Fine arts and philosophy.

LOWER DIVISION PROGRAM

The program of study in the lower division is essentially the same in all curricula. Its purpose is to give to the beginning student the fundamentals in science, mathematics, and engineering which are essential as preparation for the professional studies of the upper division.

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall Units</th>
<th>Spring Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics 3A–3B</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry 1A–1B</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Physics 4A</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Engineering 25</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Nontechnical studies</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Military Science</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Fall Units</th>
<th>Spring Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics 14A–14B or 4A*–4B*</td>
<td>5 or 3</td>
<td>5 or 3</td>
</tr>
<tr>
<td>Physics 4B–4C</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Engineering 45</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Social Science 1A–1B</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Technical elective</td>
<td>0 or 3</td>
<td>0 or 3</td>
</tr>
<tr>
<td>Military Science</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

17 17

UPPER DIVISION PROGRAMS

Agricultural Engineering

134 units

(For courses of the lower division, see above)

In 1960–1961 the curriculum in agricultural engineering at Berkeley will be replaced in 1961 by the new curriculum in engineering at Davis. Students currently registered in agricultural engineering at Berkeley may graduate under the curriculum in engineering at Davis.

<table>
<thead>
<tr>
<th>Junior Year (Berkeley)</th>
<th>Fall Units</th>
<th>Spring Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Eng. 130</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Civil Eng. 111</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Electrical Eng. 100A–100B</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Engineering 102</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Engineering 103</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Nontechnical studies</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Technical electives</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year (Davis)</th>
<th>Fall Units</th>
<th>Spring Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering 120</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Engineering 190</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Nontechnical studies</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Technical electives</td>
<td>14</td>
<td>9</td>
</tr>
</tbody>
</table>

17 16

*, †, || See asterisk (*), dagger (†), and parallels (||) footnotes on the next page.
The technical electives must be selected to provide a minimum of at least 24 units in an organized program of engineering study, with at least 9 units in engineering courses (including 3 units of engineering design) and 3 units of agricultural or biological sciences. For further details regarding the program and the recommended technical electives see the Announcement of the Colleges of Engineering or the General Catalogue, Davis.

**Fifth (Graduate) Year**

Students who intend to engage in design, development, research, or teaching and who qualify for admission to the Graduate Division are encouraged to undertake a fifth-year program leading to the Master of Science or Master of Engineering degree which is offered at Davis. Advancement rate and initial salary are usually more satisfactory for those with the master's degree.

The student should consult the Announcement of the Graduate Division, Northern Section, for admission and program requirements.

**Civil Engineering**

132 units

(For courses of the lower division, see page 93)

*Upper Division.—* The program of study in the upper division is set up to meet the general requirements of the College of Engineering and to provide a basic education in the field of civil engineering. Eleven units of technical electives are provided in the upper division program; an orderly sequence of technical elective courses should be planned by the student in consultation with his counselor. Within these 11 units a student may emphasize studies relating to one of the major branches of civil engineering; a student must take at least 6 of the 11 units in one of the groups listed under Elective Groups.

### Junior Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Eng. 110</td>
<td>2</td>
</tr>
<tr>
<td>Civil Eng. 130, 131</td>
<td>3</td>
</tr>
<tr>
<td>Civil Eng. 140</td>
<td>3</td>
</tr>
<tr>
<td>Elec. Eng. 101, Civil Eng. 138</td>
<td>3</td>
</tr>
<tr>
<td>Eng. 102, Civil Eng. 161</td>
<td>2</td>
</tr>
<tr>
<td>Eng. 103, Mech. Eng. 105A</td>
<td>3</td>
</tr>
</tbody>
</table>

†Nontechnical studies

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Eng. 121, Eng. 120</td>
<td>3</td>
</tr>
<tr>
<td>Civil Eng. 135</td>
<td>3</td>
</tr>
<tr>
<td>Civil Eng. 141</td>
<td>3</td>
</tr>
<tr>
<td>Civil Eng. 170</td>
<td>3</td>
</tr>
<tr>
<td>Civil Eng. 191</td>
<td>2</td>
</tr>
<tr>
<td>Technical electives</td>
<td>4</td>
</tr>
<tr>
<td>Nontechnical studies</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
</tr>
</tbody>
</table>

### Elective Groups:

Six units, of the total of 11 units of technical electives in the senior year, are to be chosen from one of the particular specialty areas noted below. However, students may elect to take the whole total of 11 units of technical electives in their specialty.

**Construction Engineering**

Civil Engineering 181 required, plus approved selections in cost accounting, economics and/or industrial relations.

**Hydraulic and Water Resources Engineering**

Civil Engineering 159, 160, 166, 167, 168; Mechanical Engineering 161; Aeronautical Sciences 102.

*Students in civil, geological, and mining engineering take Mathematics 4A—4B and surveying; all other students take Mathematics 14A—14B.*

†For selection of nontechnical studies, see page 93.

§To be selected from elective groups, see above.

‖Students interested in irrigation, drainage, and water resources may substitute other technical courses for Electrical Engineering 100B or Mechanical Engineering 105B.
Sanitary Engineering
At least 3 units from Group A courses required: Group A—Civil Engineering 142, 145, 146, 147; Public Health 111, 115, 117, 147A, 170. Group B—Civil Engineering 160, 166, 168, 171; Chemistry 109; Biochemistry 102; Public Health 160A; Political Science 162, 181; Soil Science 111, 114; City and Regional Planning 121.

Soil Mechanics
Civil Engineering 114, 118, 122 required, plus approved selections in engineering, chemistry, geology and/or soil science.

Structural Engineering
Civil Engineering 136 and/or 137; additional selections suggested are: Civil Engineering 138, 114, 118, 122; and approved selections in Mathematics.

Structural Mechanics
Civil Engineering 136 and/or 137; additional selections suggested are: Civil Engineering 138; Mathematics 104, 119, 122, 185; Mechanical Engineering 170, 175; Engineering 164.

Surveying, Geodesy, and Photogrammetry
Civil Engineering 101, 102, 105, 107.

Transportation Engineering
Civil Engineering 171 required, plus 3 units from Civil Engineering 101, 102, 114, 118; additional selections suggested are: Civil Engineering 136, 181; Statistics 130E; Business Administration 170; City and Regional Planning 110; Political Science 181.

Fifth (Graduate) Year
For students who intend to pursue professional careers, the fifth and graduate year, built upon the more general undergraduate education, offers opportunity for specialization in one of the major branches of civil engineering. A variety of programs of study can be arranged which include instruction related to the planning and design aspects of the major fields of specialization together with supporting courses in applied science, advanced analysis, and in areas such as economics, statistics, public administration, city planning, etc.; some experience in research and development may also be obtained. The major fields in which advanced professional study may readily be undertaken are: construction, foundation, hydraulic, irrigation, photogrammetric and geodetic, sanitary, structural and transportation engineering; combination programs may be arranged. A master’s degree may be obtained on successful completion of a satisfactory fifth-year program.

For students who intend to proceed with studies beyond the fifth year, in preparation for careers in teaching and research, or for professional careers involving research and development, the fifth year should emphasize the applied sciences which support the areas of professional specialization. For example, studies concerned with biological sciences and chemistry, fluid mechanics and hydrology, soil mechanics, modern aspects of materials and structural mechanics may be arranged to comprise a program which will give a basis for later studies for the doctoral degree.
Electrical Engineering

134 units

(For courses of the lower division, see page 93)

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Fall</th>
<th>Spring</th>
<th>Senior Year</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Eng. 109A–109B</td>
<td>7</td>
<td>7</td>
<td>Electrical Eng. 116A</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Civil Eng. 132</td>
<td>2</td>
<td></td>
<td>Electrical Eng. 125, 198 (8-3)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mechanical Eng. 105A, 109</td>
<td>3</td>
<td>3</td>
<td>Electrical Eng. 132A</td>
<td>2</td>
<td>(2)</td>
</tr>
<tr>
<td>Mechanical Eng. 100</td>
<td>2</td>
<td></td>
<td>Electrical Eng. 111A, 133A (3-2)</td>
<td>or</td>
<td></td>
</tr>
<tr>
<td>Physics 121</td>
<td>3</td>
<td>3</td>
<td>Electrical Eng. 112A–112B (5)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>*Nontechnical studies</td>
<td>3</td>
<td>3</td>
<td>Engineering 113</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Engineering 120</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Restricted electives</td>
<td>6 (or 3)</td>
<td>9 (or 5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*Nontechnical studies</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

17 16

16 17

Senior students will select a logical sequence of restricted electives from one of the groups suggested or from any other logical sequence of courses approved by counselors. These restricted elective units must be of senior level and are to be taken at the University of California. Students whose grade-point averages are below 2.5 must elect 6 units of electrical engineering courses. Suggested course groupings are:


**Control Systems:** Electrical Engineering 119, 127 or 112A, 112B, 128, Mechanical Engineering 164, Mathematics 185, Statistics 134.

**Energy Conversion, Control and Transmission:** Electrical Engineering 114A, 114B, 112A or 111B, 133B, 127, 128.

**Illumination:** Engineering 140, 140L, 141, 141L, 142, Optometry 109, Physics 108A, 108B, Physiology 108.


**Fifth (Graduate) Year**

Professional work in many fields of electrical engineering is highly analytical and requires not only sound training in basic science and in engineering methods but ability to plan and carry out original attacks on new problems. The fifth-year program strongly emphasizes individual work on a research problem, culminating in an original thesis and recognized by the M.S. degree. In addition, each student will include at least two electrical engineering courses of graduate level, together with undergraduate courses in mathematics, physics, and engineering more advanced than the requirements for the B.S. degree. The program is chosen to make possible maximum progress in preparation for doctorate examinations for those students qualified for doctoral study, as well as to provide experience in practical engineering research for those who go directly into industry. A typical program would be:

* For selection of nontechnical studies, see page 93.
Graduate electrical engineering courses in field of specializa-
tion (Electrical Engineering 200 series) .................. 3 3
Individual study and research (Electrical Engineering 299) ... 3 3
Advanced undergraduate engineering, mathematics or physics 4 4

No credit is given for the required thesis, but the research leading to its
preparation is counted as individual study.

Engineering Science

The curriculum in engineering science provides special students with the
opportunity for obtaining a broad background in the principal areas of engi-
neering science and the related fields of mathematics, and science. The general
program of study in this curriculum is so designed as to allow the flexibility
deemed necessary to give adequate emphasis in the area of the student's
major interest. It is anticipated that many students entering this program
will continue their education at the graduate level either in engineering science
or in other programs (see engineering physics program). Students will be
permitted to enroll in this curriculum if they have at least a 2.75 grade-point
average; and they must maintain better than a 2.5 grade-point average
throughout their upper division studies. Any student failing to maintain this
requirement will be requested to transfer to another curriculum even though
such a transfer may delay his graduation.

The general program of study in this curriculum will be administered by
an Engineering Science Subcommittee of the Committee on Undergraduate
Study of the College of Engineering. This subcommittee will be composed of
faculty members who are experts in the various areas of engineering science.
Upon consultation with each student, the subcommittee will formulate indi-
vidual programs of study so as to best achieve the student's major objectives.

Curriculum in Engineering Science

128 Units
(For courses of the lower division, see page 93)

Upper Division

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Fall Units</th>
<th>Spring Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering 102 or equivalent</td>
<td>3</td>
<td>Civil Engineering 130</td>
</tr>
<tr>
<td>Nontechnical elective</td>
<td>3</td>
<td>Engineering 103 or equivalent</td>
</tr>
<tr>
<td>†Engineering elective</td>
<td>3</td>
<td>Mechanical Engineering 105A or equivalent</td>
</tr>
<tr>
<td>Engineering, science, and mathematics</td>
<td>6</td>
<td>Engineering, science, and mathematics</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Fall Units</th>
<th>Spring Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Engineering 101 or equivalent</td>
<td>3</td>
</tr>
<tr>
<td>†Engineering elective</td>
<td>3</td>
</tr>
<tr>
<td>Engineering, science, and mathematics</td>
<td>6</td>
</tr>
<tr>
<td>*Nontechnical studies</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

* For selection of nontechnical studies, see page 98.
† Three units among the engineering electives must emphasize engineering design.
The following program of study in engineering physics, which was designed cooperatively by the College of Engineering and the Department of Physics, is illustrative of the types of programs that can be formulated under the engineering science curriculum. Qualified students graduating from this program may enter graduate studies in either physics or engineering science.

### Engineering Physics

130 units

(For courses of the lower division, see page 93)

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Fall</th>
<th>Spring</th>
<th>Senior Year</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 104, 112 (or Chemistry 110A)</td>
<td>3</td>
<td>3</td>
<td>Physics 110B, 108B</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physics 105A–105B</td>
<td>3</td>
<td>2</td>
<td>Engineering 120</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physics 121, 110A</td>
<td>3</td>
<td>3</td>
<td>Aeronautical Sci. 150</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Civil Eng. 130</td>
<td>3</td>
<td>4</td>
<td>Mechanical Eng. 164</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>† Restricted electives</td>
<td>4</td>
<td>4</td>
<td>* Restricted electives</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>‡ Nontechnical studies</td>
<td>16</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Students who fail to maintain a 2.5 grade-point average will be requested to transfer to some other curriculum.

### Fifth (Graduate) Year

Although some positions in engineering physics will be open to engineers holding a B.S. degree, the requirements of a broad and intensive background in both physics and engineering suggest that the better students should plan to enter graduate fields of instruction. Students who complete this curriculum with an average grade of B or better and who have selected appropriate restricted electives will be prepared for graduate work in either engineering or physics.

### Industrial Engineering

136 units

(For courses of the lower division, see page 93)

The curriculum in industrial engineering provides for both a four-year and a five-year program of studies. Those students who, upon receipt of the Bachelor of Science degree, wish to prepare for high-level professional work in the field are urged to take the five-year program leading to either the Master of Science or Master of Engineering degree. The four-year program, leading to the Bachelor of Science degree, is designed to furnish an adequate foundation for graduate studies of the fifth year, either in industrial engineering or in some other field, or as a sound training in industrial engineering fundamentals for those who will receive further on-the-job training as offered by many companies or who do not wish to pursue graduate study.

* For selection of nontechnical studies, see page 93.
† In this program of study the equivalent of 8 units of work is required in French, German, or Russian. Up to 6 units of the 18 nontechnical studies may be used to satisfy the language requirement of this program. The first two years in high school French, German, or Russian will be counted in satisfaction of 4 units of this requirement and each year thereafter as 4 units.
‡ Restricted electives must be selected with the approval of the counselor to provide a consistent program of study in one of the areas in engineering physics. At least 9 of the 18 units of restricted electives must be selected from upper division courses in engineering; the remainder must be selected from upper division courses in mathematics, physics, chemistry, other physical sciences, and engineering.
Three fields of specialization are available in the fifth year: Administration, Metal Processing, and Industrial Systems Analysis. The general course requirements in each field are as shown below. It is desirable for each student to have a number of elective courses available in the graduate year so as to permit the program to be organized to fit his particular interests and needs. Proper selection of technical electives during the undergraduate years, as indicated, will make this possible.

**Administration**

<table>
<thead>
<tr>
<th>Units</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Administration 122</td>
<td>3</td>
</tr>
<tr>
<td>Psychology 185</td>
<td>3</td>
</tr>
<tr>
<td>Industrial Eng. 146</td>
<td>3</td>
</tr>
<tr>
<td>Industrial Eng. 243</td>
<td>3</td>
</tr>
<tr>
<td>Industrial Eng. 290</td>
<td>3</td>
</tr>
<tr>
<td>Industrial Eng. 299</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>3-15</td>
</tr>
</tbody>
</table>

**Metal Processing**

<table>
<thead>
<tr>
<th>Units</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Administration 122</td>
<td>3</td>
</tr>
<tr>
<td>Engineering 164</td>
<td>3</td>
</tr>
<tr>
<td>Industrial Eng. 161</td>
<td>3</td>
</tr>
<tr>
<td>Industrial Eng. 261</td>
<td>3</td>
</tr>
<tr>
<td>Industrial Eng. 245 or 248</td>
<td>3</td>
</tr>
<tr>
<td>Industrial Eng. 299</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>0-9</td>
</tr>
</tbody>
</table>

**Industrial Systems Analysis**

<table>
<thead>
<tr>
<th>Units</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Eng. 161</td>
<td>3</td>
</tr>
<tr>
<td>Industrial Eng. 261</td>
<td>3</td>
</tr>
<tr>
<td>Industrial Eng. 245 or 248</td>
<td>3</td>
</tr>
<tr>
<td>Industrial Eng. 299</td>
<td>3</td>
</tr>
<tr>
<td>Statistics 264</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>3-6</td>
</tr>
</tbody>
</table>

For full details regarding the requirements for the Master of Science degree and admission requirements to the graduate program, the student should consult the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION.

**Mechanical Engineering**

130 units

(For courses of the lower division, see page 93)

<table>
<thead>
<tr>
<th>Units</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Eng. 105A-105B</td>
<td>3</td>
</tr>
<tr>
<td>Mechanical Eng. 112</td>
<td>3</td>
</tr>
<tr>
<td>Mechanical Eng. 124</td>
<td>3</td>
</tr>
<tr>
<td>Mechanical Eng. 131A-131B</td>
<td>3</td>
</tr>
<tr>
<td>Mechanical Eng. 120</td>
<td>3</td>
</tr>
<tr>
<td>Mechanical Eng. 132</td>
<td>3</td>
</tr>
<tr>
<td>§Electives</td>
<td>3</td>
</tr>
</tbody>
</table>

* The 18 units of nontechnical studies must include at least one course in each of the following: economics, psychology.
† Should be taken as technical electives in the senior year.
‡ May be taken as a nontechnical elective in the undergraduate program.
§ Electives must include 12 units of upper division technical courses (engineering, physical sciences, or mathematics) and 9 units of upper division nontechnical subjects (for selection of nontechnical courses see page 98).
Fifth (Graduate) Year

Students who qualify for admission to the Graduate Division and who plan to engage in design, development, research, or teaching, may wish to undertake a fifth-year program leading to the master's degree. Fifth-year programs in mechanical engineering, applied mechanics, and aeronautical sciences are offered.

To insure a well-integrated five-year sequence, the undergraduate student should give careful consideration to his fifth-year program at the time he chooses his technical electives. For full details regarding the requirements for the Master of Science degree and admission requirements to the graduate program, the student should consult the Announcement of the Graduate Division, Northern Section.

Curriculum in Materials Science
(For courses of the lower division, see page 93)

### Ceramic Engineering

<table>
<thead>
<tr>
<th>Course</th>
<th>Junior Year</th>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fall</td>
<td>Spring</td>
</tr>
<tr>
<td>Materials Science 100, 102</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Materials Science 103</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Materials Science 101</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Chemistry 5</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Chemistry 110A-110B</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Civil Eng. 130</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Physics 121</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>*Nontechnical studies</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

16 units

### Metallurgy

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials Science 100</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Materials Science 104, 122</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Materials Science 111, 111L.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mineral Eng. 101</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electrical Eng. 101</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electrical Eng. 102</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Materials Science 112</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Materials Science 115</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Seminar in Materials Science</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>*Restricted electives</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>*Nontechnical studies</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

16 units

Fifth (Graduate) Year

Programs of study in ceramic engineering and metallurgy may involve either four or five years. B.S. degrees are awarded after four years but those qualified for advanced work may continue and receive a Master of Science or a Master of Engineering degree at the end of the fifth year. High-level scientific and professional programs are available; the undergraduate program prepares students to enter either field. In general, the demand for scientifically trained engineers exceeds the demand for professionally trained engineers in these fields. Graduates receiving master's degrees are in greater demand and receive substantially higher starting salaries than do the four-year graduates.

* For selection of nontechnical studies, see page 93.

† With special permission of his counselor, a student in ceramic engineering may take 3 units of restricted electives in place of Materials Science 132.

‡ Students wishing to emphasize extractive metallurgy should take Materials Science 133; those wishing to emphasize physical metallurgy should take Materials Science 124.

§ Any upper division course in science or engineering.
Curriculum in Mineral Engineering
(For courses of the lower division, see page 93)

The curriculum in mineral engineering is designed to provide students with a background for future work in the broad field concerned with the discovery, extraction, and utilization of minerals, metals, and fuels. It also provides the training necessary to apply geological fundamentals to engineering problems that arise in the construction of dams, roads, tunnels, bridges, and so on.

The programs of study in mineral engineering (mining, geological engineering, and petroleum engineering) are especially organized to provide preparation for advanced study at the graduate level in the three fields.

<table>
<thead>
<tr>
<th>GEOLOGICAL ENGINEERING</th>
<th>MINING ENGINEERING</th>
</tr>
</thead>
<tbody>
<tr>
<td>132 units</td>
<td>133 units</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PETROLEUM ENGINEERING</th>
</tr>
</thead>
<tbody>
<tr>
<td>136 units</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 110A</td>
<td>3</td>
<td>..</td>
</tr>
<tr>
<td>*Chemistry 110B or Mining 140</td>
<td>..</td>
<td>3</td>
</tr>
<tr>
<td>Civil Eng. 111</td>
<td>..</td>
<td>1</td>
</tr>
<tr>
<td>Civil Eng. 130</td>
<td>..</td>
<td>3</td>
</tr>
<tr>
<td>Electrical Eng. 101</td>
<td>3</td>
<td>..</td>
</tr>
<tr>
<td>Electrical Eng. 102</td>
<td>..</td>
<td>1</td>
</tr>
<tr>
<td>Engineering 102</td>
<td>3</td>
<td>..</td>
</tr>
<tr>
<td>Engineering 103</td>
<td>..</td>
<td>3</td>
</tr>
<tr>
<td>Geology 150</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Mineral Eng. 100</td>
<td>3</td>
<td>..</td>
</tr>
<tr>
<td>†Petroleum Eng. 160 or Mechanical Eng. 105A</td>
<td>..</td>
<td>3</td>
</tr>
<tr>
<td>‡Petroleum Eng. 160L</td>
<td>..</td>
<td>1</td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology 103, 102B</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Mineral Eng. 101</td>
<td>3</td>
<td>..</td>
</tr>
<tr>
<td>†Nontechnical studies</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>‡Restricted electives</td>
<td>6-7</td>
<td>8</td>
</tr>
<tr>
<td>Geological Eng. 123</td>
<td>3</td>
<td>..</td>
</tr>
<tr>
<td>Mineral Eng. 101</td>
<td>3</td>
<td>..</td>
</tr>
<tr>
<td>Mineral Eng. 102, 102L</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Mining 143</td>
<td>3</td>
<td>..</td>
</tr>
<tr>
<td>Mining 144</td>
<td>..</td>
<td>3</td>
</tr>
<tr>
<td>Materials Science 153</td>
<td>3</td>
<td>..</td>
</tr>
<tr>
<td>†Nontechnical studies</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>‡Restricted electives</td>
<td>5</td>
<td>..</td>
</tr>
</tbody>
</table>

**Petroleum Engineering**

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering 118</td>
<td>2</td>
<td>..</td>
</tr>
<tr>
<td>Geology 111A</td>
<td>3</td>
<td>..</td>
</tr>
<tr>
<td>Mineral Eng. 101</td>
<td>3</td>
<td>..</td>
</tr>
<tr>
<td>Mineral Eng. 102, 102L</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Petroleum Eng. 161, 162</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Petroleum Eng. 161L, 162L</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>†Nontechnical studies</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>‡Restricted electives</td>
<td>3</td>
<td>..</td>
</tr>
</tbody>
</table>

* Chemistry 110B for petroleum engineering; Mining Engineering 140 for geological engineering and mining engineering.
† Petroleum Engineering 160 and 160L for petroleum engineering; Mechanical Engineering 105A for mining engineering. Geological engineers may take either Mechanical Engineering 105A or Petroleum Engineering 160 and 160L.
‡, §, †, ‡, See double dagger (†), section (§), parallels (‡), and paragraph (‡) footnotes on the next page.
Requirements of Colleges, Schools, and Curricula

Fifth (Graduate) Year

Programs of study in mining, petroleum, and geological engineering may involve either four or five years. B.S. degrees are awarded after four years but those qualified for advanced work may continue and receive a Master of Science or Master of Engineering degree at the end of the fifth year. High-level scientific and professional programs are available, and the student should choose one of these areas before selecting technical electives in the senior year. In general, the demand for professionally trained engineers will exceed the demand for scientific engineers in these fields. Graduates receiving either master's degree are in greater demand and receive substantially higher starting salaries than do the four-year graduates.

Programs of study leading to doctoral degrees in engineering science in the fields of geological, mining, and petroleum engineering and in mineral exploration are also available. Properly qualified students with the bachelor degree in engineering, geology, physics, chemistry, or mathematics are eligible to work for such degrees.

Process Engineering

130 units

(For courses of the lower division, see page 93)

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Fall</th>
<th>Spring</th>
<th>Senior Year</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 110A-110B</td>
<td>3</td>
<td>3</td>
<td>Process Eng. 100</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Civil Eng. 130</td>
<td>3</td>
<td></td>
<td>Eng. 120 or Mineral Eng.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Eng. 101</td>
<td>3</td>
<td>101</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electrical Eng. 102</td>
<td>1</td>
<td></td>
<td>Mechanical Eng. 107</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Engineering 102, 103</td>
<td>3</td>
<td></td>
<td>Mechanical Eng. 151</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mechanical Eng. 106A</td>
<td>3</td>
<td></td>
<td>Mechanical Eng. 154</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mechanical Eng. 105A</td>
<td>3</td>
<td></td>
<td>Mechanical Eng. 164</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Nontechnical studies</td>
<td>3</td>
<td></td>
<td>Nontechnical studies</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Restricted elective</td>
<td>3</td>
<td></td>
<td>Restricted electives</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

15 16

Fifth (Graduate) Year

Students who qualify for admission to the Graduate Division and who plan to engage in design, development, research, or teaching, may wish to undertake a fifth-year program leading to the master's degree. For advanced study in process metallurgy, the graduate program of study includes advanced courses in metal processing and basic courses in chemical engineering. For advanced study in the field of mechanical design of equipment, the graduate program includes courses in instrumentation and automatic controls, corrosion, selection of materials and other related fields.

† Suitable upper division courses in civil, electrical, and mechanical engineering, chemical engineering, or metallurgy, approved by adviser, 3 units of which must be design.
‡ For selection of nontechnical studies, see page 93.
§ Students must take sufficient restricted electives to make 65 units during the Upper Division course of study. Suggested restricted electives for students interested in mineral exploration are: Geology 106A, 106B, Geological Engineering 122, 123, Mining 143, 145, 146. Students interested in geological engineering as applied to construction and other engineering problems should take Geological Engineering 120 and 121, Civil Engineering 198 (Soil and foundation engineering for geological engineers), plus 7 or 8 units of restricted electives, such as Civil Engineering 181, Geology 111A, 111B, Geological Engineering 122, 123, and Mining 143, 144, 146.
¶ To be selected from such courses as the following: Geological Engineering 128; Materials Science 104, Petroleum Engineering 169; Civil Engineering 131, 181; Geology 101, 102B-102C, 106A, 106B, 111A, 116, 122A, 122B, and Industrial Engineering 161.
†† Any upper division course in physics, chemistry, chemical engineering, mathematics, geology, or engineering.
Naval Architecture
Fifth (Graduate) Year

This graduate program is intended for students who may have majored in civil or mechanical engineering, or related fields, for the bachelor’s degree as well as those who have majored in naval architecture. The following courses (or equivalent) are required. Those marked **, totaling 15 units must be taken as part of the graduate program at Berkeley, and at least 9 additional units must be taken to make up the minimum 24 units required for all programs leading to the Master of Engineering degree. The student may offer these 9 units from the required list if needed to make up undergraduate deficiencies.

Many mechanical or civil engineers will have completed all the required courses as part of their undergraduate programs except those undergraduate professional courses in naval architecture, marked *, which total 9 units. Such students may therefore be able to complete the requirements in two semesters of graduate work, with some additional summer session work.

Required Courses

1) Professional Upper Division Courses (9 units)
   *Naval Architecture 151. Statics of Naval Architecture .......... 3
   *Naval Architecture 152. Dynamics of Naval Architecture ...... 3

2) Related Upper Division and Graduate Courses
   Aeronautical Sciences 162. Elementary Hydrodynamics .......... 3
   Civil Engineering 230B. Advanced Mechanics of Materials .. - 3
   Mathematics 104. Intermediate Analysis ...................... - 3
   Naval Architecture 153. Marine Engineering ............... 3

3) Professional Graduate Courses (15 units)
   **Naval Architecture 240A-240B. Theory of Ship Structures .. 3 3
   **Naval Architecture 241A-241B. Hydrodynamics of Ships .... 3 3
   **Naval Architecture 299. Individual Study or Research ...... - 3

Students whose undergraduate programs included the required undergraduate courses may take other work related to the major to make up the additional 9 units. Additional seminar courses are organized each year for graduate students in naval architecture. Examples of such seminars are:

Fall Spring

Free Surface Hydrodynamics ........................................ 3 3
Propeller Theory ................................................... - 3
Ship Vibrations ..................................................... 3 -
Acoustics ............................................................... 3 -

Students whose undergraduate preparation was primarily in physics or mathematics and who do not intend to become professional naval architects but who are interested in preparing for research in the hydrodynamics of ships, seaplanes, etc., may elect to follow a related program of study in Naval Hydrodynamics, leading to the degree of M.S. in engineering science. The specific selection of courses for such students will be based upon the individual’s background.

A weekly, departmental, noncredit seminar is held to give opportunity for the students to report on current literature and on their own research work, as well as to hear distinguished visitors and lectures. All graduate students in naval architecture are expected to attend and participate in these seminars.
Nuclear Engineering

Fifth (Graduate) Year

Graduate programs directed by the Department of Nuclear Engineering are designed to prepare students who have obtained the bachelor's degree in one of the branches of engineering or the physical sciences for work in the applications of nuclear energy.

Students who qualify for admission to the Graduate Division may, in consultation with the departmental advisers, arrange programs of study including formal course work, group seminars, and individual research leading to the degree of Master of Science from the following courses, as well as related courses in engineering and science:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear Reactor Theory</td>
<td>(3–2)</td>
</tr>
<tr>
<td>Nuclear Reactor Systems</td>
<td>(3)</td>
</tr>
<tr>
<td>Materials for Nuclear Engineering</td>
<td>(2–2)</td>
</tr>
<tr>
<td>Nuclear Engineering Laboratory</td>
<td>(1–1)</td>
</tr>
<tr>
<td>Nuclear Reactor Systems Design</td>
<td>(2)</td>
</tr>
<tr>
<td>Neutron Transport Theory</td>
<td>(3)</td>
</tr>
<tr>
<td>Nuclear Chemical Engineering</td>
<td>(3)</td>
</tr>
<tr>
<td>Special Topics in Nuclear Engineering</td>
<td>(2)</td>
</tr>
<tr>
<td>Instrumentation and Automatic Controls</td>
<td>(3)</td>
</tr>
<tr>
<td>Thesis Research</td>
<td>(4)</td>
</tr>
</tbody>
</table>

Doctoral Program

Students will find the above typical of the preparation required to qualify for a doctoral program in nuclear engineering. For all programs required preparation in undergraduate course work includes mathematics through differential equations and advanced analysis, atomic and nuclear physics, applied thermodynamics, and fluid mechanics.

Students interested in a Ph.D. degree should consult the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION, for degree requirements, as well as discuss a program of study with the graduate adviser in nuclear engineering.

Graduate Study in Engineering

The principal objectives of graduate study in engineering are:

1. To provide the student with the scientific and professional knowledge in his field of interest.
2. To develop in the student the ability to formulate solutions to new and complex problems in his field.

These objectives are accomplished by flexible programs of study designed to meet individual student needs. These programs include formal courses, special group seminars, individual study and research under faculty supervision, and participation in group research projects.

Completion of appropriate programs of study leads to the degrees of Master of Science and Doctor of Philosophy for study in the engineering sciences and Master of Engineering and Doctor of Engineering for professional study.

Courses offered by the Departments of Engineering and other departments of the University are described in the ANNOUNCEMENT OF COURSES, DEPARTMENTS AT BERKELEY.

For further details regarding graduate programs the student should consult the ANNOUNCEMENT OF THE COLLEGES OF ENGINEERING, and the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION.
The Institute of Transportation and Traffic Engineering

In conjunction with the Institute of Transportation and Traffic Engineering, various offerings and research facilities are available in the fields of highway, air transport engineering, and general transportation analysis and planning. The undergraduate work is formally offered in civil engineering in the form of a required course in highway engineering and elective courses in transportation engineering. The elective courses in transportation engineering include traffic engineering, route surveying, and highway materials. The graduate work offered through the Division of Transportation Engineering includes courses in highway planning, design and economics, airport planning, design and economics, traffic engineering, highway and airport pavements, materials and structures, seminars in urban transportation planning, bituminous materials, highway administration, financing highways and airports, and transportation statistics. Available in other departments of the University are courses pertinent to advanced study in the field, such as transportation economics, public administration, statistics, and city and regional planning.

The Cooperative Work-Study Program in Engineering

Under the cooperative work-study program an opportunity is provided for students to obtain work experience in industry while completing their undergraduate work. This program requires five years for completion of the program for the B.S. degree, as the students must complete three work periods of six months each prior to the beginning of the senior year.

Under the cooperative program the students complete their first year in the normal manner. During the following three years, they alternately work in industry six months and attend the University six months. In this three-year period the students complete the normal second- and third-year courses and obtain one and one-half years of work experience. Following the three-year cooperative period, the fourth year of study is completed without interruption.

Junior college transfer students may enter the program at the end of the first semester on the campus. These students work only two periods; the senior year is spent full time on the campus.

Students are selected upon the basis of their grades achieved in the first year and upon an interview. During the work periods they are not registered in the University but are under the guidance of the Dean of the College of Engineering. They are regular employees of the companies for which they are working. All jobs are regular ones, and normal compensation is received for the work being done. Students normally work all of the three periods at one company to which each has been assigned. Students start the first work period at jobs commensurate with their abilities, progressing to more advanced work later.

Students interested in the program should apply at the cooperative work study office to arrange for an interview.

COLLEGE OF ENVIRONMENTAL DESIGN

The College of Environmental Design was established in 1959 and is composed presently of the departments of Architecture, City and Regional Planning, and Landscape Architecture. The several departmental offerings include five professional curricula: two are undergraduate in nature, in the departments of Architecture and Landscape Architecture; and three are graduate programs, in the departments of Architecture, City and Regional Planning, and Landscape Architecture, respectively, administered under the supervision of the Graduate Council.

The specific curricula requirements leading to the several degrees will be
Requirements of Colleges, Schools, and Curricula

found under the separate departmental descriptions below. Students are advised to read, in addition, the detailed information concerning the courses of instruction in the College, found in the Announcement of the College of Environmental Design, obtainable without charge from the Office of the Dean of the College of Environmental Design, University of California, Berkeley 4.

The prospective student should refer also to the general admission requirements of the University at undergraduate and graduate levels, found on pages 19–31.

UNDERGRADUATE CURRICULA

Degree of Bachelor of Architecture

Requirements

The Department of Architecture offers a five-year curriculum leading to the professional degree, Bachelor of Architecture. New students requesting advanced standing in architectural design, descriptive geometry, water color, pen and pencil drawing, and history of architectural courses offered by the department must present a comprehensive, well-organized exhibit of their work for evaluation by the faculty during registration week.

**PREScribed CURRiculum FOR THE BaChelOR OF ArChitecTURE DEGREE**

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<thead>
<tr>
<th>Subject</th>
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The Bachelor of Architecture degree will be recommended for students of the College who have successfully completed the prescribed undergraduate five-year curriculum in architecture as set forth above, and who have complied with the rules for candidacy for this degree.
Degree of Bachelor of Landscape Architecture

The four-year curriculum leads to the professional degree Bachelor of Landscape Architecture. The student's proposed study list must be submitted to the departmental adviser for endorsement before it can be approved by the Dean and filed with the Registrar.

REQUIREMENTS

1. General University requirements (see page 34-41).

2. Departmental requirements:
   (a) Complete at least 124 units of university work. Not more than 4 units may be in lower division physical education courses.
   (b) 36 units of the above total must be in upper division courses (courses numbered 100-199).
   (c) Complete 9 units of mathematics. Matriculation work may be offered toward this requirement, counting each year of high school work as 3 units. Trigonometry taken in high school is recommended as partial satisfaction of this requirement. Normally this can be satisfied by the end of the sophomore year.

3. Curriculum requirements:
   (a) General
      Botany ......................................................... 5
      Civil engineering (surveying) ......................... 3
      City and regional planning ............................ 4
      Economics ................................................. 3
      English and/or speech .................................. 6
   (b) Departmental
      Agriculture, forestry, additional botany ........... 9
      Landscape architecture ............................... 35
      Summer practice course ............................... 0
   (c) Electives (restricted)
      Art, architecture, additional city and regional planning, decorative art ............................ 16
      Engineering (other than surveying), geography, geology, mathematics, physics .................. 6
      History, philosophy, political science, psychology, sociology ........................................... 6

4. Additional courses chosen by the student, with approval of the major adviser. (These may be used to satisfy the course requirements under 1 and 2 above) ........................................ 31

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5. Certain courses are required for the major and, where applicable, may be used in partial satisfaction of 3 above: Architecture 1N, 2N, 3N, 11 and 12 or 13; Art 2A; Landscape Architecture 1, 2, 20, 111A-111B, 120, 130, 131, 132A-132B.

6. For more detailed information, see the ANNOUNCEMENT OF THE COLLEGE OF ENVIRONMENTAL DESIGN.

GRADUATE CURRICULA

Degree of Master of Architecture

REQUIREMENTS

The degree of Master of Architecture will be recommended for students of the College who have been in residence for at least one year following the degree of Bachelor of Architecture taken at this University, or a comparable
Requirements of Colleges, Schools, and Curricula

five-year degree from another institution, and who have completed the prescribed curriculum for the graduate year with an average grade of B or better, who have been duly advanced to candidacy, and who have presented a thesis acceptable to the faculty of the Department or have successfully completed a comprehensive examination.

**Prescribed Curriculum for the Master of Architecture Degree**

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<tr>
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<tr>
<td>Electives</td>
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</table>

Total units minimum: Plan I, 20 units, plus thesis; Plan II, 24 units, plus comprehensive final examination.

**Degree of Master of City Planning**

The Department of City and Regional Planning offers a two-year graduate curriculum leading to the professional degree of Master of City Planning (M.C.P.). The curriculum is designed to offer related courses of instruction that will enable students to develop a broad understanding of the physical, social, and economic aspects of urban planning while at the same time developing certain professional and technical skills. The program of study is designed to prepare students for positions on the staffs of public and private urban planning agencies. The program requires a period of at least two years of study, including a three-months’ period of internship in a planning office, preferably undertaken during the summer between the two graduate years. The first year of study includes basic courses in the history, theory, principles, analytical methods, and the administrative and legislative bases of contemporary city planning. In addition students are enrolled in related courses in the social sciences and design fields. The second graduate year consists of seminars and workshop courses dealing with the urban general plan, with the effectuation of general plan policies, and with the three-dimensional design of urban areas. Normally students will find it possible to take some elective courses during the second year.

**Requirements for Admission**

The requirements for admission to the Graduate Division, Northern Section, of the University of California, for the purpose of undertaking work leading to the degree of Master of City Planning are as follows:

1. A bachelor’s degree from a recognized college or university, with an academic record and background considered satisfactory as preparation for graduate study in the field of city planning.

2. Completion of at least a one-year college course in each of the following five fields: economics, political science, physics, English, and mathematics. Study in fields directly related to these fields may be considered as equivalent to work in these fields. For example, study of the history of the United States may be considered as comparable to an introductory course in political science; and work in chemistry or some other college science course in which the scientific method is defined and applied in laboratory work may be considered as comparable to work in physics. Work in applied statistics may be considered as equivalent to work in mathematics. Deficiencies in some of the above five subjects may be removed during the two years of graduate study. Examinations for credit are given for certain of the courses, and deficiencies may be removed without enrolling in regular college courses by passing such examinations.
Most of the students who apply for admission to the Graduate Division of the University to study city planning have done their undergraduate work either in architecture, landscape architecture, engineering, or in one of the social sciences, such as sociology, economics, or political science. The two-year curriculum has been designed with this in mind. Students who have had a general liberal arts major during their undergraduate years are also eligible for admission, but they may be required to undertake a program requiring more than two years. Experience has shown, however, that satisfactory programs can be developed for such students and that they are able to engage successfully in professional work.

Students who wish to undertake graduate work in this field must submit a formal application for admission to the Graduate Division, Northern Section. The application must be filed at the office of the Dean of the Graduate Division, preferably eight months prior to the opening of the semester, and must be accompanied by a money order or bank draft for $5 in payment of the application fee. The application blank may be obtained by addressing the Dean of the Graduate Division, 250 Sproul Hall, University of California, Berkeley 4. Official transcripts of records covering all college and university work completed to date may accompany or must immediately follow the application. Two copies of the official records must be presented from each institution previously attended.

In addition, the following information should be submitted to the Chairman of the Department of City and Regional Planning:

1. A statement fully describing the applicant's interest in the field of city planning, his reasons for deciding to enter the field, and his hopes and desires concerning future practice in the profession.

2. A brief biographical summary, including both academic and working experience. This summary should include place of birth, age, marital status, work experience, and schools attended, as well as some indication of the quality of unusual academic and working experiences.

3. A more detailed picture of the applicant's educational background and record, listing the courses taken at university level, grouped according to general fields such as the physical sciences, social sciences, humanities, design, mathematics. This information is intended to provide a clearer picture of each applicant's academic preparation than is provided by the official transcript of record.

4. The names of at least three persons to whom the department may write for letters of recommendation concerning suitability of the applicant for study in this field.

Normally the department is able to accommodate only fifteen new students in the fall semester of each year. It is desirable, therefore, that interested students apply for admission and establish contact directly with the faculty members of the Department of City and Regional Planning as early as possible, preferably by January 15 of the spring preceding the September in which admission is sought. Final decisions on admission applications are made by the Dean of the Graduate Division on the basis of recommendations submitted by the department faculty. Students who are able to visit the department are urged to do so. Personal interviews with members of the faculty will be arranged by the department secretary.

Requirements for the Master's Degree

The degree Master of City Planning will be recommended upon satisfactory completion of the following requirements:

1. Twenty-four units of work in required graduate courses in city planning.

2. Twenty units of advanced work in courses representing at least three fields related to city planning. These courses will be selected by the student
Requirements of Colleges, Schools, and Curricula

in consultation with his faculty adviser. Exceptions may be made for students unusually well prepared in several related fields, and the number of units required may be reduced to twelve.

3. Satisfactory performance on a comprehensive examination given during the fourth semester. The examination covers all aspects of city planning theory and method in relation to social science theory and design considerations.

Exceptional students may be permitted to substitute an individual thesis for the comprehensive examination. The thesis presents the results of original research on a subject selected by the student in consultation with members of the faculty.

4. A three-month internship in a planning office, preferably undertaken during the twelve-week summer period between the two years of graduate study.

In order to complete the requirements described above, four semesters of residence as a graduate student are necessary. Every student's program of study will be considered individually. The faculty adviser will recommend a definite curriculum, including electives, based on an evaluation of the student's undergraduate training and practical experience.

Degree of Master of Landscape Architecture

The degree of Master of Landscape Architecture will be recommended for students of the College who hold a bachelor's degree from the University of California or from another university of approved standing. Preparation must be subject to approval of the department.

The master's degree will require (a) residence for one year minimum, (b) completion of 20 units of approved upper division and graduate courses (including at least 8 units of Landscape Architecture 201A–201B) with an acceptable thesis, or (c) completion of 24 units of approved upper division and graduate courses (including at least 12 units of Landscape Architecture 201A–201B) with an average grade B or better and passage of a comprehensive final examination.

For more detailed information, see the Announcement of the College of Environmental Design and the Announcement of the Graduate Division.

SCHOOL OF BUSINESS ADMINISTRATION

The School of Business Administration offers undergraduate curricula leading to the degree of Bachelor of Science. (For graduate work, see statement of the Graduate School of Business Administration on page 113.)

Admission, General.—To be admitted to the School, students must have attained at least junior standing or equivalent and at least a C average in one of the colleges of the University of California, or the equivalent elsewhere.

Admission, Specific Unit and Curriculum Requirements (effective September, 1960):

1. 57 or more units
2. a) English 1A–1B or Speech 1A–1B and
   b) Additional course in English composition, speech or literature
3. One course chosen from the following:
   Mathematics 3A or 16A (may be counted toward natural science requirement below)
4. Statistics 2 or Economics 2 (may be counted toward natural science requirement below)
5. 8 units of one language (see additional language required for graduation)
School of Business Administration

6. 6 units of natural science (at least one laboratory science course must be included*)
7. Social Science:
   a) Economics 1A-1B
   b) Sociology 1 or Psychology 1A and one course from among the following:
      Anthropology 2A, 2B, Psychology 1A, Sociology 1, 30
8. Business Administration 1A-1B

Students who have begun their preparation under former admission requirements may continue with their present programs.

Admission with Junior Standing.—Students may, if they prefer, elect to take their lower division work in one of the colleges of applied sciences. For instance, those looking forward to employment in the agricultural industries or in business based closely upon these industries, might well take their lower division work in the College of Agriculture. Likewise, those wishing to work in the technical aspects of manufacturing or in industrial management could profitably spend their first two years in the College of Engineering. In general, students should choose that lower division preparation which is most closely related to the particular field and division of business administration they wish to enter. Students entering the School with junior standing in a college of applied science should consult the Dean of the School of Business Administration for information on admission requirements.

The Requirements for the Degree of Bachelor of Science

The requirements for the degree of Bachelor of Science are intended to provide for all students not only a broad knowledge of the background and chief functions of modern business enterprise, but also elementary training in the use of the professional tools of accounting, statistics, and economic analysis. Since many students are unable to decide upon the specific field or position for which they wish to train, and since some shift into positions other than those anticipated, it is highly important that all have the common basis of fundamental training. On this foundation they can readily build for specific types of needs. But students are normally expected to begin to specialize by electing a field of emphasis of 9 units beyond the introductory course in one field (see below). Under the advisory procedure of the School, fields of emphasis may be approved in departments other than those listed below if the total program of the student is soundly conceived in terms of his future interests and needs. It is hoped that some students will wish to propose programs integrating work in other fields of training, such as agricultural economics, public administration, and mechanical engineering (see below).

In order to qualify for the degree of Bachelor of Science in the School, the student must have received 120 units of credit with at least a C average. All candidates for the degree of Bachelor of Science entering the School of Business Administration after attendance at other colleges or schools of this University or other institutions, with senior standing at the time of admission, are required to have been enrolled during the senior or final year in resident courses of instruction in the School of Business Administration (Berkeley). At least 34 units (12 units each semester) must be completed in this period. It is permissible to offer 12 units completed in two summer sessions of the same year as equivalent to one semester, but the student must complete in resident instruction at least one regular semester of his senior year. The can-

* This laboratory requirement may be satisfied by a one-year high school laboratory course in chemistry, physics, or biology, but such a course does not reduce the unit requirement. If not met in high school, the laboratory requirement may be postponed until after admission.
didate shall have maintained at least a C average in all upper division courses in business administration and economics taken in residence at the University of California in satisfaction of the requirements for the degree of Bachelor of Science in business administration.

Below are listed the specific requirements for the degree of Bachelor of Science. For further information see the Announcement of the School of Business Administration.

I. Additional Breadth Requirements for the B.S. Degree:
   A. Additional language: two courses. This requirement may be satisfied by:
      (a) Language courses, or
      (b) Courses in geography, literature or history relevant to the country whose language was studied in meeting the admission requirement, or
      (c) Courses in mathematics beyond the 3A, 16A level, or
      (d) A combination of the above alternatives. (If one language course is used in combination with one of the other alternatives, the language must be the one used in meeting the admission requirement.)
   B. 6 units of additional natural science.
   C. Additional social science: (see the Announcement of the School of Business Administration for details).
      (a) 3 units of history.
      (b) 6 units from among following areas: agricultural economics, anthropology, economics, geography, history, psychology, sociology and social institutions.

II. Basic Courses:
   A. Required of all:
      Units
      American History and American Institutions.......................... 0
      Business Administration 1A–1B (Principles of Accounting) ............. 6
      Business Administration 18 (Business Law) .............................. 3
      Business Administration 100 (Economics of Enterprise) ............... 3
      Business Administration 101 (Business Fluctuations and Forecasting) .......................................................... 3
      Business Administration 105 (Law of Business Organization and Regulation) or 109 (Law of Negotiable Instruments and Security Devices) ................................................. 3
      Business Administration 131 (Corporation Finance) .................... 3
      Business Administration 140 (Production Organization and Management) ............................................... 3
      Business Administration 150 (Industrial Relations) .................... 3
      Business Administration 160 (Marketing) .................................. 3

      Basic Courses: Total.............................................. 30

   B. A semester course from one of the following courses:
      Business Administration 135 (Economics of Insurance)
      Business Administration 170 (Transport Economics)
      Business Administration 180 (Introduction to Real Estate and Urban Land Economics)
      Economics 135 (Money and Banking)
      Economics 190A (International Economic Relations) .................. 3

III. Field of Emphasis:
    Units
    Nine units beyond the basic course or courses in one field... 9
The following fields of study are approved: accounting, administration and policy, banking and finance, business statistics, foreign trade, industrial management, insurance, actuarial science, marketing (including retailing, wholesaling, sales management, industrial purchasing, advertising, and cooperative marketing), industrial relations and personnel management, managerial economics, production management, real estate and urban land economics, transportation and traffic management, and public utilities.

Students who do not wish to elect one of the above fields of emphasis may receive permission to (1) fulfill the requirements of the major in the Department of Economics, (2) elect special programs with the permission of the Dean (such programs may be in other fields; for example, agricultural economics, civil engineering, electrical engineering, forestry, geography, nutrition and home economics, journalism, mathematics, mechanical engineering, political science, psychology, and public administration).

It will be noted that the courses listed above under II and III total 42 units. In cases where some requirements are fulfilled by 2-unit courses (e.g., by summer session courses), thus reducing the total number of units in the basic courses and field of emphasis, additional upper division courses must be completed in business administration or economics or, with the permission of the Dean of the School, in closely related subjects, to raise the total to at least 41 units.

Honors

Honors at Graduation.—Students whose work has been of marked excellence receive honors at graduation.

GRADUATE SCHOOL OF BUSINESS ADMINISTRATION

The Graduate School of Business Administration, established in August, 1955, offers curricula leading to the degree of Master of Business Administration. The programs of work for this degree afford opportunity for advanced and specialized training based either upon the fundamental curriculum for the degree of Bachelor of Science or upon the broader background of the Bachelor of Arts degree.

Admission to the Graduate School requires evidence of superior scholarship and an acceptable bachelor's degree. In evaluating applications from mature persons, demonstrated capacity for leadership and for intellectual activity of a high order will be taken into account.

The master's degree will require a minimum residence of two full semesters for those with a Bachelor of Science degree in business administration from the University of California, or its equivalent from some other institution. A minimum of four semesters is necessary for those with no previous work of any kind in business administration. In addition, a B average in all work undertaken since receipt of the bachelor's degree is required, as well as a comprehensive examination at the end of the program of study.

A special group of core courses is available, restricted to graduate students, for those with little or no background in business administration. This special group covers the first two semesters of work and includes the subject matter of the basic work in quantitative methods in business (economic analysis, statistics, accounting), in business law, in finance, in marketing, in production, and in industrial relations.

Those students who wish to prepare for high-level research positions in business and government, or for academic careers in schools of business or commerce, may pursue a program leading to the degree of Doctor of Philosophy in business administration.

For detailed information concerning the requirements, see the ANNOUNCEMENT OF THE GRADUATE SCHOOL OF BUSINESS ADMINISTRATION and the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION.
SCHOOL OF CRIMINOLOGY

The School of Criminology offers undergraduate and graduate curricula leading to the degrees of Bachelor of Arts, Bachelor of Science, and Master of Criminology.

Three Programs of Study.—Three distinct fields of study are provided. Two of them deal with the application of the social sciences to (a) law enforcement and (b) correctional work. They lead to the degree of Bachelor of Arts. The third field of study is criminalistics. It is concerned primarily with the application of the natural sciences to law enforcement and crime investigation and leads to the degree of Bachelor of Science. Completeness of training in either field requires a combination of social and natural sciences with emphasis on one or the other.

All students in law enforcement and correctional work are required to complete the basic courses listed below, and students in criminalistics over half of them. These courses provide a common basis of fundamental training on which the student may build to meet their specific interests and needs. At the time of entrance, students are expected to elect as their major field of interest either law enforcement, correctional work, or criminalistics. Students are urged to take first aid, wrestling, boxing, and judo.

Admission.—To be admitted to the School, students must have attained upper division standing and at least a grade C average in the College of Letters and Science or the equivalent elsewhere. This work shall have been directed toward the completion of the first requirement listed below for the bachelor's degrees. Evidence of superior scholarship and an acceptable bachelor's degree are required for admission to the School of Criminology in graduate standing.

Requirements for the Bachelor's Degree

The bachelor's degrees in the School of Criminology are granted upon the following conditions:

1. The student shall have satisfied the following requirements, which are normally completed before admission to the School:

   (a) General University Requirements.
       American History and Institutions requirement.
       Military science and tactics requirement.

   (b) English Reading and Composition. A year course, normally completed in the freshman year, to develop facility in English reading and composition.

   (c) Foreign Language. The equivalent of 8 units in one modern foreign language, or 12 units in either Latin or two modern foreign languages.

   (d) Humanities. Twelve units of work in the Humanities, in courses acceptable for this purpose to the College of Letters and Science, are required of all criminology students except that those who major in criminalistics are required to complete only 3 units of such work.

   (e) Social Science. Political Science 1 and 2; Psychology 1A and 1B or 3 or 33; and Social Science 1A–1B. Students who major in criminalistics may meet this requirement by completing Psychology 1A and Social Science 1A–1B.

   (f) A total of 12 units of Natural Science courses acceptable for this purpose to the College of Letters and Science, and including Physiology 1 and a minimum of 3 units in the physical sciences. One course must include 2 units of laboratory work. Criminalistics majors shall have completed Chemistry 1A–1B, 5, 12; Physics 2A–2B, 3A–3B; and Physiology 1 and 1L.

   (g) Statistics 2 or 12, 12 being required of criminalistics majors.
2. The student shall have received at least 120 units of credit with at least a C average and shall have maintained at least a C average in the upper division courses required for his major. At least the final 24 units shall have been completed in the School of Criminology. No credit will be allowed toward the bachelor's degree for work completed at a junior college after the student has completed 66 units toward the degree.

3. The student shall have been enrolled during the senior or final year of residence in the School of Criminology. It is permissible to offer two Summer Sessions as equivalent to one semester; but in any event the student shall have completed in residence instruction either the fall or spring semester of his senior year.

4. The student who is admitted to senior standing in the School of Criminology on the basis of credit from other institutions, or on the basis of credit from University Extension, University of California, shall have completed in residence in the School of Criminology, subsequent to such admission, at least 18 units of work in upper division courses, including at least 12 units in his major program.

5. The student shall have completed the course of study outlined below.

I. Basic Courses (required of all students in law enforcement and correctional work)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criminology 100A-100B (Crime Causation, Prevention, and Correction)</td>
<td>6</td>
</tr>
<tr>
<td>Criminology 101 (Crime Investigation)</td>
<td>2</td>
</tr>
<tr>
<td>Criminology 103 (Psychological Aspects of Criminology)</td>
<td>3</td>
</tr>
<tr>
<td>Criminology 105A-105B (Police Administration)</td>
<td>6</td>
</tr>
<tr>
<td>Criminology 115A-115B (Legal Relations Involved in Criminology)</td>
<td>6</td>
</tr>
<tr>
<td>Criminology 161 (Psychiatric Aspects of Criminology)</td>
<td>3</td>
</tr>
<tr>
<td>Criminology 162 (Therapeutic Theories in Preventive Criminology)</td>
<td>3</td>
</tr>
<tr>
<td>Criminology 163 (Interrogation and Detection of Deception)</td>
<td>4</td>
</tr>
</tbody>
</table>

II. Majors (Students must complete the courses in one major)

Law Enforcement: Adviser: Mr. O'Neill.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criminology 107 (Personal Identification)</td>
<td>3</td>
</tr>
<tr>
<td>Criminology 111 (Physical Evidence)</td>
<td>2</td>
</tr>
<tr>
<td>Criminology 113 (Legal Medicine)</td>
<td>3</td>
</tr>
<tr>
<td>Criminology 171 (Police Planning)</td>
<td>2</td>
</tr>
<tr>
<td>Civil Engineering 179 (Traffic Engineering for Police)</td>
<td>2</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
</tr>
</tbody>
</table>

Correctional Work: Adviser: ———

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criminology 182 (Institutional Treatment of the Criminal and Delinquent)</td>
<td>2</td>
</tr>
</tbody>
</table>

† Should be taken in the junior year to avoid conflict in senior year.
Requirements of Colleges, Schools, and Curricula

Criminology 184A-184B (Noninstitutional Treatment of the Criminal and Delinquent) ......................................................... 4
Social Welfare 100 (The Field of Social Welfare) .................. 3
Electives ........................................................................................... 8
Agricultural Economics 112A-112B; Anthropology 118, 123, 125; Business Administration 140; Economics 106A-106B, 113, 121A-121B; Education 100A, 160, 164, 181; Home Economics 142; Nutrition 121A; Political Science 102, 103A, 104A, 105A, 181, 183; Psychology 112, 113N, 141, 145, 165A-165B, 185; Public Health 125, 131, 135; Social Welfare 102, 201; Sociology and Social Institutions 115, 130, 160, 178.

Criminalistics: Adviser: Mr. Kirk. Units
Criminology 100A (Crime Causation, Prevention, and Correction) .......................................................... 3
Criminology 101 (Crime Investigation) ....................................... 2
Criminology 103 (Psychological Aspects of Criminology) ......................................................... 3
Criminology 105B (Police Administration) ............................... 3
Criminology 107 (Personal Identification) ................................ 3
Criminology 111 (Physical Evidence) ...................................... 2
Criminology 113 (Legal Medicine) .......................................... 3
Criminology 115A-115B (Legal Relations Involved in Criminology) ................................................................. 6
Criminology 151A-151B (Microscopy and Microchemistry of Physical Evidence) ......................................................... 8
Criminology 153A-153B (Quantitative and Instrumental Techniques) ................................................................. 4
Criminology 155 (Comparative Microscopy) ................................ 3
Biochemistry 102 (A Brief Survey of the Principles of Biochemistry) ......................................................... 3
Forestry 114 (Wood Technology) ................................................. 3
Public Health 172 (Industrial Toxicology) .................................. 2
Zoology 119A-119B (Optics and Metrology in Biology) .......... 4
Recommended: Botany 108; Chemistry 105, 109, 115, 125; Criminology 157, 161 and 163; Geology 103, 104A-104B; Mathematics 3A-3B, 3R; Physiology 100A-100B; Speech 110A-110B; Statistics 113; Zoology 114.

Precriminology Curricula.
The following programs of study are suggested to students preparing to enter the School of Criminology. Some of these courses may be completed after admission to the school.

Social Science Program Counselor: Mr. O'Neill.

First Year

<table>
<thead>
<tr>
<th>Fall Units</th>
<th>Spring Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Military Science</td>
<td>2</td>
</tr>
<tr>
<td>English 1A-1B or Speech 1A-1B</td>
<td>3</td>
</tr>
<tr>
<td>¹Foreign language</td>
<td>4</td>
</tr>
<tr>
<td>Social Science 1A-1B</td>
<td>3</td>
</tr>
<tr>
<td>Political Science 1, 2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

¹Foreign language: the School of Criminology requirement is 8 units of credit in one modern foreign language.
The following programs of study are suggested to criminology students.

**Law Enforcement***

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criminology 100A–100B</td>
<td>Criminology 115A–115B</td>
</tr>
<tr>
<td>Criminology 101</td>
<td>Criminology 113</td>
</tr>
<tr>
<td>Criminology 103</td>
<td>Criminology 163</td>
</tr>
<tr>
<td>Criminology 105A–105B</td>
<td>Criminology 171</td>
</tr>
<tr>
<td>Criminology 107</td>
<td>Civil Engineering 179</td>
</tr>
<tr>
<td>Criminology 111</td>
<td></td>
</tr>
<tr>
<td>Criminology 161</td>
<td></td>
</tr>
<tr>
<td>Criminology 162</td>
<td></td>
</tr>
</tbody>
</table>

**Correctional Work***

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criminology 100A–100B</td>
<td>Criminology 115A–115B</td>
</tr>
<tr>
<td>Criminology 101</td>
<td>Criminology 163</td>
</tr>
<tr>
<td>Criminology 103</td>
<td>Criminology 182</td>
</tr>
<tr>
<td>Criminology 105A–105B</td>
<td>Criminology 184A–184B</td>
</tr>
<tr>
<td>Criminology 161</td>
<td>Social Welfare 100</td>
</tr>
<tr>
<td>Criminology 162</td>
<td></td>
</tr>
</tbody>
</table>

*Foreign language: the School of Criminology requirement is 8 units of credit in one modern foreign language.

* Uncompleted required courses in the humanities, natural sciences, and electives may be taken in the junior and senior years.
Requirements of Colleges, Schools, and Curricula

CRIMINALISTICS

Junior Year
- Criminology 100A
- Criminology 101
- Criminology 107
- Criminology 111
- Criminology 113
- Criminology 151A-151B
- Criminology 155
- Biochemistry 102
- Chemistry 112C
- Zoology 119A-119B

Senior Year
- Criminology 103
- Criminology 105B
- Criminology 115A-115B
- Criminology 153A-153B
- Forestry 114
- Public Health 172

Honors at Graduation.—Students whose work has been of marked excellence receive honors at graduation.

The Degree of Master of Criminology

Opportunity is offered for graduate study in criminology leading to the degree of Master of Criminology. Advancement to candidacy presupposes the completion of undergraduate requirements in criminology equivalent to those prescribed at the University of California. Except for making up deficiencies in the undergraduate requirements, the graduate student's program may be planned largely to meet his individual needs and interests. Students who have completed the work for the bachelor's degree in the School of Criminology should be able to complete the requirements for the degree of Master of Criminology in one year.

SCHOOL OF DENTISTRY (SAN FRANCISCO)

The School of Dentistry offers two curricula, leading to the degree of Bachelor of Science and to the degree of Doctor of Dental Surgery. The dental program is taught in a period of eight semesters. The student has the option, at the close of the second semester in the dental school, of registering in either one of two major curricula: (1) restorative dentistry, or (2) orthodontics. At the end of the sophomore year (fourth semester), a selected small group of students may enter the honors curriculum, which is designed to train outstanding students in the fields of dental research and teaching. In addition to these, there is a curriculum for the training of dental hygienists, leading to the degree of Bachelor of Science.

Classes are admitted to the School of Dentistry once a year, in September. Applications for admission in September, 1961, may be filed between January 1, 1960, and December 31, 1960. All transcripts of record must be filed by the deadline date. For further information, write to the office of the Dean of the School of Dentistry.

Upon the satisfactory completion of six semesters, the dental student will be eligible for the Bachelor of Science degree, and for the Doctor of Dental Surgery degree upon the completion of two additional semesters. The Bachelor of Science degree will be granted the student in the dental hygiene curriculum at the end of the fourth semester.

The dental student who wishes to qualify for the degree of Bachelor of Science in addition to the degree of Doctor of Dental Surgery must complete satisfactorily a special project and thesis in the field of his major interest under the supervision of a faculty committee, and receive passing grades in 4 units of special instruction selected by the committee.

The School of Dentistry also offers a graduate program leading to the degree of Master of Science in Dentistry, and Master of Dental Surgery.

† Offered in alternate years only.
Admission to Dental Curricula

All applicants for admission to the dental curricula must have completed at least 60 units of college work with a scholarship average satisfactory to the Admissions Committee, including the requirements (2) to (6) (listed below). Students who have attended the University of California must have a C average or better in work undertaken in the University. In addition, all applicants must take a performance test, designed to test manual dexterity. This test must be taken on the San Francisco campus, and is given in June, during the Christmas recess and during the period between the fall and spring semesters. The January, 1961, tests are the last tests which may be taken for admission in 1961, the June, 1961, test will be the first in the series given for admission in 1962. Applicants for admission in advanced standing in 1961, however, may take the June, 1961, test. The dental aptitude test of the American Dental Association is also a requirement for admission. This test is usually given in October, January, and April. Applicants for admission to the School of Dentistry must take one of the two first tests. For further information regarding the performance test and the A.D.A. test, write the Dean's Office, School of Dentistry, 630 Medical Sciences Building, University of California Medical Center, San Francisco 22. The School of Dentistry reserves the right to limit enrollment on the basis of scholarship, results of the performance and aptitude tests or other tests and recommendations. At the present time, because of limited facilities and the large number of applications, it is not possible for the School of Dentistry to act favorably upon applications from persons who have not had the major portion of their high school and preprofessional education and residence in California or in one of the far western states. Exception to this is made only in the cases of persons who have been residents of the State of California for one year prior to the date on which they file application. Students from the far western states without dental schools who are interested in certification for education benefits under the Western Interstate Commission for Higher Education program may write to the Dean of the School of Dentistry for a pamphlet describing the program. The student will find himself more adequately prepared for the dental curricula if he has taken in high school the following subjects: English, 3 units; history, 1 unit; mathematics, 3 units (algebra, plane geometry, and trigonometry); chemistry, 1 unit; physics, 1 unit; foreign language, 4 units in one foreign language.

Requirements for First and Second Years

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) General University requirements*</td>
<td></td>
</tr>
<tr>
<td>Subject A (see page 34)</td>
<td></td>
</tr>
<tr>
<td>Military Science</td>
<td>8</td>
</tr>
<tr>
<td>(2) English or Speech† (1A-1B)</td>
<td>6</td>
</tr>
<tr>
<td>(3) Science</td>
<td></td>
</tr>
<tr>
<td>(a) Chemistry</td>
<td></td>
</tr>
<tr>
<td>Inorganic (1A-1B)</td>
<td>10</td>
</tr>
<tr>
<td>Organic lecture (8)</td>
<td>3</td>
</tr>
<tr>
<td>Organic laboratory (9) or quantitative analysis (5)</td>
<td>3</td>
</tr>
<tr>
<td>(b) Physics with laboratory (2A-2B and 3A-3B)</td>
<td>6-8</td>
</tr>
<tr>
<td>(o) Biology, including one full semester of vertebrate zoology, with laboratory (Zoology 1A-1B)</td>
<td>8</td>
</tr>
</tbody>
</table>

* The requirement of American History and American Institutions is also prerequisite to the bachelor's degree, page 85. Although this requirement may be satisfied while enrolled in the School of Dentistry, it is preferable that it be completed in the predental program.
† Course numbers in parentheses refer to courses given in the departments at Berkeley.
‡ Applies only to students who complete the first two years of college work in the University of California.
(4) Trigonometry (this requirement must be completed in high school)

(5) Twelve units in one foreign language (may be satisfied from high school as follows: 4 units for the first two years, 4 units for each year thereafter) .......................... 12

(6) Twelve units in social sciences and humanities ............................. 12

### Admission to the Dental Hygiene Curriculum
(Open to Women Only)

Applicants for admission to the dental hygiene curriculum must have completed at least 60 units of college work with a scholarship average satisfactory to the Admissions Committee, including the requirements (2) to (9) listed below. Students who have attended the University of California must have a C average or better in work undertaken in the University. The School of Dentistry reserves the right to limit enrollment if applications exceed the available facilities and to require interviews and aptitude tests if they are necessary in the selection of a class. All applicants will be required to take the American Dental Hygiene Association Aptitude Test. The student will find herself more adequately prepared if she has taken in high school the following subjects: English, 3 units; history, 1 unit; mathematics, 2 units (algebra and plane geometry); chemistry, 1 unit; physics, 1 unit; foreign language, 4 units in one foreign language.

1. **General University requirements:**
   - Subject A (Examination in English composition, see page 34).
   - American History and American Institutions (required for the bachelor's degree). The examination in American History and American Institutions may be taken in the School of Dentistry, but it is preferable to satisfy the requirement in the predental hygiene program. (See page 119.)

2. **English or speech† (1A–1B) .........................................................**
   - Units
   - 6

3. **Chemistry (1A, 8) ..........................................................**
   - Units
   - 8

4. **Biology (Zoology 1A, 1B) ..................................................**
   - Units
   - 6–8

5. **Twelve units in one foreign language (may be satisfied from high school as follows: 4 units for the first two years, 4 units for each year thereafter§) .........................................................**
   - Units
   - 12

6. **Psychology (1A–33) ..........................................................**
   - Units
   - 6

7. **Humanities .................................................................**
   - Units
   - 12

8. **Social science ............................................................**
   - Units
   - 12

9. **Electives .................................................................**
   - Units
   - 10–0

---

### School of Education

The School of Education offers professional courses intended for students preparing for educational service in elementary, junior, and senior high schools, and junior colleges; for students who are fitting themselves for supervisory or administrative positions in public schools; and for students who propose to engage in school administration, to teach in state colleges or in university departments of education, or to carry on research work in the field of education.

† Course numbers in parentheses are courses given in the departments at Berkeley.

§ For students who complete the freshman and sophomore years in the College of Letters and Science, Berkeley, the provisions of the foreign language requirement of that College will apply.
GENERAL REQUIREMENTS IN TEACHER EDUCATION

The student must satisfy the following general requirements to complete a curriculum leading to a recommendation for a teaching credential.

Scholarship.—The School of Education will admit to candidacy for recommendation only those students who have maintained a grade-point average of not lower than 2.5 in studies undertaken during the junior and senior years.

Oral English.—The student must prove that he has a command of spoken English adequate to the purposes of instruction. He may satisfy this requirement by examination, by completing suitable courses in the Department of Speech, or by any other evidence satisfactory to the Committee on Oral English.

Health Certificate.—The student must take a medical examination and obtain a satisfactory certificate from the University Physician.

Citizenship.—Each applicant for a credential is required by the State Department of Education to be a citizen of the United States. An applicant who has filed his declaration of intention to become a citizen (first citizenship papers) is eligible to apply for a credential if he has not been in the United States for permanent residence for more than six years and one month. No credential can be issued for service beyond this period unless the applicant has received his certificate of naturalization. If a credential is issued for less than a full term because of the citizenship requirement, it will be extended when citizenship is verified.

Oath of Allegiance.—The State Board of Education also requires each applicant for a credential to take an oath of allegiance to the United States and to submit identification cards showing fingerprints.

The Constitution of the United States.—The State Board of Education requires the completion of a course or the passing of an examination on the provisions and principles of the Constitution of the United States. This requirement may be satisfied by passing the examination in American Institutions or by completing one of the following sequences: History 17A-17B, 171A-171B, 172A-172B; Political Science 157A-157B; or by passing one of the following courses: Political Science 1, 100A, 113.

Credential Requirements.—For information concerning credential requirements, students should consult the Student Personnel Service, 103 Haviland Hall.

Each prospective candidate for a teaching credential must file an application for admission to graduate standing with the Dean of the Graduate Division, 250 Sproul Hall, no later than July 15 for the fall semester and no later than December 15 for the spring semester. This application must be accompanied by a bank draft or money order for the $5 application fee, payable to The Regents of the University of California. The graduate student must furnish a transcript of his college or university work both to the Dean of the Graduate Division and to the Dean of the School of Education when he files his office record card in Room 103 Haviland Hall. On the basis of these records, the Dean of the Graduate Division issues a statement of the student's official status. The student must present this statement when he files his office record card.

Application for Credential and for Supervised Teaching.—Detailed schedules of procedures may be obtained in 103 Haviland Hall. Applications for supervised teaching (Education 320A, 320C, 323, 324, 330A, and 330C) must be made in 103 Haviland Hall not later than November 7, 1960, for the spring semester, 1961, and not later than April 3, 1961, for the fall semester, 1961. Enrollment is limited to available facilities and staff.

Students planning to enroll in supervised teaching (Education 320A, 320C, 320E, 323, 324, and 330C) should note that these are extra-session courses, in which instruction begins with the beginning of the semester in the public
schools, and ends at the close of the semester in the public schools. In the
fall semester, 1960, instruction in these courses in most cases will begin on or
about September 6, 1960, and end on January 27, 1961; in the spring sem-
ester in most cases, it begins on January 30, 1961, and ends on June 16, 1961.

Application to the State Board of Education.—The application to the State
Board of Education for a teaching credential must be accompanied by a
health certificate; duplicate personal identification (fingerprint) cards; and
money order, certified check, or cashier’s check for $4, the application fee,
made payable to the Commission on Credentials.

Renewal of Provisional Teaching Credentials.—Teachers who hold pro-
visional credentials in California may wish to use credit obtained in Summer
Session or University Extension classes in applying for the renewal of their
credentials through the University of California. To do this they must not
only enroll in Summer Session or University Extension classes, but must also
be declared eligible for admission as regular students. This applies only to
undergraduates. Application should be made to the Director of Admissions,
127 Sproul Hall.

Teachers who plan to renew provisional credentials should consult the
Student Personnel Service, 103 Haviland Hall, in planning programs to meet
credential requirements.

The General Secondary Credential

Specific Requirements

Counselors.—Students may consult one of the following counselors: Mr.
Edwards, 111 Haviland Hall; Mr. Loban, 108 Haviland Hall; Mr. Lund, 110
Haviland Hall; Mr. Schevill, 304 Haviland Hall; Mr. Webster, 208 T-8; Mr.
Hogan, 226 T-8.

Requirements.—The candidate for the recommendation for this credential
must satisfy the following specific requirements, in addition to the general
requirements described beginning on page 121.

1. He must spend two graduate semesters at this University during which
he completes a minimum of 24 units of upper division and graduate work
with a grade-point average of not lower than 2.75. At least 6 of these units
must be in graduate courses, or in upper division courses accepted by the
School of Education, in the fields of the teaching major or minor, or both.

2. He must complete with a scholarship average of at least two grade points
the following 22 units in education (the State Board of Education requires
that at least 6 units in education courses be completed in the graduate year):

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education 100A (Learning and the Learner)</td>
</tr>
<tr>
<td>Education 100B (The School in American Society)</td>
</tr>
<tr>
<td>Education 320B (Introduction to Teaching in</td>
</tr>
<tr>
<td>Secondary Schools)</td>
</tr>
<tr>
<td>Education 320A (Supervised Teaching)</td>
</tr>
<tr>
<td>Education 320C (Supervised Teaching)</td>
</tr>
<tr>
<td>Education 320E (Professional Methods)</td>
</tr>
<tr>
<td>Electives in Education</td>
</tr>
<tr>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>-------------------------------------------</td>
</tr>
</tbody>
</table>

The candidate should note the following:

(a) Students are advised to distribute these courses over the junior, senior,
and graduate years as follows: Education 100A in the junior or senior
year; Education 100B, and 320B concurrently in the senior year; Edu-
cation 320A, 320C, and 320E in the graduate year.

(b) Psychology 1A or its equivalent is prerequisite to these courses.
(e) Credit in courses offered in the Department of Education for a teacher's credential may not be obtained by examination.

3. He must complete a teaching major and a teaching minor selected from the following fields of University studies:

(1) Agriculture
(2) Art or decorative art
(3) Business education
(4) English or speech
(5) Foreign languages
(6) Homemaking
(7) Librarianship
(8) Life science
(9) Mathematics
(10) Music
(11) Physical education
(12) Physical science
(13) Social studies

The Teaching Major.—There are two kinds of teaching majors. The first consists of 36 units of which 18 to 24 units are completed in upper division and/or graduate work, the precise amount to be agreed upon by the School of Education in consultation with the subject representative in the department or departments concerned (ordinarily, 18 units of the teaching major shall be selected from the departmental major for the bachelor's degree). The second consists of a minimum of 36 units of upper division and/or graduate work in two or more related subjects (for example, social studies), this major being fixed by the School of Education in consultation with the subject representatives of the departments concerned. In addition to the foregoing minimum requirements, the School of Education will prescribe such graduate courses designed for teachers as may be organized by the various departments; and, in agreement with the subject representative, such other courses, either graduate or undergraduate, as may be found necessary, provided the total number of units required for any subject does not exceed 36.

The Teaching Minor.—The teaching minor in any subject consists of not less than 20 units, ordinarily in a department or field of studies other than the teaching major. Not less than 9 units of this total shall consist of upper division and/or graduate courses (except as recommended by the department or departments concerned to the School of Education).

4. He must maintain the following scholarship ratings in the various classifications of this work:

- Upper division work: a grade-point average of at least 2.50
- Postgraduate work: a grade-point average of at least 2.75
- Education courses: a grade-point average of at least 2.00
- Work for the major: a grade-point average of at least 2.75
- Work for the minor: a grade-point average of at least 2.00

The Junior College Credential

Counselor.—Mr. Schevill, 304 Haviland Hall.

Requirements.—The candidate for the recommendation for this credential must fulfill the specific requirements listed below, in addition to the general requirements described on page 121.

† A combination teaching major and minor may be worked out in certain fields, utilizing the basic courses as fundamental to both the teaching major and teaching minor.

‡ For requirements for the teaching majors and teaching minors, consult the ANNOUNCEMENT OF THE SCHOOL OF EDUCATION.
1. He must complete as a graduate student, two semesters of work in residence at this University.

2. He must hold a master's or doctor's degree from this University, or from another institution recognized as equivalent by the Graduate Division, in one of the following fields of study: agriculture, anatomy, anthropology, architecture, art, astronomy, bacteriology, botany, business administration, chemistry, child development, comparative literature, decorative art, economics, engineering, English, forestry, French, geography, geology, German, Greek, history, journalism, nutrition and home economics, Italian, Latin, librarianship, mathematics, mining and metallurgy, music, paleontology, philosophy, physical education, physics, physiology, political science, psychology, sociology and social institutions, Spanish, zoology. The major for the master's or doctor's degree is recognized as the teaching major if it is in one of the above fields.

3. He must complete an approved teaching minor in one of the above fields or in a field chosen from the list of teaching majors for the general secondary credential.

4. He must complete with a scholarship average not lower than two grade points at least 10 units in education courses, including:

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Junior College—Education 279 ..................................................... 4</td>
</tr>
<tr>
<td>Supervised Teaching and Professional Methods:</td>
</tr>
<tr>
<td>Education 324, and 320E, Section 16 ............................................... 6</td>
</tr>
<tr>
<td><strong>Total</strong> ................................................................. 10</td>
</tr>
</tbody>
</table>

5. He must maintain the following scholarship ratings in the various classifications of his work:

   - Upper division work: a grade-point average of at least 2.50
   - Postgraduate work: a grade-point average of at least 2.75
   - Education courses: a grade-point average of at least 2.00
   - Work for the major: a grade-point average of at least 2.75
   - Work for the minor: a grade-point average of at least 2.00

The General Elementary Credential

_Counselors._—Mr. Dumas, 106 Haviland Hall; Mr. Arnsdorf, 314 Haviland Hall; Mr. Michaelis, 316 Haviland Hall; Mr. Russell, 315 Haviland Hall; Mr. Scott, 314 Haviland Hall.

_Requirements._—The candidate for the recommendation for this credential must satisfy the following specific requirements, in addition to the general requirements described on page 121.

1. He must hold a bachelor's degree from one of the academic colleges of this University or its equivalent.

2. He must take one semester of graduate work.

3. He must maintain the following scholarship ratings in the various classifications of his work:

   - Upper division work: a grade-point average of at least 2.50
   - Postgraduate work: a grade-point average of at least 2.50
   - Education courses: a grade-point average of at least 2.00
   - Work for the major: a grade-point average of at least 2.00
   - Work for the minor: a grade-point average of at least 2.00

4. He must complete with a scholarship average of not lower than two grade points the following courses:
Learning and the Learner—Education 100A ....................... 4
The School in American Society—Education 100B ..................... 3
The Elementary School Curriculum—Education 130
130A. Arithmetic ............................................................... 2
130B. Art and Music ............................................................ 2
130C. Reading and the Other Language Arts ............................. 3
130D. Social Studies and Science ......................................... 3
Introduction to Elementary Teaching—Education 330A* .................. 2
Elementary Supervised Teaching—Education 330C* ..................... 8
Methods of Teaching in Elementary School or Junior High School—
Education 330E .................................................................. 2

5. Recommended Sequence of Courses:
A. Plan I.
   Low junior semester: Education 100A. This course is prerequisite to
   Education 100B, 130A–B–C–D, and 330A.
   High junior semester: Education 100B and one of the following—
   Education 130A–B–C–D.
   Low senior semester: two of the following—Education 130A–B–C–D.
   High senior semester: one of the following—Education 130A–B–C–D,
   and Education 330A* which is prerequisite to Education 330C,
   330E.
   Graduate semester: Education 330C*, 330E. (One additional course
   may be added on consent of the adviser.)
B. Plan II.
   Students who wish a more extensive liberal arts program may be inter­
   ested in the following one-year graduate sequence listed below. Pre­
   requisite: A.B. degree including (1) group or department major
   and minor from approved list (see section 6), and (2) the following
   courses or their equivalents: Psychology 1A, Decorative Art 6A,
   Music 10, Education 100A, Education 100B, and one course chosen
   from the following: Geography 131, History 187A, 187B, 189A,
   189B, 181B.
   First graduate semester: Physical Education 26 (Games and Dance),
   Education 130A, B, C, D, Education 330A.
   Second graduate semester: Education 330C, Education 330E.

6. He must complete, with a scholarship average of at least 2.00 a major
   and a minor selected from the following fields of university studies:
   (a) Art or decorative art
   (b) English and/or speech
   (c) Foreign language
   (d) Home economics
   (e) Mathematics
   (f) Music
   (g) Natural science
   (h) Physical education
   (i) Social studies
   (j) Psychology, with emphasis on child and clinical psychology.
   (k) Group majors chosen from: American civilization, American litera­
       ture, child development, communications and public policy, East Asiatic
       studies, international relations, labor and industrial relations, physical

* Application for enrollment in Education 330A and 330C must be filed in 103 Havi­
   land Hall not later than November 7, 1960, for the spring semester, 1961, and not later
   than April 3, 1961, for the fall semester, 1961.
education, recreation, sociology, social welfare, wildlife conservation. In each case, the major must be approved by the Director of Supervised Teaching.

(i) Regional group majors chosen from: China, Hispanic America, Russia, and Eastern Europe. In each case, the major must be approved by the Director of Supervised Teaching.

(m) Any other major for the A.B. or B.S. degree the content of which is primarily related to the elementary school curriculum, may be accepted, provided that application for acceptance be made to the Committee on Admission to Supervised Teaching and be approved by the committee.

Courses taken in fulfillment of a major cannot be used to satisfy the minor requirement.

7. Other courses required for this credential:
- Psychology 1A, General Psychology (3).
- Decorative Art 6A, Theory of Design and Color (2).
- Physical Education 26, Physical Education Activities (section on Games for Elementary Schools and section on Rhythmical Activities for Elementary Schools) (½ each).
- Music 10, Basic Musicianship (2); Music 27A, Introduction to Musical Literature (3) is strongly recommended.
- History 189A or 189B, History of California (2); both are recommended.

SCHOOL OF FORESTRY

The School of Forestry offers undergraduate and graduate curricula leading to the degrees of Bachelor of Science, Master of Forestry, and Master of Science.

Admission to the School of Forestry

Candidates for admission to the School of Forestry must qualify in the following ways:

A. Completion of at least 60 units of work in one of the colleges of the University of California, preferably the preforestry curriculum of the College of Agriculture; or admission to the University in junior standing. In all cases, junior standing requires the completion of 60 units of work acceptable to the Board of Admissions of the University.

B. The candidate must have the following preparation for courses in the curriculum of the School of Forestry:*

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Botany (general botany)</td>
<td>5</td>
</tr>
<tr>
<td>2. Chemistry (general inorganic, and organic)</td>
<td>8</td>
</tr>
<tr>
<td>3. Engineering (plane surveying)</td>
<td>3</td>
</tr>
<tr>
<td>4. Economics (elements of economics)</td>
<td>6</td>
</tr>
<tr>
<td>5. Geology (structural)</td>
<td>3</td>
</tr>
<tr>
<td>6. Mathematics (beyond trigonometry)</td>
<td>3</td>
</tr>
<tr>
<td>7. Physics (general physics)</td>
<td>6</td>
</tr>
</tbody>
</table>

* If applicants are otherwise qualified, they may be admitted to the summer field practice course, Forestry 49, and the School of Forestry with certain subject shortages in this list. No listing of specific permissible shortages can be made, as they depend upon the practicability of the student's carrying a full program of required forestry courses concurrently with the removal of shortages in preforestry requirements. This must be determined for each individual case. Nevertheless, shortages of over 12 units in the subjects listed, or a shortage of either general botany or plane surveying, will make it impossible for a student to take Forestry 49 or to be admitted to the School of Forestry. Students desiring further information should communicate with the School of Forestry, University of California, Berkeley 4.
School of Forestry

Requirements for the Degree of Bachelor of Science

Undergraduate students must complete the following requirements for a bachelor's degree:

1. The equivalent of eight semesters' residence, the senior year of which must be spent at this University.

2. One hundred twenty-four units of study with 248 grade points, exclusive of the field practice course, Forestry 49. Thirty-six of the 124 units must be in upper division courses, and at least 60 units must be completed in the School of Forestry. This total of 60 units, however, may be reduced in the case of students admitted to the School with advanced standing.

3. The removal of any deficiencies in the following courses usually taken in high school: mathematics, 3 years, including plane geometry, algebra, and trigonometry; mechanical drawing, one-half year.

4. An examination in English composition known as Subject A. Students who fail in this examination are required to take the course in Subject A, which yields no unit credit toward the degree and for which a fee of $35 is charged.

5. The University requirement of American History and American Institutions by examination.

6. The University requirement of 8 units of military science and tactics.

7. The field practice course, Forestry 49, in camp at Meadow Valley, near Quincy, in the Plumas National Forest.

8. In addition to requirements 3 and 5 above, University preforestry courses as listed above for admission to the School, and courses in the School of Forestry as follows:

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Statistical methods ................................................................. 3</td>
</tr>
<tr>
<td>9. Zoology (general biology) ...................................................... 3</td>
</tr>
<tr>
<td>10. English or speech ................................................................. 6</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

C. No student with a grade-point average of less than 2.00 (C average) will be admitted.

Note. The restricted technical elective requirements may be fulfilled by completion of 15 units of study selected from one of the following options:

I. Forest management option: Business Administration 140; Entomology 114; Plant Pathology 100; Range Management 101; Zoology 116; Forestry 106, 112, 118, 125, 126, 130, 132.

II. Range management option: Botany 108; Forestry 125, 132; Range Management 101, 102, 123, 133; Zoology 116.

III. Wood utilization option: Business Administration 1A, 122, 140; Engineering 18A, 18B; Forestry 112, 115, 126.

A student who has a specific educational objective which is not attainable through one of these options may, with the permission of the Study-Lists Committee, satisfy the restricted technical elective requirement by election of other courses which define a relevant area of specialization.

The nontechnical elective requirement must be completed while in the upper division. At least 9 units must be drawn from two of the following nontechnical fields: (a) English or speech; (b) foreign language; (c) economics, political science, psychology, or sociology; (d) anthropology or history; (e) fine arts or philosophy; (f) military, naval, or air science (upper division).
Plan of Study

THE CURRICULUM OF THE SCHOOL OF FORESTRY

A single curriculum is offered in the School of Forestry, arranged to give a solid broad training, with some opportunity for electives. The broad forestry education provided by this curriculum lays the foundation which students need for later more specialized professional or academic work in this field.

PREFORESTRY

The schedule of study offers a broad basic training in the first four semesters. To complete his work for the degree of Bachelor of Science in the normal eight-semester period, the student should adhere closely to the recommended program, which follows. It enables him to complete the maximum number of lower division courses in an orderly manner and without conflicts. Much of this work is prerequisite to necessary courses in the School of Forestry, and thus the student is prepared to make an advantageous selection of electives and a logical arrangement of requirements in the School of Forestry.

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall Units</th>
<th>Spring Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 1A–1B</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Speech 1A–1B or English</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>1A–1B</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Zoology 10</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Chemistry 1A</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Military Science</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Fall Units</th>
<th>Spring Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 2A–2B</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Geology 10</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>*Botany 1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Military Science</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Statistics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Chemistry 8</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Engineering 21</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>14</td>
</tr>
</tbody>
</table>

FORESTRY

The two-year foundation of courses outlined in the preforestry program above is followed by a sequence of required professional courses.

In the summer following his sophomore work, the student must attend the field practice course, Forestry 49. This course is prerequisite to all required courses in the School of Forestry. The camp experience gives the student a better knowledge of forest practices and activities. Often, too, it enables him to find out whether his choice of forestry as a profession is a wise one.

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Fall Units</th>
<th>Spring Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forestry 103</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Forestry 108</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Forestry 128</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Forestry 110</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Botany 111</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Soils 10</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Technical electives</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Nontechnical electives</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
<th>Fall Units</th>
<th>Spring Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forestry 104</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Forestry 121</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Forestry 114</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Forestry 120</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Forestry 122</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Technical electives</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Nontechnical electives</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

Restricted Technical Electives.—Fifteen units of technical electives must consist of courses drawn from one of the three options listed on page 127.

Nontechnical Electives.—Twelve units of nontechnical electives must in-

* Students who prepare for forestry at other institutions which do not offer a one-semester course in botany (equivalent to Botany 1) should take a general botany course. This does not take the place of 4 units of plant physiology with laboratory (Botany 111).

† One-half year of mechanical drawing and one-half year of trigonometry are necessary for forestry courses. Trigonometry is also prerequisite to engineering. They should be taken in high school. The University does not offer a course in mechanical drawing.

† Students interested in wood utilization or logging engineering should elect a year course in calculus.
School of Forestry

clude at least 9 units drawn from two of the nontechnical fields listed on page 127. The subject matter of forestry is such that the courses follow a normal sequence as shown above. Therefore, students should adhere as closely as possible to this suggested program.

*Enrollment in Upper Division Forestry Courses.*—Enrollment in upper division forestry courses is open only to students registered in the School of Forestry and to those registered in other colleges or schools who have both a C average and preparation satisfactory to the instructor in charge.

**Graduate Study**

The School of Forestry offers varied opportunities for graduate study. The diversity of climate, vegetation, and soil in California provides a wide choice of subjects for investigation. The faculty of the School of Forestry and of related departments is active in research and has developed facilities and equipment which permit graduate students to attack a wide variety of research problems.

The University of California offers a Master of Forestry degree program for those wishing to obtain preparation in the professional aspects of forestry and a Master of Science degree program for those desiring to specialize in a particular phase of forestry, such as timber management, wood technology, or range management. The Ph.D. degree program is available for those wishing to specialize in some phase of basic research related to forestry. Complete information regarding graduate instruction on the Berkeley campus is contained in the *Announcement of the Graduate Division, Northern Section*.

**THE MASTER'S DEGREE**

Broad advanced professional education in forestry can best be accomplished by working toward the degree of Master of Forestry, which requires completion of 24 units of upper division and graduate courses. At least 12 of these units must be in strictly graduate courses in the major subject. In addition, the student must present an acceptable professional paper and must pass a comprehensive final examination to demonstrate mastery of the essentials of professional forestry.

Specialization in some phase of forestry can best be approached by working toward the degree of Master of Science, which requires completion of 20 units of courses, of which at least 8 units must be strictly graduate courses in the major subject. In addition, the student must prepare a satisfactory thesis based upon his own research.

To be admitted to the Graduate Division for either the Master of Forestry or Master of Science degrees, the student must have had a high scholastic record in his undergraduate years. He will be expected to have completed an undergraduate curriculum essentially equivalent to that required for a bachelor's degree at the University. The graduate student's program is usually planned largely to meet his individual needs and interests. The arrangement is flexible enough so that the student may either include a broad preparation for professional work or specialize and give a greater part of his time to a specific problem.

**THE DOCTOR'S DEGREE**

For many research and teaching positions in the field of forestry, the Doctor of Philosophy degree is highly desirable. The specialized work required under these circumstances involves a far more thorough basic education than can otherwise be secured. At the University of California, it is assumed that the doctor's degree involves thorough study in basic scientific fields; therefore, the student has his choice of a series of fields of basic science which in
Requirements of Colleges, Schools, and Curricula

some cases cross departmental lines and are handled by faculty advisers and committees under the administration of the Graduate Division. Some of the groups which are closely allied to forestry are plant physiology, genetics, agricultural economics, botany, geography, and soil science. A forester ordinarily would specialize in one of these fields. Since the work toward the doctorate is based upon these fundamental basic sciences, the forester, with his training in the applied scientific field, generally must take certain required basic science courses when he embarks upon a program leading to the Ph.D. degree in any of these subjects. Foresters, therefore, may have to include in their programs courses in chemistry, biochemistry, plant physiology, economic theory; and other similar basic work.

As a result, it often takes three years to satisfy the requirements for the doctorate. The training, however, is extremely thorough and basically valuable, so that the student who earns this higher degree at the University of California is well equipped for highly specialized work in his chosen field of study. The research for the thesis should be on a problem which involves forestry, under the supervision of faculty members concerned with his own special line of work within the School of Forestry.

WOOD TECHNOLOGY

A graduate program in wood technology leading to the degree of Master of Science is offered at Berkeley under guidance of a staff group drawn from chemistry, engineering, forestry, and other related departments. Work leading to the degree of Doctor of Philosophy may be pursued in some basic science field to which wood technology is closely allied. The Forest Products Laboratory provides exceptional facilities for graduate research and study in this field.

RANGE MANAGEMENT

A graduate program in range management leading to the degree of Master of Science is available at Berkeley and Davis. Work leading to the degree of Doctor of Philosophy may be pursued in some basic science field to which range management is closely allied.

SCHOOL OF LAW

Preparation for the Study of Law

For the guidance of students who may become applicants for admission to the School, the essentials of a satisfactory prelegal education are summarized as follows:

In the first place, the prelegal student should follow a plan of study which will assure adequate foundations for broad culture. Such a plan should include among its objectives: (1) a well-grounded facility in the use of English, written and spoken, and a wide acquaintance with the best of English literature; (2) a familiarity with at least the outlines of history and a thorough knowledge of the history of our own country and people; (3) an acquaintance with the great philosophers and an understanding of the progress and significance of philosophic thought; (4) a mastery of elementary logic and mathematics and some acquaintance with their application in contemporary life; (5) an introduction to science and an appreciation of its tremendous importance in the modern world; and (6) a thorough knowledge of the elements of social science, including the essentials of economics, government, psychology, and other important social studies. Foundations must be laid in high school for the study of English, history, mathematics, and natural science. The prelegal student normally will be well advised to defer philosophy and the social studies until he has entered college. If prelegal study is planned effectively, the foundations for a broad culture may be laid in high school and in the first two years of college.
In the second place, the prelegal student should acquire the intellectual discipline and experience which are to be derived from intensive work for a substantial period of time in a selected field of study. This work should be carefully planned, and a special competence should be achieved in the selected field. It has often been found that a well-chosen group of courses in economics may be related effectively to later professional study in law. An effective preprofessional training may also be planned with emphasis upon political science, history, business administration, psychology, English, philosophy, or similar fields. Applicants who are interested in courses stressing international, historical or comparative aspects of the law, or in the School's postgraduate program in International Legal Studies will find reading knowledge of a foreign language beneficial.

In the third place, the prelegal student should begin the cultivation of professional standards of study as early as possible. Few ideas are more fallacious or harmful than the notion that it is possible to dawdle through high school and college and then make the adjustment to high standards promptly upon entering the professional school. Essential habits of concentration and effective methods of study must be acquired and developed during the prelegal years. Careful reading and constant exercise of practice in writing should be cultivated assiduously. Intelligently selected private reading should supplement the work of the classroom at all times. The law as a process of social adjustment is reflected in all aspects of life, and the student who carelessly wastes the opportunities of his prelegal years cannot possibly present himself well prepared for professional training. A large proportion of failures in the professional school may be traced directly to the neglect of opportunities in high school and college. Distinguished achievement in high school and college is usually followed by distinction in the professional school and in later law practice.

The satisfactory completion of a basic course in accounting is a prerequisite for entry into the second year of law school. This prerequisite may be met by satisfactory completion: (1) of a basic undergraduate course in accounting of six semester hours, or its equivalent; or (2) of a course in legal accounting which will be offered as a part of the School of Law summer session program. Students at the University of California, Berkeley, may meet this requirement by completing Business Administration 1A-1B. It is suggested that every prelegal student learn to use a typewriter.

Copies of a memorandum (designed primarily for prelegal students at the University of California, Berkeley) entitled "Recommended Courses for Prelegal Students" may be obtained from the office of the Dean, School of Law, Berkeley 4. The offices of the prelegal advisers are located in the School of Law Building. Prelegal students are not required to discuss their programs with a prelegal adviser, but those who have special problems should not hesitate to seek advice.

Law School Admission Test

The School of Law cooperates with other law schools in requiring that applicants for admission take the Law School Admission Test, administered by the Educational Testing Service. The test is designed to measure aptitude for professional study, rather than knowledge of subject matter, and no special preparation is necessary. Centers where the test may be taken have been established for the convenience of applicants in all parts of the country. The test is required of all applicants for admission to this School and should be taken during the academic year preceding the one for which admission is sought. Students who plan to apply for scholarships are urged to take the Law School Admission Test in the fall preceding entrance. For application procedures, see Admission Procedure, page 132.

The Educational Testing Service will supply each applicant with a bulletin
Admission to the Professional Curriculum

Applicants for admission to the professional curriculum of the School of Law, leading to the degree of Bachelor of Laws, must have received the degree of Bachelor of Arts or Bachelor of Science from the University of California, or an equivalent degree from a college or university of approved standing. The program of study leading to the degree should be in substantial conformity with the essentials of a satisfactory prelegal education (see page 130).

Applicants who have achieved a B (3.0) average in the work of the last two prelegal years may be admitted unless their scores on the Law School Admission Test are so low as to demonstrate a lack of capacity for the work of the professional curriculum.

Applicants having less than a B average, but at least a C+ (2.5) average, may be admitted if they give sufficient evidence through their scores on the Law School Admission Test, or otherwise, of capacity for the work of the professional curriculum. Such applicants may be asked to present themselves at the School for personal interviews before admission is granted.

Applicants must also submit satisfactory references as to character, including the names and addresses of not fewer than three disinterested and responsible persons to whom the applicant is well known and to whom the faculty may appropriately address inquiries with respect to the applicant's character. Wherever possible, the character references should include a member of the Bar who is a graduate of the School of Law or of another law school approved by the American Bar Association.

Students beginning their professional work are admitted only in September. Attention is called to the accounting prerequisite for entry to the second year of law study described in the section on Preparation for the Study of Law, on page 130.

Admission to Advanced Standing

Applicants who have completed at least one year of work in another law school may be admitted to the second year of the professional curriculum with credit for not more than one year of such work if (1) the applicant would have been eligible for admission to the first year in this School, (2) the work has been completed in a school which is a member of the Association of American Law Schools, and (3) the work for which credit is sought has been of superior grade. The faculty reserves the privilege of prescribing further conditions for the granting of such credit and may, in its discretion, require examinations in subjects for which credit is sought. To be assured of satisfactory programs, students transferring from other law schools should plan to enter at the opening of the fall semester.

Students who have been disqualified at another law school will not be admitted to this School.

Admission Procedure*

1. The initial application for admission to the School of Law should be made on forms which will be supplied by the School and should be addressed to the School of Law, University of California, Berkeley 4. It should be accompanied by transcripts of all college, university, or professional school records other than the records of work completed at the University of California, Berkeley. Where the applicant is currently in a college or university,

* The procedure herein applies to the class entering in the fall semester of 1961.
the transcripts should cover all work completed to date and should be accom­panied by a statement indicating the time when it is expected that the work pending will be completed and the necessary supplemental transcripts sup­plied. To insure consideration of an application for admission in September, 1961, the initial application should be received by the School not later than July 15. Actual receipt of the initial application by the School is the appli­cant's responsibility. In no circumstances should the initial application be addressed to another department or office of the University.

2. Applicants are also required to apply for admission to the Graduate Division. This application must be made prior to mid-July on forms which will be supplied by the Graduate Division and should be addressed to the Grad­uate Division, University of California, Berkeley 4, accompanied by a remit­tance in the sum of $5 payable to The Regents of the University of California. The remittance of $5 is not required of veteran applicants who expect to enroll under the provisions of Public Law 16 or Public Law 894. Persons governed by Public Law 550 must pay this fee at the time of application. This application must also be accompanied by official transcripts of records other than the record of work completed at the University of California, Berkeley. Such transcripts are in addition to those accompanying the initial applications to the School of Law. Since applicants cannot be admitted to the School until they have been admitted to graduate standing, the application should be filed at the earliest possible date.

3. For permission to take the Admission Test, applicants will write directly to Law School Admission Test, Educational Testing Service, 20 Nassau Street, Princeton, New Jersey, requesting an application blank and bulletin of infor­mation listing places where the test may be taken and the dates on which the test will be given. If the applicant so requests on the test application form, his score will be reported not only to this law school but also to other law schools where he may be applying for admission. He will also receive an indi­vidual score report directly from the Educational Testing Service.

**Admission to the Graduate Curriculum**

The student who desires (1) to broaden his professional education by study of legal history, international and comparative jurisprudence, or the relations of law and other social sciences, or (2) to supplement his professional educa­tion by study of special subjects (e.g., taxation, labor law, international law, marital property, procedure, corporations), or (3) special training in prepar­ation for law teaching, legal research, government service, or legislative drafting, may become a candidate for the degree of Master of Laws (LL.M.) or the degree of Doctor of the Science of Law (J.S.D.).

Admission to the graduate curriculum, as a candidate for either the LL.M. or the J.S.D. degree, may be granted to any applicant who has had at least six years of resident study at approved colleges and law schools, who holds a professional degree from a law school approved by the American Bar Association, and who, in the opinion of the faculty, gives evidence of capacity to complete the requirements for the degree; except that an applicant who has not received the A.B., B.S., or equivalent degree may be admitted only if the faculty concludes that his preparation in social sciences other than law has not been unreasonably limited.

Admission to the graduate curriculum though not as a candidate for a degree, may also be granted to any applicant who holds a professional degree from a law school approved by the American Bar Association and who, in the opinion of the faculty, gives evidence of capacity to continue advanced legal study successfully. An applicant so admitted may, after completion of one academic year of resident study, depending on his achievement and proved ability, be admitted as a candidate for the LL.M. or J.S.D. degree.
If the previous training of an applicant for admission to the graduate curriculum has been received in foreign educational institutions, he must present evidence that his preparation is substantially equivalent to that required for graduates of an American college or university.

SCHOOL OF LIBRARIANSHIP

The School of Librarianship offers curricula leading to the degrees of Master of Library Science, Doctor of Library Science, and Doctor of Philosophy. The Master of Library Science degree is awarded to students completing the first-year program of 28 units with an average grade of at least B (3.0 grade-point average).

The A.B. degree of the University of California or its equivalent, a grade-point average of at least 2.5 (C+) in the last two years of academic work, graduate standing, without deficiencies, in the University, and a college year of each of two modern languages—preferably French and German—are required for admission. Ability to use the typewriter with accuracy and a fair degree of speed is expected of all students. Applicants are required to take the Aptitude Test of the Graduate Record Examination and to have their scores sent to the School in time for evaluation before final action is taken on their applications. Applications for admission to the first-year curriculum will ordinarily not be considered from persons over 35; exceptions may be made for those holding advanced degrees or for those who have had successful library experience. Applicants must submit to the Dean of the School complete transcripts of their academic records so that their qualifications for admission to the School may be determined. New first-year students will not be admitted at the beginning of the spring semester.

Any course in the advanced curriculum is open to any graduate student who satisfies the instructor of his ability and preparation to undertake the work, even though he is not a candidate for a degree in this School and does not qualify for it.

Candidates for advanced degrees are subject to all general University regulations governing those degrees (see ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION).

Curriculum for the Master’s Degree.—The School’s basic curriculum is designed to prepare municipal, county, college, university, school, children’s, and special librarians. To ensure adequate opportunity for students who enroll in the School, only a limited number will be accepted for the first-year curriculum. No one should come to Berkeley without having made application to the School and to the Graduate Division and having received notice of acceptance from both. Early application is desirable and after the class has been selected, opportunity to enter is dependent on withdrawal of someone previously accepted.

Curricula for Advanced Degrees.—Candidates for advanced degrees, before being admitted to the School, must be accepted in graduate standing, without deficiencies, in the University of California; must have been graduated with at least a grade B average from the basic professional curriculum in a graduate library school which is accredited by the American Library Association, and approved by the University of California; must have had at least a college year, not less than 8 units, of each of two modern foreign languages; and must take the Graduate Record Examination Aptitude Test. Professional library experience before undertaking advanced work is recommended.

The degree of Doctor of Library Science is a professional degree conferred in recognition of the candidate’s command of a comprehensive body of professional knowledge and of his ability to initiate, organize, and pursue the investigation of significant problems in the field of librarianship. The candidate for the Doctor of Library Science degree must have had professional experience. The foreign language requirement, other than that required for
admission, not general for this degree, depends upon the needs of each candidate. He may specialize in college and university libraries or public libraries. Although most dissertations written for the Doctor of Library Science degree will fall within one or another of these two fields, the designation of fields of specialization does not preclude the writing of a dissertation which does not obviously fall in one field or the other.

**Admission Requirements**

A student is admitted to candidacy for the Doctor of Library Science degree by the Graduate Council on the recommendation of the School of Librarianship after he has completed the following requirements: (1) He must have completed a minimum of two semesters in residence, after fulfilling all the requirements for admission to the School of Librarianship noted above. (2) He must have passed a comprehensive examination in general librarianship, as represented by the first-year curriculum at the University of California. (3) He must have passed an intensive written and oral examination in one of the two fields noted above in which he plans to write his dissertation. (4) His complete program, including a detailed outline of his proposed dissertation as candidate for the degree of Doctor of Library Science, must have been approved by the faculty of the School of Librarianship. (5) He must have passed a reading knowledge examination in one or more foreign languages if, in the judgment of the faculty, such reading knowledge is essential to the successful completion of the proposed dissertation. (6) He must have shown evidence of having had a significant amount of successful professional experience.

**Degree Requirements.**

(1) The candidate must complete at least four semesters of graduate study, beyond his first professional degree, in residence at the University of California, two before and two after being advanced to candidacy. (2) He must have completed at least 36 units of graduate and upper division courses in librarianship and other departments related to his field of study, in addition to those taken for the first professional degree, and in addition to the thesis course (299). (3) He must submit a dissertation which demonstrates his ability to conduct independent investigation and which contributes to knowledge, or organizes known facts to produce a result of importance and value, in the field of librarianship. (4) He must successfully defend his dissertation in an oral examination, and show his mastery of the field in which the dissertation is written.

The degree of Doctor of Philosophy is conferred upon the qualified candidate in recognition of his command of a comprehensive body of academic and professional knowledge and upon his demonstration of a general grasp of the subject matter of a large field of study. He must also show his critical ability and power to analyze problems, as well as to coordinate and correlate data from a number of cognate disciplines. The student must, furthermore, show through his dissertation the power to make an original contribution to the knowledge of his chosen field of study and, throughout all his career as a graduate student, give evidence of his ability to work independently. He may specialize in the following fields of librarianship: bibliography, history of books and printing, history of libraries, or the library as a social institution. Although most dissertations written for the Ph.D. degree will fall within one or another of these four fields, the designation of fields of specialization does not preclude the writing of a dissertation which does not obviously fall in one field or another.
ship, as represented by the first-year curriculum at the University of California; (b) an examination in the field in which the dissertation will be written, including the closely related subject field or fields outside the School of Librarianship; (c) an examination in one other of the fields in which the Ph.D. degree is offered in librarianship; and (d) an oral examination given after the written examinations have been passed.

For further information, see the ANNOUNCEMENT OF THE SCHOOL OF LIBRARIANSHIP.

SCHOOL OF MEDICINE (SAN FRANCISCO)

The School of Medicine offers a four-year curriculum leading to the degree of Doctor of Medicine.

Preparation for the Study of Medicine.—The practice of medicine is a complex function requiring knowledge derived from many basic and applied sciences, various technical skills and personal aptitudes. Medical education is correspondingly complex and demanding. The premedical curriculum must provide the student with sufficient training in physical and biological sciences to permit later effective study of the basic medical sciences. Equally important, it must give him a broad education as a basis for the more specialized professional education that follows. The premedical student, in particular, as a prospective physician and as an individual, requires the opportunity for intellectual maturation and development afforded by a well-rounded liberal arts curriculum.

Admission Requirements.—Minimum admission requirements are outlined here. Further information may be obtained in the ANNOUNCEMENT OF THE SCHOOL OF MEDICINE, SAN FRANCISCO. (The corresponding courses offered at the University of California, Berkeley, are given in parentheses.)

One year of English or speech .............. (English 1A–1B or Speech 1A–1B)
One year of general chemistry, with laboratory ...... (Chemistry 1A–1B)
Three semester hours of quantitative chemical analysis ...... (Chemistry 5)
(Chemistry 4A–4B will meet requirements for Chemistry 1A, 1B, and 5)
Three semester hours of organic chemistry .................. (Chemistry 8)
One year of physics, with laboratory ............ (Physics 2A–2B, 3A–3B)
One year of general zoology or biology, with laboratory. (Zoology 1A–1B)
(Biology 11A–11B will meet Zoology 1A requirements)
Three semester hours of vertebrate embryology ............ (Zoology 100)
Eight semester hours of one modern foreign language

A student may apply for admission following the completion of three or four years of undergraduate work. If the student has not received a baccalaureate degree prior to entering the School of Medicine, it may be possible for him to receive the Bachelor of Science degree in Medical Sciences on successful completion of the first year of the School of Medicine curriculum. For further information, see the ANNOUNCEMENT OF THE SCHOOL OF MEDICINE, SAN FRANCISCO.

Application to the School of Medicine.—Applications for admission to the School of Medicine should be filed with the Office of the Director of Admissions, The University of California Medical Center, San Francisco 22, California. Applications for the September, 1961, first-year class must be filed between May 1, 1960, and September 30, 1960, and no application blanks will be issued by the Office of the Director of Admissions after September 15, 1960. It will not be possible to give a statement of tentative acceptance to any applicant.

Enrollment in the School of Medicine is limited. Candidates for admission to the first-year class are accepted primarily on the basis of scholarship and personal qualities judged important for a prospective physician. Two personal interviews are held. Each applicant must take the Medical College
School of Medicine

Admission Test, administered for the Association of American Medical Colleges by the Educational Testing Service at Princeton, New Jersey. The test is given at various colleges and universities, including the University of California. Applicants for the September, 1961, class are advised most strongly to take this test in May, 1960, unless it has been taken in 1959 (the test should be repeated if at the time of application more than two years have elapsed since the last test). While the fall test (October or November, 1960) will be acceptable, the results are not usually available before December, which delays consideration of the application.

The student must apply for the Medical College Admission Test at least three weeks but not more than three months prior to the scheduled date. Further information may be obtained from the Educational Testing Service, Princeton, New Jersey.

The student must complete all premedical requirements, including American History and American Institutions, not later than the spring semester preceding his admission.

Interview Appointments.—The procedure for making interviews is as follows:
1. The application and transcripts of all records must be filed in duplicate with the Office of the Director of Admissions in San Francisco.
2. Qualified applicants are then requested by the Dean's office to make appointments for interviews.

Certain applicants may be rejected without interview because of low scholarship and/or a low score in the Medical College Admission Test and, occasionally, for other reasons. Attention is called to the fact that no personal interview appointments are given until the applicant’s record has been evaluated.

An accepted applicant who is unable to start work or who enters the school but finds it necessary to withdraw within the first year, loses his place and, if he desires to begin work in a subsequent year, is required to reapply with that year’s applicants.

Physical Qualifications.—The Committee on Admissions takes into consideration the applicant’s physical and emotional fitness for the study of medicine. Applicants may be requested to authorize their Student Health Service or personal physician to send health information to the Committee on Admissions. At the time of registration all entering students must have a complete physical examination, and continuation in school is contingent upon satisfaction of health requirements.

California Applicants.—The majority of places in each class are given to students from California. Applications are screened carefully by the Committee on Admissions. In reaching a decision, the committee takes into consideration the applicant’s legal residence, the location of his high school and of the institution in which he has taken premedical work, the legal residence of his parents and, occasionally, other factors.

Out-of-State Applicants.—A maximum of ten per cent of the places may be filled with outstanding applicants from outside the state of California. Preference will be given to applicants from the following Western states not having medical schools: Alaska, Arizona, Hawaii, Idaho, Montana, Nevada, New Mexico and Wyoming.

The attention of applicants from these areas is invited to the program of Interstate Training and Financing, administered by:

The Western Interstate Commission for Higher Education
Fleming Law Building, University of Colorado
Boulder, Colorado

Well-qualified applicants from states other than those above will receive consideration by the Committee on Admissions.
Foreign Applicants.—Ordinarily not more than one applicant can be accepted from outside continental United States and this place is reserved for a student of outstanding caliber. The committee will select an individual from a foreign country who is in the United States for the purpose of pursuing his medical education and who intends to return to his own country following graduation, preferably for teaching in a school of medicine, for public health, or for related work. This applicant must have completed at least one year of premedical or academic work at the University of California, or at an equivalent institution in the United States, one semester of which must have been completed previous to February 15 of the year of admission. The attention of the applicants for this place is called to the fact that completion of the premedical program in the University of California or in some other institution does not necessarily guarantee acceptance by the School of Medicine.

All of the above is subject to change by such emergencies as may arise.

For further information see the annual Announcement of the School of Medicine, San Francisco, and the leaflet for the 1961 class, both of which may be obtained from: Dean's Office, University of California School of Medicine, San Francisco 22, California.

PROFESSIONAL ANCILLARY CURRICULA FOR TECHNICIANS

Professional curricula for technicians in exfoliative cytology, medical illustration, medical technology, orthoptics, physical therapy, and X-ray technique are offered at the University of California Medical Center, San Francisco.

Exfoliative Cytology

The School of Medicine offers a curriculum in the technical methods of exfoliative cytology to students preparing to be cytotechnologists.

Admission.—Applicants must satisfy the following requirements:
1. Two years of college work.
2. In addition, applicants must satisfy the following subject requirements.
   At least 12 units or 12 semester hours of natural science chosen from the following list, or their equivalent:
   - Bacteriology 2 and 4 (Introductory Bacteriology) 4 units or 4 semester hours
   - Biology 11A-11B (Introduction to the Science of Living Organisms) 6 units or 6 semester hours
   - Zoology 1A and 1B (General Zoology) 8 units or 8 semester hours
   - Physiology 1 and 1L (Introductory Physiology) 5 units or 5 semester hours

Curriculum.—Students complete course 401, Techniques of Exfoliative Cytology.

The course is one semester in length and consists of lectures, informal discussions, and laboratory work covering the technical methods of exfoliative cytology including collection, preparation, staining, and screening of specimens from the genitourinary, respiratory, and gastrointestinal tracts for detection of abnormal or malignant cells. (480 hours—12 units)

Certificate.—A certificate is given upon satisfactory completion of the course.

Fees.—Fees are as follows:

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Medical Illustration

A curriculum for medical illustrators.

Admission.—Applicants for admission must meet the following conditions:
In addition to meeting the general University admission requirements to freshman status, the applicant must have had two years of art training satisfactory to the faculty of the department and be able to demonstrate his ability in the field of art.

When possible, a personal interview is prerequisite to acceptance in the course. Due to space limitations, enrollment is limited and is subject to review by the faculty of the department. By arrangement, qualified students may enroll in certain courses offered.

Curriculum.—The course is given as professional training and extends over two forty-eight-week periods of full-time work, and covers the following subjects: pencil sketching of bones; principles of halftone and pen and ink drawings; anatomy lecture and dissection; lettering of charts and graphs; sketching at surgery, autopsy, and of specimens; water-color drawing; microscopic technique for drawing of colored slides; exhibit and display work; training in the eye clinic for slit-lamp and eye-ground drawings; medical photography.

Certificate.—Subject to the approval of the faculty, a certificate is given upon completion of the course.

Fees.—Fees are as follows:

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For further information and detailed announcement of courses, write to the Supervisor, Curriculum in Medical Illustration, University of California School of Medicine, San Francisco 22, California.

Medical Technology

A curriculum for medical technicians.

Admission.—Applicants must satisfy one of the following requirements:
1. Bachelor’s degree:
   Applicants for admission on this basis must hold a bachelor’s degree with a major in one of the biological sciences. Courses taken in preparation for the major must have included Bacteriology 101, Biochemistry 102 or 100A–100B, and 102L or 101A–101B, or their equivalent.
2. Three years of college training:
   Applicants for admission on this basis must have completed three years of a regulation curriculum in medical or clinical laboratory technic. This curriculum must have included courses in biochemistry and advanced bacteriology. Applicants will not be considered unless the college they attended shall

* The entire matter of incidental and tuition fees during the third semester is awaiting decision by proper University authorities. An announcement will be made later.
† Awaiting decision by proper University authorities as to whether or not the $100 or $200 fee should be charged to the students in the Medical Illustration course. An announcement will be made later.
grant a bachelor’s degree to them upon satisfactory completion of the four-year curriculum.

Curriculum.—The course is one year in length, and covers training in biochemistry, medical bacteriology, parasitology, mycology, histological technic, clinical pathology, serology, blood bank procedures, basal metabolism, and electrocardiography. Upon satisfactory completion of the course, the student is eligible for the State Examination and the National Registry Examination.

Certificate.—A certificate is given upon satisfactory completion of the course.

Fees.—Fees are as follows:

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For further information and detailed announcement of courses, write to the Supervisor, Curriculum in Medical Technology, University of California School of Medicine, San Francisco 22, California.

**Orthoptic Technology**

A curriculum for orthoptic technicians is offered at the School of Medicine. This course deals through a full calendar year.

Orthoptics deals with the conservative treatment of “strabismus,” commonly called “cross eyes” or “wall eyes.” Treatments are essentially “lessons” inasmuch as re-education of the binocular process is involved. Since the majority of patients are small children, one must be genuinely fond of children to be successful in this field.

Admission.—Applicants should be twenty years of age or over and should have at least two years of college training or its equivalent. Previous medical and/or teaching experience is preferred but this is not essential. A personal interview with the Medical Director, Curriculum for Orthoptic Technique, Department of Ophthalmology, will precede acceptance.

Curriculum.—A course in Orthoptic Technology (400A–400B–400C). Clinical practice in the Florence C. Noble Orthoptic Laboratory. Practical training devised to supplement the eight-week basic course given by the American Orthoptic Council. Practical training is offered in the Orthoptic Laboratory to give the student knowledge of terminology and office practice. Lectures, seminars, and conferences supplement clinical practice.

Certificate.—A certificate is given upon satisfactory completion of the course.

Fees.—Fees are as follows:

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* The entire matter of incidental and tuition fees during the third semester is awaiting decision by proper University authorities. An announcement will be made later.
The entire course is designed so that upon completion the student will have the necessary knowledge and experience to qualify for the examination given by the American Orthoptic Council. For further information please write to the Medical Director, Curriculum for Orthoptic Technique, University of California School of Medicine, San Francisco 22, California.

Physical Therapy

A curriculum for physical therapists.
The requirements for admission to the curriculum in physical therapy offered by the School of Medicine, meet and exceed those set by the Council on Medical Education and Hospitals of the American Medical Association.

Admission.—Applicants for admission must satisfy one of the following requirements:
1. Bachelor's degree from an accredited institution.
   Candidates for admission on this basis must have completed 26 semester units of biological and physical science. They must have also included in their undergraduate studies all of the specific requirements of the curriculum in physical therapy. Upon satisfactory completion of the course, the student is awarded a certificate.
2. Three years of college or university training.
   Candidates for admission on this basis must have completed courses that qualify them for senior standing in the college of Letters and Science of the University of California (Berkeley or Los Angeles), or in the College of Applied Arts, and the requirements in the basic sciences in the curriculum in physical therapy. The student may matriculate into the curriculum in physical therapy in his fourth year of college and obtain the degree of Bachelor of Science and a Certificate of Completion in physical therapy.

Applicants for admission must present transcripts from their colleges or universities. Such records must show the satisfactory completion of the following courses, or their equivalent.

Chemistry 1A—
   5 units or 5 semester hours—(general inorganic chemistry)
Physics 10—
   3 units or 3 semester hours—(general physics)
Anatomy 25—
   3 units or 3 semester hours—(general human anatomy)
Physiology 1 and 1L—
   5 units or 5 semester hours—(introductory physiology)
Psychology 168—
   3 units or 3 semester hours—(abnormal psychology)

The student must complete all prerequisites before beginning the course, although these requirements need not be completed at the time the application is filed.

Curriculum.—Two semesters will include all theory, seminars, and demonstration. The final twelve weeks will be devoted to practical training and can be completed in approved hospitals. The curriculum includes anatomy, physiology, physics, pathology, psychology, surgery, orthopaedic surgery, medicine, neurology, pediatrics, nursing, ethics and administration, electrotherapy, radiation, hydrotherapy, massage, kinesiology, therapeutic exercise, and clinical practice.

Graduates of the curriculum in physical therapy are eligible for the State Registration Examination and the American Registry Examination.

Expenses.—The student must supply his own books and uniforms. The approximate cost is as follows: fall semester, $70; spring semester, $35; clinical practice period, $40.
Fees.—Fees for the first and second semesters are as follows (there being no fees at present for the Summer Sessions):

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For further information, write to the Clinical Supervisor, Curriculum in Physical Therapy, University of California School of Medicine, San Francisco 22, California.

**X-Ray Technology**

A curriculum for X-ray technicians is offered at the School of Medicine. This course extends through a full calendar year, beginning with the fall semester.

**Prerequisites.**—Anatomy and physics, whether they are given at the City College of San Francisco or the University of California, Berkeley, or equivalent courses at other colleges. Courses recommended at both City College of San Francisco and the University of California, Berkeley, are listed as:
- Anatomy 25
- Physics 2A, 2B, 3A, 3B—preferred
- Physics 10 acceptable

**Admission.**—The student may be admitted after satisfactory completion of prerequisites and a personal interview.

**Curriculum.**—Practical training for X-ray technicians is offered in the Department of Radiology. The curriculum rotates the student through all areas of the X-ray department and is designed to give the technician knowledge of the various procedures used in making X-ray examinations, the techniques used in developing films in the darkroom, the services required of a technician in the fluoroscopy room, and in assisting the radiologist in therapy. The student is taught the routine procedures of handling patients in the reception areas, the filing of films, and other matters concerned with the running of an X-ray department. Practical instruction is supplemented by lectures including anatomy, physics, and other subjects related to radiology.

**Certificate.**—A Certificate of Completion will be given to the student upon satisfactory completion of the course. The student, upon completion of the course and with one year of experience as an X-ray technician, serving under the direction of a qualified radiologist, is eligible for the American Registry Examination.

**Expenses.**—The student must supply his or her own maintenance and uniforms.

**Fees.**—Fees are as follows:

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* The entire matter of incidental and tuition fees during the third semester is awaiting decision by proper University authorities. An announcement will be made later.
For further information concerning the program, write to the Medical Director, X-Ray Technician's Course, University of California School of Medicine, San Francisco 22, California.

SCHOOL OF NURSING (SAN FRANCISCO)

The School of Nursing offers three curricula for students:

1. The basic curriculum leading to the Bachelor of Science degree in nursing. (See below.)
2. Curriculum for graduate nurses leading to the Bachelor of Science degree in nursing. (See page 144.)
3. Curriculum for graduate nurses leading to the Master of Science degree. (See page 146.)

Basic Curriculum

The University of California School of Nursing believes that nursing is a process in which the nurse works constructively with others for the promotion and restoration of physical, emotional, spiritual, and social health in the individual, the family and the community. Therefore, it provides through its curricula an academic and professional education which will enable the student to:

1. Give competent care in hospitals, homes, and community agencies.
2. Accept responsibility for self-directed activity toward her own established personal and professional goals.
3. Understand that goals in nursing have to be continuously adapted to meet the changing needs of the individual and society.
4. Participate cooperatively as an effective professional worker within her own profession, with members of other professions, and with members of citizen groups for the improvement of the total health service.
5. Contribute through creative activities to the improvement of nursing.
6. Recognize need for continuing cultural and professional growth.
7. Recognize and assume the responsibilities of intelligent citizenship.
8. Acquire the foundations for advanced preparation in special fields of nursing.

The basic nursing curriculum requires four semesters of general arts and science courses to be taken at the University of California, or at other universities, state colleges, or junior colleges where comparable courses are offered. Beginning with the fall semester, 1959, the basic curriculum became six semesters in length. Students admitted prior to that time will complete the requirements according to the former program of five semesters and two summer terms.

Upon satisfactory completion of this curriculum the student receives the degree of Bachelor of Science. She is prepared to take the California State Board examination for a license as a registered nurse and to apply for the California Public Health Nurse Certificate and also for the Health and Development Credential for School Nursing. An applicant for the California State Board examination must be either a citizen of the United States or have declared her intention to become a citizen of the United States.

Requirements for Admission

Two years of academic work in an accredited university or college are prerequisite to admission to the basic curriculum. Such work, if taken on the Berkeley campus of the University of California, must include fulfillment of the following breadth requirements of the College of Letters and Science:
English reading and composition .................. 6
Foreign language ................................................. 12
Humanities .......................................................... 12
Natural sciences ..................................................... 17
Social sciences ..................................................... 12

If the work is taken on another campus of this University, or in a junior or state college or other university, it must include fulfillment of these requirements. The equivalent of the following courses offered on the Berkeley campus must be included:

Chemistry 1A ......................................................... 5
Bacteriology 1 and 4 or 2 and 4 .......................... 4-5
Physiology 1 and 1L ............................................. 5
Anatomy 25 .......................................................... 3
Psychology 1A ...................................................... 3
English 1A–1B ....................................................... 6
Sociology and Social Institutions 1 or 30 .......... 3
American History and American Institutions requirement. See page 35.

Students are advised to choose electives from psychology, sociology or anthropology.

ENROLLMENT LIMITATION

The Committee on Admissions to the School of Nursing is authorized to refuse admission to a student with less than a 2.2 grade-point average. A 2.4 grade-point average is required of those transfer students who were ineligible for admission to the University as freshmen upon graduation from high school. Preference will be given to students with a 2.5 grade-point average or above. Students must also satisfy the Committee on Admissions that they possess the personal characteristics essential for professional nursing education and practice. Each prospective student will be required to make an appointment for an interview after she files application for admission to the school. The day of the interview, the student should plan to spend approximately the whole day at the School of Nursing in San Francisco.

Curriculum for Graduate Nurses

The courses comprising the curriculum for graduate nurses are selected from offerings of the School of Nursing, San Francisco, and other schools and colleges of the University. This undergraduate curriculum leads to the Bachelor of Science degree and its aim is to prepare the registered nurse for professional nursing service in hospitals and public health agencies.

Requirements for Admission

A. Academic requirements.
1. Fulfillment of matriculation requirements for admission to the University of California, Berkeley.
2. *Satisfactory completion of a minimum of 55 units of academic work in an accredited college or university in courses selected from the following:

*Satisfactory completion" is defined as a 2.2 grade-point average for University of California work or its equivalent in quality for work taken elsewhere. Students who have been accepted for admission under former requirements will be permitted to complete the old program.
School of Nursing

Units

English (required 1A, 1B) ..................................................... 6
Foreign language (in one language) ........................................ 12
Humanities ............................................................................... 12
Social sciences (required: Psychology 1A, Sociology 1 or 30; recommended: Psychology 33, Anthropology 2A) . 12
Natural science† (one course from group A, physics recommended; one course from group B, zoology or biology recommended; one course from group C (Bacteriology 2 and 4, recommended) ....................................................... 12
Electives ................................................................................... 1

55

B. Professional requirements.
1. Graduation from an accredited school of nursing.
2. Registration as a professional nurse.
3. Completion of Plan A of the National League for Nursing Graduate Nurse Qualifying Examination, or Plan C and the College Ability Test.
4. Evidence of personal qualifications and capacity for the work of the professional curriculum.

Curricula Leading to the Bachelor of Science Degree

PROCEDURE FOR ADMISSION

Application for admission to the University of California School of Nursing, San Francisco, should be made directly to the Director of Admissions, University of California Medical Center, San Francisco 22, California, who will supply the necessary forms for application. Every applicant for admission to the University is required to pay an application fee of $5 when the first application is filed.* Remittance should be made by draft or money order payable to The Regents of the University of California. Prospective students who plan to complete the prerequisite courses at institutions other than the University of California are advised to submit to the Director of Admissions their high school transcripts, two transcripts of completed work including school of nursing, and a statement of their proposed additional courses not later than the end of their first college year. At this time they should request a preliminary evaluation of their credentials and proposed program. All transcripts and requests for evaluation of credentials should be sent to the Director of Admissions, University of California Medical Center, San Francisco 22, California.

In order to give time for necessary correspondence and for due notice to applicants who may be required to make up entrance deficiencies, application should be made as early as possible.

Requests for information regarding the Graduate Nurse Qualifying Examination, or for consultation concerning curricula for nurses should be sent to the Dean, School of Nursing, University of California Medical Center, San Francisco 22, California. Nurses are urged to write or come to the School of Nursing office for consultation after a statement of entrance status has been received from the Office of Admissions.

* Veterans who expect to enroll under the provisions of Public Law 346 or Public Law 16, are not required to remit this fee with their applications, nor are students previously matriculated on another campus of this University.

† The laboratory course in natural science may be waived if the student has had an advanced year course with laboratory in chemistry, physics or biology in high school (eleventh or twelfth grade). For list of courses in Group A, B, and C, see page 62 of this bulletin.
Baccalureate Program for Registered Nurses

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Growth and Behavior (Psychology 110A–110B)</td>
<td>5-5</td>
</tr>
<tr>
<td>Concepts of Illness (Nursing 132)</td>
<td>5</td>
</tr>
<tr>
<td>Group Dynamics and Leadership (Nursing 198A–198B)</td>
<td>1-1C</td>
</tr>
<tr>
<td>Community Health Nursing (Nursing 135)</td>
<td>6</td>
</tr>
<tr>
<td>Public Health Administration (Public Health 100*)</td>
<td>3</td>
</tr>
<tr>
<td>Advanced Nursing (Nursing 137)</td>
<td>3</td>
</tr>
<tr>
<td>Ecology of the Professions (Nursing 131)</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>36</td>
</tr>
</tbody>
</table>

Biostatistics or other elementary statistics course (3 units): elective to those students having scholarship or potential for graduate study.

Nursing 136 (Psychiatric Nursing) or equivalent should be completed before admission to the School of Nursing. If, on the basis of tests or other evaluation of the student’s record, deficiencies in an area of nursing are identified, the student will be counseled regarding ways in which to compensate for these deficiencies.

A graduate of a basic collegiate program in nursing desiring only to complete preparation in public health nursing must meet the requirements for admission to the School. Her program in the School of Nursing will be determined by an evaluation of her credentials.

An over-all grade-point average of 2.0 must be maintained. A grade of at least C is required for each nursing course undertaken.

General Information

All students who have not completed an approved program in public health and/or psychiatric nursing must enroll for experiences in these areas.

During field experience in public health nursing, students are required to have the use of a car and provide for its maintenance at their own expense.

Tuition and Incidental Fees.—For information concerning fees and expenses see the Announcement of the School of Nursing.

Public Health Service Traineeships

The United States Public Health Amendments Act of 1956 authorized the Public Health Service of the Department of Health, Education, and Welfare to initiate two types of traineeships for graduate nurses. The University of California School of Nursing, San Francisco, was awarded grants under both programs: Title I. Public Health Personnel Traineeship Program, and Title II. Professional Nurse Traineeship Program.

For information concerning the above programs see the Announcement of the School of Nursing.

The Master of Science Program

The master's degree program, with emphasis in various fields of interest, is offered at the University of California School of Nursing, San Francisco, to prepare clinical nursing experts, and teachers and supervisors in clinical nursing areas, to provide an introduction to research and research methodology in nursing and to provide a foundation on which post-master's and doctoral programs in nursing and related areas can be built.

* Public Health 100 may be taken at Berkeley.
Objectives of master's program are:
1. The development of expertness in one or more clinical nursing fields.
2. An orientation to research in nursing and research methodology.
3. The further development of habits of critical thinking, ability to make sound judgments and ability to work with others.
4. Development of perspective on the present and future responsibilities of the nursing profession and its relationships to other health professions.
5. The deepening of knowledge and understandings from physical, biological and social science fields basic to expertness in one or more nursing fields and to functioning in leadership positions in nursing.
6. For those nurses who elect a functional as well as clinical area, the development of competency to function in a teaching or supervisory position.

Requirements for Admission

A. Academic requirements:
1. Admission to graduate status in the University which requires a baccalaureate degree from an institution of acceptable standing.
2. Completion of junior and senior courses with an average grade of B.

B. Professional requirements:
1. Graduation from an accredited school of nursing.
2. Registration as a professional nurse.
3. Completion of an undergraduate program in nursing, equivalent to that given at the University of California in San Francisco.
5. Evidence of personal qualifications and capacity for graduate study.

C. Additional requirements:
Applicants must present evidence of having completed upper division courses in statistics, psychiatric and public health nursing with clinical practice. Students who lack statistics should plan to fulfill this requirement in an accredited college or university. Those lacking public health and psychiatric nursing should enroll in a comparable baccalaureate program in their own locale or make arrangements to make up this deficiency in this School of Nursing prior to registration in the master's program.

Procedure for Admission

Students should apply for admission to the master's program before January 1 preceding the fall semester since plans must be made for clinical experience. Formal application for admission to this program must be made to the Graduate Division, Northern Section, and to the School of Nursing as follows:

A. Graduate Division, 250 Sproul Hall, University of California, Berkeley 4, California.
   1. Obtain application form from the Dean of the Graduate Division, and return completed form together with a money order or bank draft for $5 payable to The Regents of the University of California.
   2. Request the registrar of each school attended beyond high school to send an official transcript directly to the Graduate Division.

B. School of Nursing, Room 211 Medical Sciences Building, University of California Medical Center, San Francisco.
   1. Obtain application forms from the School of Nursing office for:
      a) Admission to the Master of Science Program.
      b) The N.L.N. Graduate Nurse Qualifying Examination.
2. Return completed application forms directly to the School of Nursing office. The fee for the Graduate Nurse Qualifying Examination in the form of a check or money order payable to the Director of Evaluation Service, National League for Nursing, is to be sent to the National League for Nursing in accordance with instructions.

The applicant will be informed by the Graduate Division and by the Dean of the School of her acceptance and status.

Students should consult the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION, for study-list limits. Students must maintain at least a grade average of B for all upper division and graduate courses taken during residence at the University of California as a graduate student.

For details concerning the master’s degree program see the ANNOUNCEMENT OF THE SCHOOL OF NURSING.

The Post-Master’s Program

Beginning in the fall semester, 1960, the School of Nursing will offer a post-master’s program which is designed to prepare qualified nurses to function as administrators of schools of nursing and nursing services. Preparation of these top-level administrators will be achieved through an individually planned course of study which will include instruction and supervised experience in nursing administration as well as courses in allied fields such as public health administration, educational administration, business administration, and social sciences.

The applicant for admission to the post-master’s program must satisfy the admission requirements of the Graduate Division, Northern Section, of the University of California. Information concerning specific admission requirements will appear in the 1960–1961 ANNOUNCEMENT OF THE SCHOOL OF NURSING which may be obtained by writing to the Dean, School of Nursing, University of California Medical Center, San Francisco 22, California.

SCHOOL OF OPTOMETRY

The School of Optometry offers a curriculum of three years based upon the completion of two years of study in the College of Letters and Science, or its equivalent, leading to the degree of Bachelor of Science at the end of two years, and the Certificate of Completion in optometry and the Master of Optometry degree at the end of an additional graduate year. Candidates for admission to the first-year (junior) class are accepted primarily on the basis of scholarship, with particular emphasis placed on the required subjects.

Applications for admission should be filed with the Director of Admissions. For students who are not already resident at the University of California, the application for admission must be accompanied by a certificate from a physician which states in detail the physical condition of the applicant based upon a thorough medical examination; any physical or mental handicap of the applicant should be indicated. The School of Optometry reserves the right to refuse admission to an applicant on the basis of obvious disability which in the opinion of the Executive Committee of the School would interfere with successful completion of the curriculum.

For admission to the School of Optometry the applicant is required to show completion of two years of study in the College of Letters and Science, or the equivalent. The courses taken should include the following specific subjects required by the School of Optometry: bacteriology, chemistry, physics, physiology*, plane analytic geometry, psychology, and speech or English.

* See asterisk (*) footnote on the next page.
The School of Optometry offers a four-year curriculum leading to the degree of Doctor of Pharmacy. To gain admission to the curriculum, students must have satisfactorily completed the following high school subjects: algebra, chemistry, physics, plane geometry, trigonometry, and two years of a foreign language.

The following required curriculum taken in the School of Optometry leads to the degree of Bachelor of Science at the end of the senior year and the Certificate of Completion in optometry and the degree of Master of Optometry at the end of the graduate year. For further information and detailed degree requirements, see the Announcement of the School of Optometry.

**SCHOOL OF PHARMACY**

The School of Pharmacy offers a four-year curriculum leading to the degree of Doctor of Pharmacy. To gain admission to the curriculum, students must, in addition to meeting other requirements, have satisfactorily completed the

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*While Physiology 1-1L constitutes the usual biological science sequence in the pre-optometry program, this requirement may be satisfied for admission purposes by one of the following alternative sequences:
Zoology 1A—Zoology 1B
Zoology 1A—Comparative Anatomy
Zoology 1A—Human Anatomy

Unless a course in human anatomy which is the full equivalent of Anatomy 25 at the University of California is offered in one of the above sequences, Anatomy 25 must be included in the junior year program of the School of Optometry.

† Students must have had two years of a foreign language in high school.
§ Students must meet the requirements of the School of Optometry.
two years of preprofessional study outlined on page 151. Details of the admission requirements and of the curriculum are given in the announcements of the School of Pharmacy, which may be obtained from the office of the Dean, School of Pharmacy, University of California Medical Center, San Francisco 22, California.

In addition to the above curriculum, graduate courses leading to the degrees of Master of Science and Doctor of Philosophy in pharmaceutical chemistry are open to qualified students. These programs are under the jurisdiction of the Graduate Division of the University. For details, consult the Announcement of the Graduate Division, Northern Section, and the Graduate Division bulletin entitled Announcement in the Biological Sciences, both of which may be obtained from the Graduate Division, University of California, Berkeley 4.

Requirements for Admission.—To be admitted to the Doctor of Pharmacy curriculum in the School of Pharmacy on the San Francisco campus, a student must have completed, with an average grade of C or better in the University of California or in another institution of approved standing, at least 60 units of the program set forth below under the heading “Prepharmacy.” Students taking the prepharmacy years at the University of California normally will be enrolled in the College of Letters and Science. If the work is not taken at the University of California, the courses selected must be equivalent to those offered at the University of California. In order to complete the prepharmacy studies in the minimum time, students should complete a full year of intermediate algebra, a course in trigonometry, and courses in elementary chemistry in high school.

Students who plan to take their preprofessional work in the College of Letters and Science, University of California, Berkeley, are advised to see the new requirements of the College. Detailed information may be obtained at the Office of the Dean, College of Letters and Science, 210 Sproul Hall, University of California, Berkeley 4.

Students who have completed the prepharmacy studies, whether in the University of California or elsewhere, cannot be assured of admission to the Doctor of Pharmacy curriculum on the San Francisco campus. When the number of qualified applicants exceeds the available facilities, selection will be made on the basis of scholarship, as determined from the college record, and the results of an aptitude examination. A personal interview is normally required. Application blanks for admission to the School of Pharmacy on the San Francisco campus may be obtained from the Office of the Director of Admissions, University of California Medical Center, San Francisco 22, California. Application for admission to the School of Pharmacy, University of California, San Francisco, must be filed between October 1 and March 1 preceding the September of proposed admission.

Mr. Walter Singer of the School of Pharmacy faculty will be available for consultation during the registration periods. (See the Circular for New Undergraduates, Berkeley, concerning time and place.) At other times, Mr. Eric C. Bellquist, Office of the Dean of Students, 201 Sproul Hall, Berkeley campus, is adviser to the prepharmacy students on the Berkeley campus. Applications for admission, late registration and all student petitions may be submitted to him for approval.

The adviser to prepharmacy students on the Los Angeles campus is Mr. J. S. Heard, A4–209 Medical Center Building, University of California, Los Angeles 24.

Residence Requirements.—To qualify for the California State Board of Pharmacy examinations, and to satisfy the requirements for the degree of Doctor of Pharmacy, a student must have completed four years in residence in the College and/or School of Pharmacy.
Graduation.—Candidates for the Doctor of Pharmacy degree must have completed at least four years of residence in an accredited school or college of pharmacy and must have completed the curriculum of the School of Pharmacy, University of California, including at least 129 units of work, with an average grade of C or better.

PREPHARMACY CURRICULUM

<table>
<thead>
<tr>
<th>First Year</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 1A–1B</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Botany 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English 1A–1B or Speech 1A–1B</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>1 Elective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Elective</td>
<td>3</td>
<td>3 or 4</td>
</tr>
<tr>
<td>Military Science</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Units</td>
<td>16 or 17</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoology 1A–1B</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Physics 2A–2B</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physics 3A–3B</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mathematics 16A–16B</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2 Elective</td>
<td>3 or 4</td>
<td>3 or 4</td>
</tr>
<tr>
<td>American History and Institutions (see page 35)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Military Science</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Units</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

SCHOOL OF PUBLIC HEALTH

Undergraduate Curricula

The School of Public Health offers five undergraduate major curricula. Each provides basic scientific knowledge which prepares the student for service in a variety of fields related to medicine and public health as well as for graduate study in his specialty area.

The major curricula are: biostatistics, laboratory, preadministration, pre-public health education, sanitary science.

Undergraduate students who have satisfactorily completed at least 60 units of work in one of the colleges of the University, or transfer credit evaluated as equivalent, may apply for admission to a major in public health leading to the Bachelor of Science degree. Students are urged to report to the Dean’s Office, School of Public Health, as early in their academic career as possible. Formal application for admission to the School of Public Health should be made by the beginning of the fourth semester (last semester of the sophomore year). Provisional admission will be made promptly pending satisfactory completion of the fourth semester.

DEGREE OF BACHELOR OF SCIENCE

Candidates for the degree of Bachelor of Science must have completed at least 120 units of college work, including the specific requirements of one of the majors. A minimum of 24 units must be completed after admission into the School of Public Health. The student must have obtained at least a 2.0 grade-point average for all courses undertaken by him in the University of California. He must have satisfied the general University requirements for Subject A (see page 34), Military Science (see page 36), and American History and American Institutions (see page 35).

Courses Required for All Majors

The School of Public Health has adopted the general breadth requirements of the College of Letters and Science. Exceptions are indicated in footnotes.

Mathematics C (by examination)
English and composition (6 units)

1 Trigonometry and intermediate algebra are prerequisite to Mathematics 16A.
2 Electives must be selected from courses acceptable for the breadth requirements in foreign language, humanities, and social science in the College of Letters and Science, Berkeley (see page 60). Students enrolled in the College of Letters and Science, Berkeley, are required to complete a minimum of 12 units in one foreign language.
**Requirements of Colleges, Schools, and Curricula**

*Foreign language (12 units or equivalent)*
*Humanities (12 units)*
Social sciences (including Psychology 1A) (12 units)
Natural sciences (including Chemistry 1A and Bacteriology 1 and 4 or 2 and 4) (12-17 units)
Public Health 100, 147A
Public Health 5A or 35, and 5B, while not required, are recommended as general background for students majoring in Public Health.

**Additional Requirements for Each Major**

### BIOSTATISTICS

Mathematics 3A-3B, 4A-4B
Public Health 111, 147B, 161A-161B, 163, 164
Other public health courses (3 units)
Statistics 130A-130B-130C-130D, 166
Zoology 1A, 115
At least 7 units from:
- Population
- Migration
- Social psychology
- Cultural anthropology
- Human genetics
- General and managerial accounting
- Advanced calculus or algebra, theory of functions
- General human anatomy
- Public administration
- Other courses chosen with the approval of the adviser

### LABORATORY (MEDICAL TECHNOLOGY AND PUBLIC HEALTH MICROBIOLOGY)

Bacteriology 101
Chemistry 1B, 5, 8
Entomology 117
Physics 10 (if physics not taken in high school)
Public Health 111, 147B, 150A-150B, 162
Zoology 1A, 111

### PREAD MINISTRATION

Business Administration 1A
Economics 1A or 10
Political Science 1
Public Health 101, 106, 111, 134, 162
One of the following:
- Physiology 1-1L
- Zoology 1A or 10
At least one course from each of the following subject areas:
- Administrative management
- Advanced cultural anthropology
- Governmental relationships
- Personnel administration
- Social insurance
- Social or industrial psychology
Either (a) or (b), as follows:
(a) For public health and medical care administration
- Mathematics 3A or 16A

*For laboratory and sanitary science majors certain exceptions may be made upon the advice of the major adviser.*
Public Health 109, 170
Political Science 102

(b) For hospital administration, at least one course from each of the following subject areas:
   Industrial relations
   Managerial accounting
   Principles of Accounting (Business Administration 1B)

PUBLIC HEALTH EDUCATION

Psychology 33
Public Health 111, 131, 133, 134, 135, 136, 162, and other public health courses (6 units)
One of the following:
   Physiology 1-1L
   Zoology 1A
At least 15 units from:
   Adult education
   Cultural anthropology
   Elementary or secondary education
   Nutrition
   Personality development
   Principles of education
   Social psychology
   Sociology and social institutions
   Social welfare

SANITARY SCIENCE

Bacteriology 101
Chemistry 1B, 8
Civil Engineering 144, 146
Entomology 126
Food Technology 112
Physics 2A-2B, 3A-3B
Public Health 112, 113, 114, 115, 117, 118, 119, 134, 147B, 162, 170
One of the following:
   Physiology 1-1L
   Zoology 1A

Undergraduate students who wish to consider the possibility of completing a major curriculum in Public Health (B.S. degree) and fulfilling requirements for admission to schools or colleges of medicine, dentistry, pharmacy or nursing are advised to consult the Office of the School of Public Health. The students will be referred to an undergraduate major adviser who will assist in preparing a schedule for such a combination program in the laboratory, sanitary science, biostatistics, prepublic health education or prepublic health administration (hospital) curriculum offered to undergraduate students by the Department of Public Health of the School of Public Health. The sooner such a schedule is devised the less likely will it be that the student will need to add Summer Session courses or an extra semester to complete the work. Formal admission to the School should be made when 60 units are attained (junior year) but advice on scheduling is available at all times.

Honors

Students whose work has been of marked excellence may receive the award of Honors or Highest Honors at graduation.
Graduate Curricula

DEGREE OF MASTER OF PUBLIC HEALTH

Admission.—To be admitted to the curriculum leading to the degree of Master of Public Health, the student must have graduated from an approved medical school, college of dentistry, or college of engineering, or have received an acceptable bachelor's degree with adequate training in mathematics and the natural sciences, including chemistry and biology, and in the social sciences; he must be qualified in some professional capacity for postgraduate education in public health; and must have, in addition, either

1. Professional academic qualification in engineering, nursing, education, or postgraduate work in other fields of public health; or
2. Three years of experience in responsible public health practice.

An applicant for the M.P.H. degree who does not have a doctoral degree must have completed the requirements of the major in his respective fields of emphasis at the University of California or the equivalent elsewhere. For fields of emphasis and requirements therein, see the Announcement of the School of Public Health. A student who has undergraduate deficiencies must remove them before he may complete the requirements of his curriculum.

General Requirements for the Degree

1. At least one academic year of graduate residence at the University of California and a program including not less than 24 units of acceptable course work, of which at least 12 units must be graduate courses in the major subject. An average of not less than three grade points per unit must be maintained in all work completed in graduate standing. By special permission, a candidate may be authorized to present an acceptable thesis in lieu of 4 of the 24 units required.
2. A comprehensive final examination either in the student's field of specialization or in the general field of public health, as determined by the faculty committee.
3. At least twelve weeks of approved field service in a public health agency. This may be waived for those presenting evidence of previous qualifying experience.*

DEGREE OF DOCTOR OF PUBLIC HEALTH

The doctorate in public health is offered primarily as an advanced study and research degree, in the attainment of which students who already are well advanced in a related fundamental field will carry on intensive work in the application of their particular knowledge to a public health problem. The areas of specialization follow the pattern of the Master of Public Health degree.

General Requirements for the Degree

1. The candidate must have completed, with a grade B average or better, basic courses equivalent to those required for the degree of Master of Public Health at the University of California and such additional courses as may be prescribed by an examining board appointed by the Dean of the School of Public Health to appraise the candidate's academic and professional background.
2. The candidate must have passed a qualifying examination conducted by a committee appointed by the Dean of the Graduate Division.

* Upon completion of the academic requirements, students of hospital administration spend an additional year in an administrative residency in an institution approved by the School.
School of Social Welfare

(3) In addition to requirements (1) and (2) above, the candidate must have completed, in residence at the University of California, at least one academic year of work involving advanced specialization in the particular field of public health for which he is preparing.

(4) The candidate must have indicated his capacity to make a substantial contribution to the advancement of the science and art of public health by submitting a dissertation on a subject chosen by himself and bearing on his principal subject of study, and of such character as to show power to prosecute independent investigation. In respect to the program of research and dissertation the candidate will follow Plan A as outlined in the Announcement of the Graduate Division, Northern Section, in its discussion of the Degree of Doctor of Philosophy.

(5) The candidate must have demonstrated ability either
(a) by leadership in his field as evidenced by successful professional experience in a post involving the exercise of substantial initiative and responsibility, or
(b) by such other means as the faculty of the School of Public Health may prescribe.

DEGREE OF MASTER OF ARTS

Graduate work in biostatistics leading to the degree of Master of Arts is offered under the joint direction of the faculty of the School of Public Health and members of the Mathematics–Statistical Laboratory of the Department of Statistics.

Admission.—Entrance requirements are the holding of at least a bachelor's degree in a field subject to integration in biostatistics.

Requirements for the Degree.—Specific course requirements, details of program and standards may be obtained from the School of Public Health and the Announcement of the Graduate Division, Northern Section.

DEGREE OF DOCTOR OF PHILOSOPHY

Graduate work is offered in epidemiology leading to the degree of Doctor of Philosophy. Work in biostatistics leading to the degree of Doctor of Philosophy is directed jointly by the faculty of the School of Public Health and members of the Mathematics–Statistical Laboratory of the Department of Statistics.

Admission.—Entrance requirements include an acceptable bachelor's degree in a field subject to integration in and more extensive application to one of the above areas. Applicants for admission must meet the standards of the Graduate Division and must have the approval of the staff in epidemiology or biostatistics.

Requirements for the Degree.—Specific course requirements, details of program and standards may be obtained from the School of Public Health and the Announcement of the Graduate Division, Northern Section.

SCHOOL OF SOCIAL WELFARE

In some form education for the profession of social work has been available on the Berkeley campus since 1912–1913. In 1940 the curriculum in social service was replaced by a two-year program of graduate study leading to the master's degree. In the spring of 1944 the School of Social Welfare was established. Since that time it has granted, on successful completion of two academic years of graduate work, the professional degree Master of Social Welfare. Beginning with the academic year 1960–1961, the School of Social Welfare will offer a program of graduate study leading to the degree Doctor of Social Welfare.
Preprofessional Study

In 1942 a group major in social welfare was established in the College of Letters and Science to provide a preprofessional program of study for undergraduates. The group major is designed to meet the needs of three classes of students: (a) those who propose to take graduate professional education in social welfare; (b) those who look forward to positions in branches of the social services for which graduate education is not now always required; and (c) those who, having no specific vocational objectives, desire a good general education involving a broad acquaintance with the major findings of the social sciences and psychology. For complete details see the Announcement of the School of Social Welfare.

The Master of Social Welfare Program

The program of study includes sequential courses in the areas of human growth and behavior, including bio-psycho-social pathology; social welfare services, including policies and related problems; and social work methods, including social casework, social group work, community organization, social research, and social administration. Supervised practice in social work is concurrent with academic work.

Requirements for the Master of Social Welfare Degree.—To earn the Master of Social Welfare degree, a student must spend the equivalent of at least two academic years of graduate study in social welfare, one year of which must have been in residence at the University of California. The program consists of a minimum of 40 to 44 units of upper division, graduate and professional courses, a thesis or group research project, and a comprehensive final examination in the field of social welfare. Students who have completed courses which are part of the social welfare curriculum in an accredited school of social welfare elsewhere than at the University of California may be given appropriate transfer credits.

The Doctor of Social Welfare Program

Post-World War II developments in the field of social welfare and in the profession of social work have created an acute demand for personnel with advanced qualifications to teach and to perform research. The doctoral program aims to meet these needs by preparing personnel to assume teaching positions on both the graduate and undergraduate levels and to fill research posts in universities, institutes and social welfare agencies. Although professional in orientation, the program is substantially similar to the Ph.D. program on the Berkeley campus. Its purpose is to develop in students the capacities for research, scholarship, and effective teaching.

Half of the program of study consists of courses in the School of Social Welfare in the four fields of history and philosophies of social welfare, social work theory, social welfare policy and administration, and social research methods. The remaining half is made up of courses from other departments of the University relevant to these four fields, with heaviest reliance upon the offerings of the social and psychological sciences.

The minimum residence requirement is two years, one of which must be subsequent to the completion of courses and examinations.

Special Requirements for Admission to Social Welfare

Every applicant for admission to the School of Social Welfare must hold the degree of Bachelor of Arts or Bachelor of Science from the University of California or an equivalent degree from a college or university of recognized standing and establish his eligibility for admission in graduate stand-
School of Social Welfare; Hospital Dietetics

ing at the University of California. For details of admission to graduate status see the Announcement of the Graduate Division, Northern Section.

The special requirements for admission to the School of Social Welfare for the Master of Social Welfare program include:
1. Completion of the group major in social welfare offered in the College of Letters and Science at the University of California, Berkeley, or an equivalent major.
   or
   Completion of undergraduate study of psychology and the social sciences at the upper division level sufficient, in the judgment of the Admissions Committee of the School of Social Welfare, to permit graduate study in the School.
2. Completion of an introductory course in statistics.
3. Suitability in other respects, such as age and personal qualifications, for the profession of social work, as determined by the Admissions Committee of the School.

The special requirements for admission to the School of Social Welfare for the Doctor of Social Welfare program include:
1. A master's degree from an accredited school of social work.
2. Experience sufficient to enable the student to obtain maximum benefit from the program.
3. Intellectual ability to pursue the required work.

Dates for Filing Applications.—Admission to the School of Social Welfare as a full-time student is possible only in the fall of each year. Applications should be submitted as early as possible after the first day of January for the following academic year. The deadline for these applications is July 15. Students may be admitted in either the fall or spring semester to take courses only in the part-time degree program. The deadlines for these applications are July 15 for the fall semester and December 15 for the spring semester. Application forms may be obtained at or by writing to the School of Social Welfare, Building T-1, Berkeley 4, California.

Scholarships, Assistantships, Loans
In addition to the general University scholarships, several fellowships and scholarships and many stipends have been available in past years especially for students in the School of Social Welfare. Information concerning scholarships, assistantships, and loans may be obtained upon request from the School of Social Welfare.

Library Facilities
The University Library, with a book collection exceeding 2,500,000 volumes, is one of the largest university libraries in the United States. Several branch and special libraries on the campus, including the Social Welfare Library, the Biology Library, the Law Library, and the Lange Library of Education, contain materials of much value to social welfare students. Outstanding in its field is the Bureau of Public Administration Library, which contains an unusually fine collection of social welfare documents and reports. This library is invaluable to students of social welfare who must work in a field where the literature is largely documentary.

HOSPITAL DIETETICS
The Certificate in Hospital Dietetics is no longer given. A dietetics intern (Moffitt Hospital) may, if she can qualify for entrance to the Graduate Division with a major in nutrition, register under the academic plan for her
internship. This means that she will spend one semester and one summer in residence at Moffitt Hospital in San Francisco. During one semester she will be in residence at Berkeley, will be on duty 15 hours weekly at Cowell Hospital, and may register for a maximum of 10 units of upper division and graduate work in nutrition and/or an allied science selected with the approval of the graduate adviser in nutrition. The courses taken may be counted toward the requirements for the master's or doctor's degree in nutrition. This plan will normally shorten the required time in residence for a graduate degree in nutrition by about one-half year, and at the same time allow the student to complete her requirements for membership in the American Dietetic Association in the year specified by the American Dietetic Association. Detailed information concerning the academic program for dietetics interns may be had by writing the Director of the Internship Program, Moffitt Hospital, University of California Medical Center, San Francisco 22, or to the graduate adviser in nutrition, Department of Nutrition and Home Economics, Berkeley.
INSTITUTE OF INDUSTRIAL RELATIONS

The Institute of Industrial Relations, authorized by the Legislature of the State of California in 1945, began operations in 1946. It is concerned with two principal types of activity: (1) pursuing an integrated interdisciplinary research program currently directed primarily toward the study of labor-management relations; wages and related problems; economic security programs; the labor market and labor mobility; the labor movement, social groups, and industrialization; social and industrial psychology; and the management sciences. Research staff members of the institute are usually drawn from the regular faculties of the Business Administration, Economics, Political Science, Sociology and Social Institutions, and Psychology departments. A number of half-time graduate research assistantships are available to qualified graduate students each year in connection with this program, (2) conducting, in cooperation with University Extension, a community relations program serving management, unions, and other groups interested in industrial relations. The program consists of public lectures, conferences, institutes of varying duration, and evening courses. The institute has no curriculum and offers no courses of its own, but it does issue a Curriculum Handbook which outlines the industrial relations courses offered by teaching departments on the Berkeley campus. This handbook, the institute's latest annual report, a list of its reprints and publications, and information about graduate research assistantships, may be obtained from the Institute of Industrial Relations, 201 California Hall, University of California, Berkeley 4.

THE INSTITUTE OF INTERNATIONAL STUDIES

The Institute of International Studies at Berkeley was established in 1955, to support faculty research interests in international studies and to facilitate coordinated approaches to research and training. The institute serves to coordinate the administrative aspects of research, to respond to the changing interests of individual scholars and of groups, and to act as a clearinghouse for information on international studies at Berkeley.

Among the component parts of the Institute of International Studies is the previously established Bureau of International Relations. The work of the former Institute of East Asiatic Studies has also been incorporated. The Center for Latin American Studies and the International Urban Research project became part of the institute in 1956, and the Center for South Asia Studies, the Center for Slavic and East European Studies (formerly the Institute of Slavic Studies) and the Center for Chinese Studies in 1957. The Center for Japanese Studies was established in the summer of 1958. The School of Law through its International Legal Studies program works closely with the Institute of International Studies.

The institute helps initiate, gain support for, and coordinate either individual or group research projects. It also works toward the development and improvement of teaching and training programs, in cooperation with regular teaching departments.

Asia Studies.—The Center for Chinese Studies established in 1957, is primarily concerned with the development of social science research on contemporary China. The central emphasis of the program is assisting graduate students in the fields of economics, history, political science, and sociology to apply their basic disciplines to the study of contemporary China. For this purpose, a limited number of grants are awarded to students each year for language study, so that they may acquire a proficiency in Chinese which will enable them to engage in independent research. During 1959–1960 two re-
Institute of International Studies

search projects were in process at the center. These were the Current Chinese Language Project and The Agriculture of Communist China Project. Other center activities include maintenance of a Reading Room, regular research colloquia and informal luncheon discussions. For further information, inquire at 2168 Shattuck Avenue, Berkeley 4.

Activities in East Asia Studies (formerly The Institute of East Asiatic Studies) represent faculty research interests. Each program is sponsored by a faculty committee. The East Asia Studies office assists in the administration of the entire program, which is comprised of Southeast Asia Studies, the Chinese Dynastic Histories Translations project, Korean Studies, the Mongolian Dictionary project, the Thai Dictionary project, and the East Asia Teacher Training Program.

The Center for Japanese Studies was established in 1958 to develop the facilities for research by faculty members and graduate students whose primary interests are in Japanese studies. The center provides opportunities for the faculty and students of various departments to hold seminars and sponsor public lectures.

Administered within the Center for South Asia Studies are several formal research programs, including the Indian Press Digests Project, the South Asia Village Studies Project, and the South Asia Languages Project. The center coordinates a wide range of other activities relating to South Asia Studies. These extend from the conducting of a colloquium to performing services for individual faculty members engaged in research on South Asia; from advising graduate students and student activities to sponsoring lectures by distinguished visiting South Asians.

For further information concerning Asia Studies, see the current Report on Courses and Research on Asia, or inquire at 2250 Piedmont Avenue, University of California, Berkeley 4.

Slavic Studies.—The Institute of Slavic Studies was established in 1948, with the assistance of the Rockefeller Foundation, for the purpose of encouraging graduate teaching and research on the Slavic nations, both Russian and non-Russian. Its work has been continued by grants from outside sources and with University funds.

In 1957 the work was divided between Berkeley and Los Angeles, and the Center for Slavic and East European Studies was established at Berkeley for the purpose of offering facilities for the conduct of interdisciplinary research on all the Slavic nations. The center serves to coordinate the resources of the University for developing personnel qualified to do research in Slavic studies and to train graduate students seeking careers in this field, particularly in the social sciences and humanities. Courses in the fields of Slavic studies in the departments of Economics, Geography, History, Political Science and Slavic Languages and Literatures may be selected for inclusion in the curricula for the master's degree, which is administered by the Group in Slavic Studies. These courses are also available to students taking their Ph.D. degrees in the various departments.

For further information, see Bulletin of the Center for Slavic Studies, or inquire at the office of the Chairman, 2250 Piedmont Avenue, University of California, Berkeley 4.

Latin-American Studies.—The Center for Latin-American Studies was established in 1956 on the request of faculty members, primarily in the humanities and social sciences, who had been meeting as an informal Latin-American Colloquium since 1950.

The primary function of the Center for Latin-American Studies is to encourage and to facilitate research. It seeks to accomplish this by stimulating interchange among scholars in various disciplines, exploring means to support individual and group research, and sponsoring occasional conferences and guiding the acquisition of research materials. The center has an interest
in teaching reflected in the participation of its members in both graduate and undergraduate instruction.

For further information inquire at 2250 Piedmont Avenue, University of California, Berkeley 4.

International Urban Research.—In its effort to enlarge our knowledge of urban phenomena, International Urban Research systematically gathers and files information about the earth's cities and metropolitan areas of 100,000 or more inhabitants. In this way it is able to provide individual scholars with useful data not otherwise readily available to them. The recently published monograph, *The World's Metropolitan Areas*, for example, represents the most comprehensive attempt to date to delimit metropolitan areas throughout the world using a common frame of reference.

In the analytical part of its work I.U.R. gives strong emphasis to the comparative approach in the study of particular features of urbanization. Individual topics such as urban growth, population density, the internal structure of metropolitan areas, demographic characteristics of urban populations, the hierarchy of cities within countries, are investigated. The purpose is primarily that of scientific understanding, but it is hoped that some of the knowledge will be put to practical use by governmental and other agencies concerned with cities.

Some of the research involves the intensive examination of particular countries or regions. Japan, one of the few non-Western countries with a high degree of urbanization, is the subject of a study just completed by International Urban Research. Mexico is currently under investigation.

The office not only seeks to do urban research itself but also to improve and diffuse the methods and techniques of investigation. This continuous methodological effort is illustrated by a volume, now in press, *Handbook of Urban Research Methods*, which is primarily a guide for urban research.

Graduate students wishing financial assistance and clerical aid in completing research for the Ph.D. degree in the urban field (regardless of discipline) can qualify for research training positions, if their projects are approved by the staff. Applications are received, and work may begin, at any time during the year. For detailed information, inquire at 2234 Piedmont Avenue, University of California, Berkeley 4.

Bureau of International Relations.—The bureau was established in 1919 in answer to the need following World War I for a means of bringing together studies in international relations.

The bureau is the administrative office for the Institute of International Studies. It is responsible for an International Relations Library which provides students and faculty members with facilities and materials for study and research in international law, economics, and politics. In addition, the bureau administers certain other University activities such as conferences of an international nature. It acquaints foreign visitors with the resources of the University, and works closely with such community agencies as the World Affairs Council of Northern California. The bureau assists students seeking knowledge of the forces and influences affecting present-day world politics, and provides information concerning careers in international relations or in the Foreign Service of the United States.

Hundreds of foreign visitors come annually to the University of California where the Bureau of International Relations arranges introductions between University faculty members and foreign visitors, meetings of various kinds, and participation in campus events of interest to the visitors. Students are encouraged to meet and act as hosts to foreign guests while they are at the University.

Assistance in negotiating international contracts has been part of the work of the Bureau of International Relations since 1952 when the San Francisco
Medical School initiated its participation in a program of technical aid in Indonesia through the University of Indonesia.

In connection with international contracts the bureau arranges an orientation program for participant specialists and their families going abroad under University of California auspices.

For further information concerning the services furnished by the Bureau of International Relations, inquire at 2250 Piedmont Avenue, University of California, Berkeley 4.

**THE GRADUATE DIVISION**

For information concerning all matters pertaining to the Graduate Division, including the list of available fellowships and graduate scholarships, and the requirements for higher degrees, see the **ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION**, to be obtained from the Dean of the Graduate Division.

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PART II

Announcement of Courses
Announcement of Courses

DEPARTMENTS AT
BERKELEY

Fall and Spring Semesters
1960–1961

AUGUST 15, 1960

UNIVERSITY OF CALIFORNIA, BERKELEY
CALENDAR*
Referring Primarily to the Departments of the University at Berkeley


July 15, Friday
Last day for filing credentials and applications for admission to graduate standing with the Dean of the Graduate Division.

August 15, Monday
Last day for filing applications for readmission to graduate standing with the Dean of the Graduate Division.

Sept. 1, Thursday
Final date for applications for admission to undergraduate status for the fall semester, test scores and credentials to be filed with the Director of Admissions. Credentials received as late as this may not be evaluated in time for the enrollment of the student during the regular registration period.

Sept. 12, Monday
Last day for filing applications for readmission to undergraduate status with the Registrar.

Sept. 13, Tuesday
Labor Day—an academic and administration holiday.

Sept. 15, Thursday
Examination in English for foreign students, 1 to 4 p.m., 101 California Hall.

Sept. 15, Thursday
Subject A Examination, 9 a.m. to 11 a.m.

Sept. 16, Friday
Fall semester begins.

Sept. 16, Friday
Foreign Language Placement—Achievement Tests, 1:30 to 3:30 p.m.

Sept. 17, Monday
Mathematics 1A, 1C, and 3A Placement Examinations, 4:15 to 6:15 p.m.

Sept. 17, Monday
Registration of students, graduate and undergraduate, in the departments at Berkeley for courses of the fall semester.

Sept. 17, Monday
Chemistry 4A Qualifying Examination, 4:15 to 5:15 p.m., 100 Lewis Hall.

Sept. 20, Monday
Advance enrollment. Assignment to sections.

Sept. 30, Friday
Last day for filing applications in candidacy for all master's degrees to be conferred in January, 1961; office of the Dean of the Graduate Division, 250 Sproul Hall. All signatures required upon these applications must be obtained in advance.

Oct. 3, Monday
Last day for filing applications and programs in candidacy for the certificates of completion of teacher-training curricula to be received in January, 1961; office of the Faculty Counseling Committee of the School of Education, 103 Haviland Hall.

Oct. 7, Friday
Last day for filing announcement of candidacy for a bachelor's degree to be conferred in January, 1961; before 4:30 p.m. at the office of the Registrar, Sproul Hall.

Oct. 7, Friday
Last day for filing applications in candidacy for the degrees of Doctor of Philosophy, Doctor of Public Health, Doctor of Engineering, Doctor of Education, and Doctor of Library Science, to be conferred in June, 1961; office of the Dean of the Graduate Division, 250 Sproul Hall. All signatures required upon these applications must be obtained in advance.

Last day to file petitions to add or drop courses. After this date, upon written petition duly approved by the dean of the college or school, an undergraduate student may discontinue attendance in a course, though without permission to drop the course from the study list. Normally, "F" will be assigned as the final grade in such discontinued courses. Graduate students may drop courses after this date with the permission of the Dean of the Graduate Division.

*Importance of early application: In order to give time for necessary correspondence and for due notice to applicants who may be required to take examinations for admission, applications and credentials should be forwarded to the Director of Admissions at the earliest possible date.
Oct. 25, Tuesday  Last day to file application to take an engineering examination for admission in the spring semester, 1961.


Nov. 5, Saturday  Engineering Examinations: Lower Division, 8 a.m. to 12:30 p.m.; Upper Division, 8 a.m. to 4:30 p.m.

Nov. 19, Saturday  Last day to file application for admission to the University for students wishing to enroll in the College of Engineering in the spring semester, 1961.

Nov. 24, Thursday, to Nov. 26, Saturday  Thanksgiving holiday—academic and administrative.

Nov. 24, Thursday, to Nov. 26, Saturday  Fall recess—an academic holiday.

Dec. 15, Thursday  Last day for filing credentials and applications with the Dean of the Graduate Division for admission to graduate standing in the spring semester.


Dec. 23, Friday  Christmas holiday—academic and administrative.

Dec. 26, Monday  New Year's holiday—academic and administrative.


Jan. 4, Wednesday  Last day for students enrolled in the current session to file applications for undergraduate scholarships for 1961–1962.

Jan. 10, Tuesday  Instruction ends.

Jan. 14, Saturday  Final examinations in the departments at Berkeley.

Jan. 16, Monday, to Jan. 25, Wednesday  Fall semester ends.

Jan. 25, Wednesday  Last day for filing theses with the Dean of the Graduate Division for master's degrees to be conferred in January, 1961.

1961

SPRING SEMESTER, 1961

Dec. 15, Thursday  Last day for filing credentials and applications with the Dean of the Graduate Division for admission to graduate standing.

Dec. 16, Monday  Applications for admission to undergraduate status for the spring semester, test scores and credentials to be filed with the Director of Admissions.

Jan. 16, Monday  Last day for filing applications for readmission to undergraduate status with the Registrar.

Jan. 27, Friday, or Jan. 30, Monday  Examination in English for foreign students, 1 to 4 p.m., 101 California Hall.
Subject A Examination, 9 a.m. to 12 m.
Spring semester begins.

Registration of students, graduate and undergraduate, in the departments at Berkeley for courses of the spring semester.
Advance enrollment. Assignment to sections.
Instruction begins.
Last day for filing applications for fellowships and graduate scholarships for 1961–1962.
Lincoln’s Birthday—an academic and administrative holiday.
Last day for filing applications in candidacy for all master’s degrees to be conferred in June, 1961; office of the Dean of the Graduate Division, 250 Sproul Hall. All signatures required upon these applications must be obtained in advance.
Last day for filing announcement of candidacy for a bachelor’s degree to be conferred in June, 1961; before 4:30 p.m. at the office of the Registrar, Sproul Hall.
Last day for filing applications in candidacy for the degrees of Doctor of Philosophy, Doctor of Public Health, Doctor of Engineering, Doctor of Education, Doctor of Library Science, and Doctor of Social Welfare, to be conferred in January, 1962; office of the Dean of the Graduate Division, 250 Sproul Hall. All signatures required upon these applications must be obtained in advance.
Last day to file petitions to add or drop courses. After this date, upon written petition duly approved by the dean of the college or school, an undergraduate student may discontinue attendance in a course though without permission to drop the course from the study list. Normally, “F” will be assigned as the final grade in such discontinued courses. Graduate students may drop courses after this date with the permission of the Dean of the Graduate Division.
Last day for filing applications and programs in candidacy for the certificates of completion of teacher-training curricula to be received in June, 1961; office of the Faculty Counseling Committees of the School of Education, 103 Haviland Hall.
Last day for entering students to file applications for undergraduate scholarships for 1961–1962.
Spring recess—an academic holiday.
Last day to file application to take an engineering examination for admission in the fall semester, 1961.
Engineering Examinations: Lower Division, 8 a.m. to 12:30 p.m.; Upper Division, 8 a.m. to 4:30 p.m.
Last day to file application for admission to the University for students wishing to enroll in the College of Engineering in the fall semester, 1961.
Last day for filing in final form with the committees in charge of theses for master’s degrees to be conferred in June, 1961.
Instruction ends.
Memorial Day—an academic and administrative holiday.
Final examinations in the departments at Berkeley.
Last day for filing theses with the Dean of the Graduate Division for master’s degrees to be conferred in June, 1961.
Spring semester ends.
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THE REGENTS OF THE UNIVERSITY

REGENTS EX OFFICIO

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Governor of California and President of
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Lieutenant-Governor of California
State Capitol, Sacramento 14

RALPH M. BROWN, A.B., LL.B.
Speaker of the Assembly
State Capitol, Sacramento 14

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State Superintendent of Public
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721 Capitol av, Sacramento 14

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498 Pepper rd, Petaluma

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804 Mechanics' Institute bldg.,
San Francisco 4

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737 S Hill st, Los Angeles 14

CLARK KERR, Ph.D., LL.D.
President of the University
714 University Hall, Berkeley 4
2147 Administration bldg,
Los Angeles 24

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The term of the appointed Regents is sixteen years, and terms expire March 1 of the
years indicated in parentheses. The names are arranged in the order of original accession
to the Board.

717 N Highland av, Los Angeles 38

100 Montgomery st, San Francisco 4

VICTOR R. HANSEN, LL.B. (1962)
1734 Earlmont av, La Canada

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(1962)
111 Sutter st, San Francisco 4

DONALD H. MCLAUGHLIN, B.S., M.A.,
Ph.D., D.Eng. (1966)
107 Bush st, San Francisco 4

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1520 Central bldg, 14th and Broadway,
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HOWARD C. NAFFZIGER, B.S., M.S., M.D.
(1968)
Room 415, 55 Sutter st, San Francisco 4

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MRS. DOROTHY B. CHANDLER (1970)
202 W First st, Los Angeles 58

MRS. CATHERINE HEARST (1974)
701 N Canon dr, Beverly Hills

SAMUEL B. MOSHER, B.S. (1972)
811 W Seventh st, Los Angeles 17

Lockheed Aircraft Corporation,
Burbank

PHILLIP L. BOYD, A.B. (1972)
3900 Market st, Riverside

JERD F. SULLIVAN, JR. (1964)
Crocker-Anglo National Bank,
1 Montgomery st, San Francisco 4

NORTON SIMON (1976)
Suite 1201, 3440 Wilshire blvd,
Los Angeles 3

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689 University Hall, Berkeley 4

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UNIVERSITY OF CALIFORNIA

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Dow Votaw, M.B.A., LL.B., Associate Dean of the School of Business Administration.
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David E. Snodgrass, A.B., LL.B., Dean of the Hastings College of the Law.
Malcolm S. Watts, M.D., Assistant Dean of the School of Medicine.
Gurdon G. Woods, Director of the California School of Fine Arts.
Wendell L. Wylie, D.D.S., M.S., Assistant Dean of the School of Dentistry.
UNIVERSITY OF CALIFORNIA

LETTERS AND SCIENCE LIST OF COURSES

At least 108 units offered for the degree of Bachelor of Arts, College of Letters and Science, must be in courses chosen from the Letters and Science List of Courses.

Courses not on the list, but taken for credit to satisfy a general University requirement established by the Board of Regents, will be accepted as equivalent to courses in the Letters and Science List up to a maximum of 8 units.

Any course not included in the Letters and Science List of Courses, but required, or accepted, as part of a major or group major or as a prerequisite therefor, shall, for students offering that major or group major at graduation, but not for others, be treated as if it were in the Letter and Science List of Courses.

Thirty-six units of upper division courses, selected from the following list, must be completed after the student has attained upper division standing.

- Agricultural Economics 112A, 112B, 120.
- Anatomy. All undergraduate courses.
- Anthropology. All undergraduate courses.
- Architecture 110, 121, 122, 126, 127.
- Art. All undergraduate courses.
- Astronomy. All undergraduate courses.
- Botany. All undergraduate courses except 155.
- Business Administration 1A, 1B, 10, 18, 100, 150.
- Chemistry. All undergraduate courses except 125, 125L.
- City and Regional Planning. All undergraduate courses.
- Classics. All undergraduate courses.
- Comparative Literature. All undergraduate courses.
- Decorative Art. All undergraduate courses.
- Dramatic Art. All undergraduate courses except 30, 190, 191, 192, 193.
- Economics. All undergraduate courses.
- Education 100A and not more than 3 units from 101, 102, 105.
- English. All undergraduate courses.
- Forestry 1, 103, 122, 125.
- French. All undergraduate courses except 20.
- Genetics. All undergraduate courses.
- Geography. All undergraduate courses.
- Geology. All undergraduate courses except 150.
- German. All undergraduate courses.
- Greek. All undergraduate courses.
- History. All undergraduate courses.
- Italian. All undergraduate courses.
- Journalism. All undergraduate courses except 131A, 131B, 152, and 181 series.
- Latin. All undergraduate courses.
- Linguistics. All undergraduate courses.
- Mathematics. All undergraduate courses.
- Medical Physics (see Physics).
- Music. All undergraduate courses; a total of not more than 8 units from the following courses will be accepted as Letters and Science credit: 42, 43, 46, 48, 142, 143, 146, 148.
- Near Eastern Languages. All undergraduate courses.
- Optometry (see Physiological Optics, below).
Letters and Science List of Courses

Oriental Languages. All undergraduate courses.
Paleontology. All undergraduate courses.
Philosophy. All undergraduate courses.
Physical Education 105.
Physics. All undergraduate courses except 126, 126L, 131.
Physiological Optics 105A, 105B, 106A, 106B.
Physiology. All undergraduate courses.
Plant Nutrition 115, 117.
Political Science. All undergraduate courses except 183.
Psychology. All undergraduate courses except 104, 114, 116, 117, 184, 185, 186, 187.

Sanskrit. All undergraduate courses.
Scandinavian. All undergraduate courses.
Slavic Languages and Literatures. All undergraduate courses.
Social Science 1A, 1B.
Social Welfare 100, 106, 110A, 110B.
Sociology and Social Institutions. All undergraduate courses.
Spanish and Portuguese. All undergraduate courses.
Speech. All undergraduate courses.
Statistics. All undergraduate courses except 142A, 142B, 142C, 142D, 144.
Virology. All undergraduate courses.
Zoology. All undergraduate courses except 109, 116, 119A–119B, 120, 145, 146.
GENERAL INTEREST COURSES FOR
UPPER DIVISION STUDENTS

Listed below are courses of general interest to all upper division students. For the most part, there are no prerequisites except upper division standing. Included are courses offered by departments for nonmajors. For more detailed information, see the complete course description in the departmental announcement on the following pages.

**Agricultural Economics:** 110, Agricultural Finance; 112A–112B, Rural Sociology; 120, Agricultural Policy; 130, Agricultural Marketing; 140, Fundamentals of Farm Management; 156, Agricultural Economic Measurements; 175, Economics of Natural Resources.

**Anatomy:** 25, General Human Anatomy; 103, Neuroanatomy.

**Anthropology:** 103, Culture Growth; 118, The Nature of Culture; 119, Problems in Culture and Personality; 120, Language and Culture; 124, Primitive Religion; 125, Comparative Society; 152, Human Evolution and Fossil Man; 153, Living Races of Man.

**Architecture:** 110, The House; 121, Architectural History; 122, Architectural History.


**Botany:** 115, Plants in Relation to Man; 151, Principles of Plant Distribution.

**City and Regional Planning:** 110, Introduction to City Planning; 111, Introduction to Housing; 121, Urban Aesthetics.

**Classics:** 100A–100B, Greek and Latin Literature in Translation; 138, The Greek and Roman Historians; *151, Ancient Greek Religion; *170B, *170C, Classical Archaeology; 178, Mythology; 185, Political and Social Thought of the Ancient Greeks.

**Criminology:** 100A–100B, Crime Causation, Prevention and Correction; 103, Psychological Aspects of Criminology.

**Decorative Art:** 127A–*127B–127C, Primitive Art (127A, Paleolithic West Europe, South and West Africa; *127B, of Oceania and South America; 127C, Middle and North America); 130A–130B, Interior Design; 140A–140B–140C, A Survey of Ceramic and Glass Forms; 167, History of Design since the Industrial Revolution; 175A–*175B, History of the Textile Arts (175A, The New World: Native America, Oceania; *175B, The Old World: Europe, India, Asia); 180A–180B, Survey of Expression in Materials; 193A–193B, Historic Costume (193A, Native America; Indonesia; Asia; 193B, Classic Mediterranean; Medieval to Modern Europe); 195A–*195B, The History of Interior Design.

Upper Division Courses of General Interest


Education: 101, The History of Education—General Course; 100A, Learning and the Learner; 105, Education in Foreign Countries; 106, Philosophy of Education; 130, The Elementary School Curriculum; 172, Junior High School Education; *182, Problems of Adulthood.

English: 110, The English Language; 114A-*114B, The English Drama (114A, From the Miracle Plays to 1642; *114B, From 1642 to 1850); 116, The English Bible as Literature; 117A–117B, Shakespeare; 117E, Shakespeare; *117J, Shakespeare; 119, The Age of Johnson; 121, The Romantic Period; 122, The Victorian Period; 123, Nineteenth-Century British Prose; 125B, The Novel in Western Civilization; 125C–125D, The English Novel; 125E, The American Novel; *128, Regional Literature: California and the West; 130A, American Literature before 1840; 130B, American Literature: 1840–1885; 130C, American Literature: 1885 to the Present; 131, American English; *132, The Transcendental Movement in American Literature; 141, Modes of Writing (Exposition, Fiction, Verse, etc.); *149, The English Lyric; 152, Chaucer.

Entomology and Parasitology: 100, General Entomology; 117, Helminthology; 126, Medical Entomology; 133, Biology of Aquatic Insects.

Forestry: 103, Principles of Forest Ecology; 121, Forest Economics; 122, Forest Policy.

French: *142A–142B, French Literature of the Middle Ages (142A, Epic, Romance, History; 142B, Drama, Lyric and Allegorical Poetry); *146A–146B, Readings in Contemporary French Literature.

Genetics: 100, Principles of Genetics.

Geography: (All upper division courses.)

History: Many upper division courses in History have no specific prerequisites, although preparation such as that provided by the appropriate lower division course is generally desirable.


Journalism: 140, History of Journalism; 141, The Press and Society; 145, Great Figures in Journalism; 151, Literature of the Press; 165, The Press, the Law and the Constitution; 190A*–190B, Press and World Affairs: Comparative World Journalism; 196, Theories and Problems in the Conduct of International Information Programs.

Linguistics: 100, Principles of Descriptive and Historical Linguistics.


Upper Division Courses of General Interest

Music: *127A, Introduction to Opera; 127B, The Symphonies of Beethoven; 127C, Introduction to Contemporary Music; 127D, Bach and Handel; 140, Opera Workshop; 141, Advanced University Symphony Orchestra; 142, University Chamber Band; 143, Advanced University Concert Band; 144, Advanced University Chorus; 146, Advanced Chamber Music Ensemble; 148, Advanced Piano Ensemble; 145, Repertory Chorus; *149, Collegium Musicum.


Paleontology: *170, History of Paleontology.

Physical Education: *120, Sports in American Society; 140, Community Recreation.

Physics: 132, Modern Physics.

Physiology: 102, Physiology of Human Development; 103, Human Physical Growth; *107, Environmental Physiology.


Psychology: 136, Psychology of the Unconscious; 145A, Social Psychology; *160, Mental Deficiency; 185, Personnel and Industrial Psychology.

Public Health: 101, Introduction to Health Administration; 106, Medical Sociology; 111, Environmental Sanitation; 112, Control of Vector and Reservoir Animals Affecting the Public Health; 113, Sanitary Control of Foods; 115, Radiological Aspects of Public Health Engineering; 125, Child Health; *135, Individual Health; 160A, 160B, Biometry; 163, Demography; 170, Introduction to Occupational Health and Industrial Hygiene; 186, Social, Medical, and Public Health Aspects of Venereal Disease Control; 189, Nutrition Problems in Public Health.


Scandinavian: 100A–100B–*100C, History of Scandinavian Literature (100A, From 1300 to 1850; 100B, From 1850 to World War I; *100C, From World War I to the present); 106, History of Scandinavian Drama up to 1900; 107, The Plays of Ibsen; 108, Strindberg and His Writings; 109, Scandinavian Drama of the Twentieth Century; 120A–*120B, The Novel in Scandinavia; 125, Masterpieces of Old Norse Literature.

Upper Division Courses of General Interest

**Slavic Languages and Literatures:** 130, Introduction to Russian Literature; *131, Russian Literature (1880–1917); 132, Russian Literature since 1917; 133A, Russian Novelists of the Nineteenth Century and Western European Literatures; 133C, Dostoevsky; 133D, Tolstoy; 133E, Turgenev; 133F, Chekhov; 134, Russian Folklore; *135, The Russian Drama; 140, Survey of Slavic Literatures; 143, Introduction to Modern Slavic Literary Theory; 151, Polish Literature: Sixteenth–Eighteenth Centuries; 153, Polish Literature of the Post-Romantic Period; *154, Polish and Russian Romanticism; *155, Mickiewicz; 160, Survey of Czech and Slovak Literature; *161, Czech and Slovak Literature of the Nineteenth Century; 170, Survey of South Slavic Literatures; *180A–180B, Survey of Russian Culture; 182, History of Polish Culture; 188, The Slavic-Speaking World.


**Sociology and Social Institutions:** Many upper division courses in Sociology and Social Institutions have no specific prerequisites although preparation such as that provided by the appropriate lower division course is generally desirable.

**Speech:** 117A–117B, Semantics; 119, Analysis of Communication Content; 135, British Public Address during the Eighteenth and Nineteenth Centuries; 137, American Public Address during the Eighteenth and Nineteenth Centuries; 138, Modern Public Address; 139, Modern Spokesmen; 147, Modern Rhetoric.

**Statistics:** 130A–130B, Statistical Inference.

**Zoology:** *114, Genetics; 115, Human Genetics; 116, Introduction to Wildlife and Fisheries Management.

COURSES OF INSTRUCTION*

FALL AND SPRING SEMESTERS, 1960–1961

Explanatory Note

The credit value of each course in semester units is indicated for each semester by a number in parentheses following the title. A semester unit is one hour of the student's time at the University, weekly, during one semester, in lecture, or recitation, together with the time necessary in preparation therefor; or a longer time in laboratory or other exercises not requiring preparation. The session in which the course is given is shown as follows: I, first semester (September to January); II, second semester (February to June); Yr., throughout the first and second semesters. Information concerning class hours will be found in the SCHEDULE AND DIRECTORY.

Year courses; double numbers.—A course designated by a double number (for example, History 4A-4B) is continued through two successive semesters, ordinarily from September to June; occasionally, however, the first part of a year course may begin in February. The student should use the first number in registering for the course during its first semester, and the second number during its second semester. The first half of such a course is prerequisite to the second half unless there is an explicit statement to the contrary. A final report is made by the instructor at the end of each semester. The student may discontinue the course at the end of the first semester, with final credit for the first half of the course, except as otherwise noted.

Classification and Numbering of Courses—

Courses are classified and numbered as follows:

(1) Lower division courses (numbered 1-49, or sometimes indicated by letters if in subjects usually given in high school). A lower division course is one open to freshmen and to sophomores. Such courses do not count as upper division work in any department.

(2) Upper division courses (numbered 100-199). An upper division course in any department is one open to those students only who have completed a lower division course, or courses, in that department; or is an elementary course in a subject of such difficulty as to require the maturity of upper division students. The prerequisites for courses should be noted carefully. Students will not be permitted to register in upper division courses unless they have completed the courses named as prerequisites, or, if no courses are definitely named as prerequisites, until they have attained junior standing in the University. Accepted professional training, however, will be regarded as sufficient preparation for upper division courses in the field in which the student has been trained.

Special study courses for individual advanced undergraduates, usually numbered 199, should be restricted to senior honor students having an adequate preparation in the form of credit for upper division courses.

Five units is the maximum number of units for which a student may enroll or receive credit in any and all 199 courses in any one semester.

Departments may offer special honors courses (marked H) in reading and research, with credit to be determined by the instructors in charge, according to the performance of the individual students, and subject to such general restrictions as may be imposed by the department, the college, or school.

* For information concerning general University requirements for degrees and major requirements of colleges and schools at Berkeley, see the CIRCULAR OF INFORMATION.
or the Committee on Courses of Instruction of the Academic Senate. The work of the student in an honors course may consist of additional work in connection with other courses of instruction, or may be independent of such courses.

(3) Graduate courses (numbered 200–299). As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation normally consists of the completion of at least 12 units of upper division work basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed.

(4) Professional teacher-training courses in the Department of Education and courses in other departments that are especially intended for teachers or prospective teachers (numbered 300–399).

(5) Certain professional courses in departments other than the Department of Education (numbered 400–499).

Courses are further classified as follows:

Resident courses.—Courses of resident instruction are given either during regular sessions or Summer Sessions or (by special arrangement) as extra-session courses. Laboratory, field, or other individual work, done out of session under the direction of a department of instruction, may be accepted upon the recommendation of the department in partial fulfillment of the residence requirement for the bachelor's degree. All such work is in the form of upper division or graduate extra-session courses, and these courses must be approved in advance by the Committee on Courses of Instruction. Moreover, in pursuance of existing regulations, students must register in advance for all such work, and this registration must be approved by the proper faculty before the work is undertaken.

University Extension courses.—In the curricula leading to the A.B. and B.S. degrees, credit is allowed for courses in University of California Extension that bear numbers prefixed by X, XB, XL, XR, or XSB. Such courses are rated, with respect to the general and specific requirements for the bachelor's degree, on the same basis as courses taken in residence at collegiate institutions of approved standing.

A student who proposes to take a University Extension course for credit toward the bachelor's degree must first consult the Dean of his college or school.
AGRICULTURAL CHEMISTRY
(Office, 112 Agriculture Hall)

Committee in Charge:
Clinton O. Chichester, Ph.D., Assistant Professor of Food Technology (Chairman of the Committee), Davis.
Harold T. Gordon, Ph.D., Lecturer in Entomology, Berkeley.
Walter G. Jennings, Ph.D., Assistant Professor of Dairy Industry, Davis.
Richard E. Kepner, Ph.D., Associate Professor of Chemistry, Davis.
Gordon Mackinney, Ph.D., Professor of Food Science and Technology, Berkeley.

Graduate Course
(Concerning conditions for admission to graduate courses, see page 18)
201A–201B. Research in Agricultural Chemistry. (1–6; 1–6) Yr.
The Staff (Mr. Gordon in charge, including all members of the Graduate Agricultural Chemistry Group)
The research work will ordinarily be under the direction of a member of the instructing staff who is in the field of agriculture in which the student's preparation has been found to be adequate.

AGRICULTURAL ECONOMICS
(Department Office, 207 Giannini Hall)

Raymond G. Bressler, Jr., Ph.D., Professor of Agricultural Economics.
David A. Clarke, Jr., Ph.D., Professor of Agricultural Economics.
Varden Fuller, Ph.D., Professor of Agricultural Economics (Vice-Chairman of the Department).
*Sidney S. Hoos, Ph.D., Professor of Agricultural Economics, Economics, and Business Administration.
George M. Kuznets, Ph.D., Professor of Agricultural Economics, Economics, and Statistics.
Ivan M. Lee, Ph.D., Professor of Agricultural Economics.
George L. Mehren, Ph.D., Professor of Agricultural Economics (Chairman of the Department).
Loy L. Sammet, Ph.D., Professor of Agricultural Economics.
Siegfried V. Wantrup, Dr.Agr., Professor of Agricultural Economics.
Harry R. Wellman, Ph.D., Professor of Agricultural Economics.
Murray R. Benedict, Ph.D., Professor of Agricultural Economics, Emeritus.
Henry E. Erdman, Ph.D., Professor of Agricultural Economics, Emeritus.
David Weeks, Ph.D., Professor of Agricultural Economics, Emeritus.
Norman R. Collins, Ph.D., Associate Professor of Agricultural Economics.
James N. Boles, Ph.D., Assistant Professor of Agricultural Economics.
Michael F. Brewer, Ph.D., Assistant Professor of Agricultural Economics.
Irving F. Hoch, Ph.D., Assistant Professor of Agricultural Economics.


Letters and Science List.—Courses 112A–112B, 120 are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.
Departmental Major Advisers: Mr. Brewer, Mr. Clarke.

Preparation for the Major. See page 77 of the Circular of Information.

Upper Division Courses.—All upper division courses announced by the department presuppose at least junior standing in the College of Agriculture. Juniors and seniors in other colleges may elect such courses in the College of Agriculture as they are qualified to pursue.

To graduate with a major in agricultural economics, a student must have at least a C average in all upper division courses taken in agricultural economics. Students who do not maintain such an average may be required to withdraw from the major at any time.

Honors.—Students who become candidates for the bachelor's degree in the College of Agriculture may be recommended for honors on the basis of the quality of the work done in the regular curriculum. See page 78 of the Circular of Information.

Graduate Work.—Concerning conditions for admission to graduate courses, see page 18 of this bulletin. Students who intend to become candidates for higher degrees in the College of Agriculture will be required to give evidence of the completion of an amount of work equivalent, in its value, to that required by the College of Agriculture for the degree of Bachelor of Science. The student is referred to the Announcement of the Graduate Division, Northern Section, for details of graduate work in the various fields of agriculture.

Lower Division Courses

2. Introduction to Agriculture. (3) II.
A general survey of United States agriculture, with emphasis on California. Crops and livestock, types of farming, soils and soil conservation, irrigation, pest and disease control, marketing of farm products, economic problems of agriculture, farm organizations and their role.

25. Comparative World Agriculture. (3) II.
Survey of world agriculture, stressing the development of principal agricultural regions and the interrelations among physical environment, agricultural growth, and population. Tenure, credit, and land reform problems, and the development of backward regions.

Upper Division Courses

100A. Economic Analysis in Agriculture. (3) I. Mr. Brewer
Prerequisite: Economics 1A–1B, 2, or the equivalent.
The application of economic principles to problems of agriculture: economic structure and aspects of American agriculture; analysis of demand, supply, production of agricultural products, with particular reference to the individual firm.

100B. Economic Analysis in Agriculture. (3) II. Mr. Clarke
Prerequisite: course 100A or the equivalent.
The application of economic principles to the problems of agriculture: economic pricing of agricultural output and productive services, including multiple products, multiple markets, and multiple time periods; regional specialization, location and trade; determinants of economic change; effects of economic organization.

106. Analysis of Agricultural Economic Data. (3) I. Mr. Boles
Lectures and laboratory. Prerequisite: Economics 2, Mathematics 16A, or the equivalent, or consent of the instructor.
Evaluation and treatment of economic data in agriculture, with emphasis on methods of analyzing relations among economic variables.
110. Agricultural Finance. (3) I.
Prerequisite: Economics 1A or 1B.
Mr. Benedict
Farmers' credit needs, methods of financing the agricultural industry, and the agencies supplying agricultural credit.

112A-112B. Rural Sociology. (2-2) Yr.
Mr. Taylor
The forms of human association in rural environment, including their origins, development, structures, functions, and cultural products. Rural population, social organization and institutions, social psychology, ecology patterns, social change, social pathology. Rural community development in underdeveloped countries.

120. Agricultural Policy. (3) I.
Prerequisite: Economics 1A-1B.
Mr. Brewer

130. Agricultural Marketing. (3) I.
Prerequisite: Economics 1A or 1B.
Mr. Sammet

140. Fundamentals of Farm Management. (4) II.
Lectures and laboratory. Prerequisite: junior standing.
Mr. Dean
Farm firm organization and resources; applying economic and technological principles in decision-making; analytical techniques and management control; problems in organizing and managing the farm business.

145. Land Economics and Farm Appraisal. (3) II.
Lectures and laboratory. Prerequisite: Economics 1A or 1B.
Mr. Hoch
The utilization of agricultural land, economic rent, land appraisal, political and economic problems of land development, land settlement, land policies. The relation of population growth to economic utilization of land and to land value.

Courses 156-175 are senior courses designed for those who have completed courses 100A, 100B, 106, and the appropriate survey course in the 120-145 series. A student not having this preparation but who desires a course in the 156-175 series may be admitted with the consent of the instructor.

156. Agricultural Economic Measurements. (3) II.
Mr. Hoch
Sources, collection of data, and analysis of selected measurements, including parity prices, parity income, employment, wages, production, and national income.

160. Economic Analysis in Agricultural Marketing. (3) II.
Mr. Clarke
(Formerly numbered 160A.)
An analytical treatment of agricultural marketing: the marketing firm in its economic context; location of agricultural production, processing and trade; demand analysis; economic analysis of market organization; government in marketing; the marketing system and the general economy.

163. Cooperative Management. (3) I.
Mr. Clarke
Analysis of organizational and operational problems and policies of agricultural cooperative associations.
175. Economics of Natural Resources. (3) I. Mr. Smith
An analysis of economic issues in public policy decisions affecting natural resources: economic evaluation of projects and programs; tenure of resources; development; conservation; taxation; location; analytical techniques; public policy formation and execution.

198. Directed Group Study. (1-5) I and II. The Staff (Mr. Brewer in charge)
Directed group study of selected topics in Agricultural Economics for advanced undergraduates.

199. Special Study for Advanced Undergraduates. (1-5) I and II. The Staff (Mr. Brewer in charge)
Prerequisite: senior standing and approval of the department. Limited to agricultural economics majors.

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

200A–200B. Economics of Agricultural Production and Consumption. (3–3) Yr. Mr. Collins, Mr. Kuznets
(Formerly numbered 206A and 206B.)
Theory of the firm and industry, with particular reference to production; market structures, single and multiple products, uncertainty; theory of demand and consumption; and location theory and interregional trade.

210A–210B. Quantitative Methods in Agricultural Economics. (3–3) Yr. Mr. Boles, Mr. Hoch
(Formerly numbered 204A–204B.)
Prerequisite: Statistics 131 and 131L.
Measurement of economic aggregates; statistical estimation of economic relations; models and studies of intersectoral relations; recursive and independent equation systems; total economy, sector, and commodity models.

220. Agriculture in the General Economy. (3) I. Mr. Mehren
Growth trends and cyclical variation in agriculture and in the national economy; comparative income level and distribution; production trends, variations, and projections; changing organization and structure of agriculture in relation to the general economy.

221. Formation and Administration of Agricultural Policy. (3) II. Mr. Fuller
(Formerly numbered 180.)
Political economy of agricultural policy; defining problems and policy objectives; economic analysis of policy objectives, of program alternatives for their achievement, and of program results.

222. National and World Policies for Agriculture. (2) II. Mr. Fuller
(Formerly numbered 202.)
A comparative study of national systems of policy formation, objectives, and programs; interrelations of national policies; instruments and institutions for reconciliation of conflicting national interests and objectives.

223. Seminar in Economic Development and Agriculture. (2) I. Mr. Benedict
(Formerly numbered 210.)
An analysis of the role of agriculture in economic development of selected foreign countries, with emphasis on institutional conditions and government programs.
230A–230B. Agricultural Marketing Research. (3–3) Yr.
(Formerly numbered 205 and 209.) Mr. Sammet, Mr. Collins
A seminar on the literature, current research problems, and methods of analysis in agricultural marketing.

240A–240B. Farm Management Research. (3–3) Yr.
(Formerly numbered 212.) Mr. Shaw, Mr. Dean
A seminar on the literature, current research problems, and methods of analysis in farm management.

270A–270B. Natural Resource Economics Research. (2–3; 2–3) Yr.
(Formerly numbered 207 and 208.) Mr. Smith, Mr. Wantrup
Degree candidates in Agricultural Economics who are specializing in natural resource economics are expected to take both courses for 3 units of credit. Also open to other qualified students in all departments, who may take one or both of these courses for either 2 or 3 units of credit.

270A: Seminar in the literature, current research, and methods of analysis in natural resource economics with emphasis on public policy.

270B: Seminar in the application of economics to special problems of public policy in natural resources.

290. Problems in Agricultural Economics Research. (3) II. Mr. Kuznets
Identification and statement of research problems; formation of hypotheses; selection and employment of research methods; aggregation of research findings; derivation of policy implications.

298. Individual Research. (1–6) I and II.
(Formerly numbered 203.) The Staff (Mr. Collins in charge)

299. Special Study for Graduate Students. (1–4) I and II.
The Staff (Mr. Collins in charge)
Any properly qualified graduate student who wishes to pursue a special field of study may do so if his proposed program of study is acceptable to the member of the staff with whom he works.

AIR SCIENCE
(Department Office, 218 Building T-9)
Samuel C. Gurney, Jr., Colonel, U.S.A.F.; Professor of Air Science (Chairman of the Department).
Eugene J. Kraft, Lieutenant Colonel, U.S.A.F.; Associate Professor of Air Science.
Vance F. Mitchell, Major, U.S.A.F.; Associate Professor of Air Science.
Augie T. Ong, Major, U.S.A.F.; Associate Professor of Air Science.
Jon R. Levy, Captain, U.S.A.F.; Assistant Professor of Air Science.
Robert D. Power, Captain, U.S.A.F.; Assistant Professor of Air Science.
Richard J. Schimberg, Captain, U.S.A.F.; Assistant Professor of Air Science.
Norman J. DeBack, First Lieutenant, U.S.A.F.; Assistant Professor of Air Science.

LOWER DIVISION COURSES
The lower division or basic courses in air science, together with electives (see page 36, CIRCULAR OF INFORMATION), meet the requirements established by the Regents for military training in the first and second undergraduate years. The air science lower division course offering consists of two hours of formal instruction per week for one semester of each of the first two undergraduate years and one hour of laboratory per week for the two academic years. Enrollment in air science is limited to students who are male citizens of the United States, physically fit for military service and who are at least
Air Science

14 years of age or have not reached their 23d birthday at time of initial enrollment. Uniforms as required are provided by the government, and must be returned in good condition on completion of the course.

1A. Air Science 1. (½) I. The Staff (Mr. Kraft in charge)
One section meeting per week. Instruction in and application of direct leadership techniques through military drill and command.

1B. Air Science 1. (2) II. The Staff (Mr. Kraft in charge)
General survey to provide understanding of elements and potentials of aero-space power including military instruments of national security. Leadership laboratory.

21A. Air Science 2. (2) I. The Staff (Mr. Kraft in charge)
Prerequisite: course 1B, or the equivalent.
More advanced consideration of aero-space power, emphasizing employment of air forces and space operations. Leadership laboratory.

21B. Air Science 2. (½) II. The Staff (Mr. Kraft in charge)
Prerequisite: course 21A, or the equivalent.
One section meeting per week. Instruction in and application of direct leadership techniques through military drill and command.

Upper Division Courses

Students who have successfully completed the basic courses or have received credit in lieu thereof may apply for enrollment in the advanced course in air science. In general, students selected for this course are those who have shown potential for leadership and command, whose aptitude and interest in becoming Air Force officers has been demonstrated. The advanced course consists of four hours of formal instruction and one hour of laboratory per week for the junior year. Senior students are required to complete satisfactorily Political Science 120A. In addition, senior students are required to complete one hour of laboratory per week and a seminar which meets during the later portion of the fall and spring semesters. The student may expect that at least one additional hour per week will be required for extra activities not specifically covered in the formal program but essential in his over-all development as an officer. The number enrolled in the advanced course may vary from year to year and is dependent upon selection by the Chairman of the department and the quota allocated annually based upon officer requirements of the United States Air Force. For admission to the upper division or advanced courses of air science, students must meet the following requirements:

1. Have attained upper division standing in the University.
2. Be citizens of the United States and be regularly enrolled in good standing in the University of California.
3. Be not more than 26½ years of age at anticipated date of graduation and commissioning.
4. Agree to accept a commission in the United States Air Force, if tendered.
5. Be selected by the Professor of Air Science and the Chancellor at Berkeley.
6. Successfully complete such survey or screening tests as may be prescribed.
7. Execute a written agreement with the government to complete the two-year advanced course, including attendance at summer training; to accept a commission, if tendered; to serve on active duty after receipt of such commission for a specified period, subject to call by the Secretary of the Air Force.
8. Pass successfully a prescribed physical examination.

*To be taken concurrently with an elective course. See page 36, CIRCULAR OF INFORMATION.
Students are required to attend summer training, normally of four weeks' duration, during the summer between their junior and senior years. Students attending this advanced summer camp will receive pay (approximately $75), transportation allowance to and from camp, quarters, uniforms, meals, and medical service while at camp.

At the beginning of the advanced course (junior year), an officer-type uniform is furnished each student, which becomes his personal property upon his successful completion of the advanced course. During this two-year period, each student also receives a daily monetary allowance totaling approximately $548 for the two years.

Successful completion of the advanced Air Force R.O.T.C. course and four years of education leading to the granting of a bachelor's degree qualify the student for appointment and commission, by the President of the United States, as a Second Lieutenant in the Air Force Reserve. In addition, a limited number of "Distinguished Air Force Graduates" are eligible for appointment as Second Lieutenants in the Regular Air Force and for graduate education in selected fields under Air Force auspices.

Qualified graduates may be appointed to Air Force flight training schools (pilot or navigator). Other graduates will receive education and/or assignment in varied technical or administrative fields appropriate to their qualifications and Air Force requirements.

For further information about the Air Force Reserve Officers' Training Corps, consult the Professor of Air Science, Room 216, Building T-9.

131A. Air Science 3. (3) I. The Staff (Mr. Mitchell in charge)
Prerequisite: courses 21A and 21B, or the equivalent.
Knowledge and skills required of a junior officer in the Air Force. This includes organization theory, survey of management, communication, creative thinking, and Federal budgeting with respect to aero-space power. Leadership laboratory.

131B. Air Science 3. (3) II. The Staff (Mr. Mitchell in charge)
Prerequisite: courses 21A and 21B, or the equivalent.
Principles and practices of leadership and human relations. This includes basic psychology of leadership, formal sanctions available to the leader, application of creative thinking and leadership theory to simulated and real problems. Leadership laboratory.

141A. Air Science 4. (¾) I. The Staff (Mr. Kraft in charge)
Prerequisite: courses 131A and 131B, or the equivalent.
Leadership laboratory for cadet officers, orientation in meteorology and navigation, and a seminar briefing on commissioned service for graduating seniors.

141B. Air Science 4. (3) II. The Staff (Mr. Kraft in charge)
Prerequisite: courses 131A and 131B, or the equivalent.
Survey of military aspects of world political geography; the Air Force officer; leadership laboratory for cadet officers.

ANATOMY AND PHYSIOLOGY

ANATOMY

(For courses in Physiology, see page 325.)

(Office, 4551 Life Sciences Building)

C. Willet Asling, Ph.D., M.D., Professor of Anatomy (Co-Chairman for Anatomy).

Miriam E. Simpson, Ph.D., M.D., Docteur h.c., Professor of Anatomy.
Marjorie M. Nelson, Ph.D., Lecturer in Anatomy.

Letters and Science List.—All undergraduate courses in anatomy are included in the Letters and Science List of Courses. For further information concerning this list, see page 11.

Departmental Adviser: Mr. Asling.

LOWER DIVISION COURSES

25. General Human Anatomy. (3) I. Mr. Asling
(Formerly course 102.) Lectures and laboratory. Prerequisite: Physiology 1, 1L (recommended) or Zoology 1A or Biology 11A-11B. May be taken to satisfy the anatomy requirement for entrance to professional curricula specifying Anatomy 102. Enrollment limited to two hundred students. Demonstration and laboratory study of prepared human dissections, models, and microscope slides.

UPPER DIVISION COURSES

101A–101B. Histology and Microscopic Organology. (3–3) Yr. Mr. E. Evans, Miss Simpson Lectures and laboratory. Prerequisite: Zoology 1A–1B, Chemistry 8, and Zoology 100 (may be taken concurrently) or other advanced work in mammalian biology. Microscopic study of the tissues and organs of the body, including their histophysiologic and histochemical aspects. Special attention is devoted to human structure.

103. Neuroanatomy. (4) II. Mr. Asling Lectures and laboratory. Prerequisite: junior standing with major in animal biological sciences. The structure, functional relationships, and development of the human nervous system.

105A–105B. Systematic and Regional Human Anatomy. (3–4) Yr. Mr. Srebnik, Mr. Asling Lectures and laboratory. Prerequisite: Zoology 100 or other advanced work in mammalian biology; consent of the instructor. The gross anatomy of the human body, as demonstrated by dissection, X-ray, and surface anatomy, with special reference to the functional capacities of the structures examined.

199. Special Study for Advanced Undergraduates. (1–5) I and II. The Staff (Miss Simpson, Mr. Asling in charge) Prerequisite: senior standing, with B average, and consent of the instructor.

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

210. Physiological Anatomy of Reproduction. (2) I and II. Miss Simpson Two hours per week. Informal conferences and demonstrations. Outside reading required.
211. Haematology. I and II.
Credit to be arranged.
Informal conferences and demonstrations. Outside reading required.

213. Original Investigation. I and II.
The Staff (Miss Simpson, Mr. Asling in charge)
Hours and credit to be arranged.
Students who are prepared to undertake research in the field of anatomy will be accorded facilities and guidance by members of the staff.

214. Anatomy for Advanced Students. I and II.
Hours and credit to be arranged. The Staff (Mr. Asling in charge)
Qualified students may undertake special study in selected areas of human anatomy.

ANTHROPOLOGY
(Department Office, 232 Kroeber Hall)

William R. Bascom, Ph.D., Professor of Anthropology and Director of the Museum of Anthropology.
George M. Foster, Ph.D., Professor of Anthropology and Curator of Mexican Anthropology (Chairman of the Department).
†Robert F. Heizer, Ph.D., Professor of Anthropology, Director of the University of California Archaeological Survey, and Curator of North American Archaeology.
Theodore D. McCown, Ph.D., Professor of Anthropology and Curator of Physical Anthropology.
David G. Mandelbaum, Ph.D., Professor of Anthropology and Curator of Ethnology.
John H. Rowe, Ph.D., Litt.D., Professor of Anthropology and Curator of South American Archaeology (Vice-Chairman of the Department).
Sherwood L. Washburn, Ph.D., Professor of Anthropology and Curator of Primatology.
A. L. Kroeber, Ph.D., Sc.D., L.H.D., LL.D., Professor of Anthropology, Emeritus, and Director of the Museum of Anthropology, Emeritus.
Ronald L. Olson, Ph.D., Professor of Anthropology, Emeritus.
Dell H. Hymes, Ph.D., Associate Professor of Anthropology and Linguistics for the fall semester.
Gerald D. Berreman, Ph.D., Assistant Professor of Anthropology.
B. Irven DeVore, A.B., Acting Assistant Professor of Anthropology.
*René F. Millon, Ph.D., Assistant Professor of Anthropology.
*Robert F. Murphy, Ph.D., Assistant Professor of Anthropology.
Laura Nader, A.B., Acting Assistant Professor of Anthropology.
†Richard F. Salisbury, Ph.D., Assistant Professor of Anthropology.

Richard N. Adams, Ph.D., Visiting Professor of Anthropology.
Anna Hadwick Gayton (Anna Hadwick Gayton Spier), Ph.D., Professor of Decorative Art and Curator of Textiles, Museum of Anthropology.
Pertti J. Pelto, Ph.D., Lecturer in Anthropology.
George A. Pettitt, Ph.D., Lecturer in Anthropology.

Letters and Science List.—All undergraduate courses in anthropology are included in the Letters and Science List of Courses. For further information concerning this list, see page 11.

† Absent on leave fall semester; appointment in the Miller Institute for Basic Research in Science, spring semester, 1960–1961.
1 In residence fall semester only, 1960–1961.
Anthropology

Departmental Major Advisers: Mr. Rowe, Mr. Berreman, Mr. Murphy.

The Major.—Required: Anthropology 1, 2A–2B, 105A or 105B, 152 or 153, and 6 units from the following: 101A–101B, 115, 139, 143A or 143B, 147, 149, 161. Also required are additional elective courses aggregating 12 upper division units in anthropology; with substitutions permitted among these 12 of not more than 6 upper division course units in allied subjects approved by the department. Students who fail to maintain a scholarship average in the major of at least C may be dismissed from the major at any time.

Lower Division Courses

1. General Anthropology: Physical and Biological Factors. (3) I and II.
   Three lectures and one section meeting. Mr. McCown, Mr. Washburn
   Human biology in terms of human evolution, fossil man, races, race differences, and problems.

2A–2B. General Anthropology: Cultural Factors. (3–3) Yr.
   Lectures and one section meeting per week.
   2A. Prehistory and cultural growth: Mr. Mandelbaum.
   2B. Cultural patterns and dynamics: Mr. Murphy.
   2A is not prerequisite to 2B.

*3. The Comparison of Cultures. (3) I.
   A survey of selected cultures; analysis of common factors and major variations in social life and cultural resources.

Upper Division Courses

General prerequisite: junior standing or courses 1, 2A–2B.

   Mr. Pelto, Mr. Berreman
   A descriptive survey of representative cultures, including primitive and folk societies and some comparative materials from civilizations. Either half of the course may be taken independently.

103. Culture Growth. (3) I.
   Culture and civilization; comparative history of Mesopotamian, Egyptian, Indus, Chinese, Peruvian, and Mexican civilization; expansion of Western civilization; archaeological theory.

105A–105B. The American Indians. (3–3) Yr. Mr. Berreman, Miss Nader
   Development, spread, and attainments of culture; native races and languages.
   105A. Central America, Mexico, and North America: Mr. Berreman.
   105B. South America: Miss Nader.
   Either half of the course may be taken independently.

*106. Archaeology of North America. (3) I.
   Prehistory of North American Indians; prehistoric culture areas; relations with historic Indians.

*107. Archaeology and Society. (3) II.
   Mr. Heizer
   Introduction to archaeological methods and techniques employed, types of archaeological sites and materials preserved, methods of determining age, nature of prehistoric societies; development of the discipline of prehistory; absolute values of archaeology.

Anthropology

111. Prehistory. (3) I.
   Prerequisite: course 2A.
   Origin, development, and distribution in space and time of the prehistoric cultures of the Old World.

*115. People of the Philippines and Indonesia. (3) I.
   Geography, races, populations, cultures, and development of the Philippines, as part of the larger Indonesian sphere of world history.

118. The Nature of Culture. (3) I and II. Mr. Adams, Mr. Pelto
   The general structure and basic processes of cultural behavior; dynamics of cultural life; cultural change; illustrative data from primitive and modern societies.

119. Problems in Culture and Personality. (3) II. Mr. Pelto
   The interplay of cultural and personality factors in human development; personality in various cultural settings; the "national character" concept and other concepts in the field; techniques for the study of culture-personality relations.

120. Language and Culture. (3) I. Mr. Hymes
   Language and thought; classification of languages; linguistic aspects of culture; language, nation, and state.

121. Folklore. (3) II. Mr. Bascom
   An introduction to the study of folktales, myths, legends, proverbs, riddles, and other forms of verbal tradition. Methods and theories of folklore.

*122. Economic Anthropology. (3) II.
   A comparative approach to the study of economic processes in nonindustrial societies; emphasis upon the relation of economics to the general cultural patterns of which they are a part, and upon interactions between social and economic change.

123. Politics and Law in Non-Industrial Societies. (3) I. Miss Nader
   Centralized, segmentary, and simple band types of polity; factors tending to concentrate or diffuse power; the political role of kinship groups, associations, and social strata; the cultural expression of authority and status; jural institutions in the simpler societies.

124. Primitive Religion. (3) II. Mr. DeVore
   Comparative survey of religion and magic.

125. Comparative Society. (3) I. Mr. DeVore
   Survey of kinship and family types throughout the world; their place within the total social structure; selected topics in the analysis of kinship and the family, including problems of stability and change.

*126. Invention and Technology. (3) II.
   Psychology of invention; origin, history, and spread of fundamental inventions; illustrative material from the Museum of Anthropology.

*137. Indians of California. (3) II. Mr. Heizer
   Origin and relationships of the natives; prehistoric remains; shell mounds. Tribal divisions; arts; customs; industry; beliefs.

*138. Indians of Western North America. (3) I.
   Tribes, culture types, and culture history of aboriginal peoples west of the Rocky Mountains.

Anthropology

139. Africa. (3) I. Mr. Bascom, Mr. DeVore
Races; Egyptian, Mediterranean, and Negro cultures, past and present; native achievement; Asiatic relations and influences.

141. Mexico and Central America. (3) II. Mr. Millon
Achievements of the Aztecs, Mayas, and their predecessors.

142. Peoples of the Andes. (3) II. Mr. Rowe
Culture of the Incas of Peru and of other Andean peoples.

143A*–143B. Peoples of India. (3–3) Yr. Mr. Berreman
*143A. The main tradition of Indic culture. Archaeological and literary evidence, caste, Hinduism and Islam, the tribal tradition; village life and the national scene.

143B. The structure of society in India and Pakistan. Population factors, family organization, caste relations, economic forces; the meeting of diverse cultural influences.

147. Peoples and Cultures of the Pacific Islands. (3) I. Mr. Salisbury
Oceanian races and cultures; indigenous origins; Asiatic relations and influences.

149. Cultures of the Near East. (3) II. Miss Nader
Cultures of the contemporary Near East, with special emphasis upon the Arab populations of Iraq, Lebanon, Trans-Jordan, Israel, Syria, and the Arabian peninsula.

152. Human Evolution and Fossil Man. (3) I. Mr. Washburn
Prerequisite: course 1 or the equivalent.
Nature and results of the evolutionary processes involved in the formation and differentiation of mankind.

153. Living Races of Man. (3) II. Mr. Washburn
Physical characters, distribution, and relationships of the living races of mankind.

153L. Living Races of Man. Laboratory. (2) II. Mr. Washburn
Lecture and laboratory.
Prerequisite: course 153 (may be taken concurrently). Enrollment limited to 12 students; primarily for majors in anthropology and the life sciences.
Descriptive and analytical methods used in the study of the races of man and of the human subject.

154. Primate Social Behavior. (3) I. Mr. DeVore
Survey of the social behavior and organization of monkeys and apes: techniques in analyzing primate social groups; discussion of the relevance of these data to human social groupings and the evolution of human behavior.

*160. Contemporary Civilization. (3) II.
An application of anthropological principles of analysis and interpretation to contemporary civilization.

*161. European Peasant Societies. (3) II. Mr. Foster
Representative groups considered in modern and historical perspective, stressing especially rural-urban relationships and the dynamics of change.

162. Anthropology in Modern Life. (3) I and II. Mr. Adams, Mr. Foster
The practical application of anthropological theory and data to problems in such fields as medicine and public health, agriculture, education, industry, and international technical aid programs.

163. Culture Change. (3) I. Miss Nader
Contemporary theories of culture change, especially those resulting from contact (acculturation); illustrative materials from anthropological sources.

(3) II. Mr. Pettitt
Methods and problems in the transmission of culture from generation to generation and of the processes of the socialization of the individual.

*186. Ethnology of Japan. (3) I.
Ethnological treatment of historic and modern Japanese culture, emphasizing conditions since 1868 and presenting an interpretation of factors which underlie Japanese cultural development.

191. Contemporary Latin-American Culture. (3) II. Mr. Adams
Survey of modern Latin-American cultures, stressing Iberian-Indian assimilation, African influences, development of folk-peasant societies, and the concept of "national" cultures.

*195. Field Course in Archaeological Method. (2) I. Mr. Heizer
Lectures, museum preparation, and week-end excavations. Enrollment limited to eighteen students, admitted by consent of the instructor. With consent of the instructor, may be repeated without duplication of credit.

*196. Archaeological Method. (2) I. Mr. Millon
Prerequisite: course 195 and consent of the instructor. Enrollment limited to twenty students. With consent of the instructor, may be repeated without duplication of credit.
Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication.

197. Advanced Survey of Anthropology. (3) I. Mr. Pelto
Prerequisite: senior standing or consent of the instructor.
An historical survey of anthropological methods, theories, and findings given at an advanced level. Intended for major students and for other students who have a good background in the subject.

H198. Perceptorial and Reading Course. (3) II. Mr. Rowe
Open to seniors. With consent of the instructor, may be repeated without duplication of credit.
Systematic readings in the history of anthropology and in significant modern developments within the field.

199. Special Study for Advanced Undergraduates. (2-3) I and II.
The Staff (Mr. Murphy and Mr. Berreman in charge)

GRADUATE COURSES

Concerning conditions for admission to graduate courses, see page 18

*201. Systematic Theory of Human Societies. (3) II.
Two lectures and two hours discussion per week. Prerequisite: Sociology 217.

Systematic Theory of Human Societies will involve reading, discussion and analysis of contemporary systematic theory in sociology and social anthropology. Emphasis is placed on thorough understanding of conceptual schemes, major scientific issues, and the problems of theoretical simplification and integration.

204A–204B. Fundamentals of Anthropological Theory. (3–3) Yr.  
Mr. Washburn, Mr. Mandelbaum  
A survey of basic concepts in anthropological literature.

204A. Physical anthropology, human evolution, and prehistory and archaeology: Mr. Washburn.  
204B. Cultural anthropology and ethnography: Mr. Mandelbaum.

*205. Recent Developments in Anthropology. (2) I.  
Mr. Mandelbaum

206. Proseminar. (2) I.  
Mr. Berreman  
Introduction to research. For new graduate students in anthropology.

*207A–207B. History and Theory of Anthropology. (2–2) Yr.  
Prerequisite: consent of the instructor.

§208. Problems in California Indian Ethnology. (2) II.  
Mr. Kroeber  
Prerequisite: consent of the instructor.

210A–210B. Aspects of Culture Structure. (2–2) Yr.  
Mr. Salisbury  
Prerequisite: consent of the instructor  
Concepts and problems in such major phases of culture as religion, economics, law, art, and folklore.

*215. Ethnological Field Techniques. (2) II.  
Mr. Salisbury  
Prerequisite: consent of the instructor  
The development of field methods in anthropology. Applicability of techniques from other social science disciplines. Conceptual framework of field research. Work with an informant and practice in recording data.

*216. Problems in Archaeological Method. (2) II.  
Mr. Heizer  
Techniques of analysis of archaeological data; critical review of excavation data and analytical results; continental perspective of Far Western prehistoric cultures.

*217A–217B. Dynamics of Culture and Society. (2–2) Yr.  
Prerequisite: consent of the instructor.  
Mr. Rowe, Mr. Salisbury  
Problems in culture change and stability.

*218H. Culture and Personality: the Psychological Approaches. (2) II.

225. Kinship and Social Structure. (2) II.  
Mr. Murphy  
Prerequisite: consent of the instructor  
Systematic treatment of ethnological data and concepts concerned with kinship and the social structuring of human societies; historical, analytical, and interpretative study of continuing and new problems in these fields.

235. Problems in the Culture History of South America. (2) I.  
Mr. Rowe  

*237. Culture Problems of Western North America. (2) I.  
Mr. Murphy  
Work on problems of tribal distribution and cultures.

§ To be offered one semester only, 1960–1961.
*239. Problems in African Society and Culture. (2) I.
Prerequisite: consent of the instructor.

243A–243B. Culture Problems of India. (2–2) Yr. Mr. Mandelbaum
Prerequisite: consent of the instructor.

253. Concepts and Problems in Physical Anthropology. (2) II.
Mr. Washburn
Systematic treatment of concepts in historical perspective and of continuing and new problems in the field of human biology as this concerns physical anthropology.

261A–261B. Problems in Acculturation. (2–2) Yr. Mr. Foster,
Prerequisite: consent of the instructor.
Analysis of the forms and variety of culture changes originating in the contact of different ethnic groups.

*265. Concepts and Problems in Applied Anthropology. (2) II. Mr. Foster
Prerequisite: consent of the instructor.
Survey and analysis of the use of anthropological concepts, techniques, and methods in such fields as public health and social welfare, technical aid programs, colonial administration, and related fields.

279. Factors in Material Culture. (2) II. Miss Gayton
Analysis of the nature of the materials, techniques of manufacture, decorative elements, and the uses of the total material manufactures of selected culture areas.

290. Problems in the Culture History of Mesoamerica. (2) II. Mr. Millon

291. Seminar on Contemporary Latin America. (2) II. Mr. Adams
Problems in the culture and society of modern Latin-American countries.

299. Directed Research. (2–6) I and II.
The Staff (Mr. Washburn in charge)

RELATED COURSE IN ANOTHER DEPARTMENT
Introduction to Social Science (Social Science 1A–1B).

MUSEUM OF ANTHROPOLOGY

The Robert H. Lowie Museum of Anthropology, located in Kroeber Hall, has major facilities for research in archaeology, ethnography, and physical anthropology. The 400,000 catalogued items include 200,000 archaeological and ethnographical specimens from California, 85,000 from other parts of the Americas, 35,000 from Eurasia, 40,000 from Oceania, and 10,000 entries of human skeletal material. Laboratory facilities and desk space are available for study of the collections by visiting scholars, and graduate and undergraduate students. A large exhibition hall is utilized for instructional and educational purposes, particularly in connection with class work. Those interested in the Museum facilities may address the Director, Robert H. Lowie Museum of Anthropology.

ARCHITECTURE

(Department Office, 1 Architecture Building)

E. Michael Czaja, M.Arch., Professor of Architecture.
Vernon A. DeMars, A.B., Professor of Architecture (Chairman of the Department).
Joseph Escherick, B.Arch., Professor of Architecture.
Michael A. Goodman, M.A., Professor of Architecture.
Jesse Reichek, Professor of Design.
George P. Simonds, M.A., Professor of Architecture.
William C. Hays, B.S., F.A.I.A., Professor of Architecture, Emeritus.
Raymond W. Jeams, M.A., Professor of Architecture, Emeritus.
Stafford L. Jory, Gr.Arch., Professor of Architecture, Emeritus.
Howard Moore, B.S., M.Arch., Professor of Architecture, Emeritus.
Warren C. Perry, B.S., F.A.I.A., Professor of Architecture, Emeritus.
Kenneth H. Cardwell, A.B., Associate Professor of Architecture.
Donald L. Foley, Ph.D., Associate Professor of City Planning and Architecture.
Sami Hassid, Ph.D., Associate Professor of Architecture.
Henry J. Lagorio, M.A., Associate Professor of Architecture.
Charles W. Moore, Ph.D., Associate Professor of Architecture.
Donald E. Olsen, M.Arch., Associate Professor of Architecture.
Donald P. Reay, M.Sc., Associate Professor of Architecture.
*Harold A. Stump, A.B., Associate Professor of Architecture.
Ezra D. Ehrenkrantz, M.Arch., Assistant Professor of Architecture.
John M. Jacobus, Ph.D., Assistant Professor of Architecture and Art.
Carl G. Kolbeck, A.B., Assistant Professor of Architecture.
Richard C. Peters, B.Arch., M.F.A., Assistant Professor of Architecture.
Donald J. Koebel, B.Arch., Instructor in Architecture.
Patrick J. Quinn, M.Arch., Instructor in Architecture.

Lawrence Ayer, A.B., Lecturer in Architectural Mechanics.
Scott Beamer, B.S., Lecturer in Architectural Mechanics.
Theodore Bernardi, A.B., Lecturer in Architecture.
T. J. Kent, Jr., M.C.P., Professor of City Planning.
Lois Langhorst, M.Arch., Lecturer in Architecture.
Roger Y. Lee, A.B., Lecturer in Architecture.
Gerald M. McCue, M.A., Lecturer in Architecture.
James Prestini, B.S., Lecturer in Design.
Walter W. Soroka, Sc.D., Professor of Mechanics and Design.
Karl V. Steinbrugge, B.S., Lecturer in Structural Design.
Claude Stoller, B.Arch., Lecturer in Architecture.
H. Leland Vaughan, B.L.A., Professor of Landscape Architecture.

Letters and Science List.—Courses 110, 121, 122, 126, 127 are included in the Letters and Science List of Courses. For regulations governing this list see page 11.

² In residence spring semester only, 1960–1961.
Students must complete a History of Architecture requirement for the professional curriculum:

Courses 121, 122, and one intensive period study of the student’s selection from courses 123 to 130 inclusive, of which courses 126 and 127 are presently established.

Credit in courses 11, 12, 13 will be allowed up to a total of 4 units each; but in no semester will more than 1 unit each be allowed in any one of these courses.

All design courses beginning with Architecture 3N through Architecture 103 require a grade of C or better for advancement to the succeeding course. A grade of D will require one more semester of Design at the same level, for which no further unit credit can be granted. Improvement in grade, however, will be recognized in all cases, and grade points received as earned for lower division course only, in accordance with University regulations.

**LOWER DIVISION COURSES**

1N. Design. (3) I and II. Mr. Esherick, Mr. Koberg, Mr. Olsen, Mr. Prestini, Mr. Reay, Mr. Reichek
Six hours per week. Exploration of tools and materials: study of line, plane, color, texture, tone. Visual and physical structures in two and three dimensions.

2N. Design. (3) I and II. Mr. Prestini, Mr. Reichek
Six hours per week. Prerequisite: course 1N or the equivalent. Continuation of course 1N, with emphasis on space, scale, form, environment, motion, light. Introduction to basic needs of man relative to architecture.

3N. Design. (3) I and II. Mr. Ehrenkrantz, Mr. Esherick, Mr. Peters
Six hours per week. Prerequisite: course 2N. Elementary design of buildings.

4N. Design. (4) I and II. Mr. Kolbeck, Mrs. Langhorst
Eight hours per week. Prerequisite: course 3N or 23. Design of buildings. Continuation of course 3N with increasing scope of problems.

5N. Introduction to the Professions of Architecture, City and Regional Planning, and Landscape Architecture. (2) I. Mr. Wurster, Mr. Kent, Mr. Cardwell, Mr. Vaughan
Lectures in charge of each department chairman introductory to each professional field.

6N. Descriptive Geometry. (2) I and II. Mr. Cardwell, Mr. Kolbeck
Four hours per week. Prerequisite: solid geometry. Lectures, drafting, and problem solution.

7. Shades, Shadows, and Perspective. (2) I and II. Mr. Cardwell, Mr. Kolbeck
Four hours per week. Prerequisite: course 6N. Lectures, drafting, and problem solution.

11. Graphics. (1) I and II. Mr. Cardwell, Mrs. Langhorst, Mr. Peters, Mr. Quinn
Three hours per week. Freehand drawing and rendering in pencil, crayon, charcoal, with varying emphasis in the various sections as determined by the instructor.
12. Graphics. (1) I and II. Mr. Czaja, Mr. Goodman, Mrs. Langhorst
Three hours per week.
Painting and rendering in color, with varying emphasis in the various sections as determined by the instructor.

13. Graphics. (1) I and II. Mr. Czaja, Mr. Peters, Mr. Hassid
Three hours per week.
Freehand drawing and rendering in black and white, with varying emphasis in the various sections as determined by the instructor.

23. Design. (5) I and II. Mr. Quinn, Mr. Stoller
Twelve hours per week. Prerequisite: courses equivalent to 1N and 2N.
Open only to transfer students.
A concentration of courses 2N and 3N to prevent or minimize extension of time of graduation because of transfer of college.

**Upper Division Courses**

The general prerequisite for upper division courses is third-year standing.

101. Advanced Design. (5) I and II. Mr. Koberg, Mr. Lagorio
Eight hours per week. Prerequisite: course 4N, 7, and Engineering 18A. Engineering 18B must be taken at least concurrently.
Architectural design and theory with increased emphasis on building structure as it relates to visual design.

102. Advanced Design. (5) I and II. Mr. Bernardi
Eight hours per week. Prerequisite: course 101.
Architectural design problems of increasing complexity.

103. Advanced Design. (6) I and II. Mr. Olsen, Mr. DeMars, Mr. Goodman
Eight hours per week. Prerequisite: course 102 and City and Regional Planning 100.
Architectural design problems of large scope.

104. Architectural Design and Working Drawings. (7) I and II. Mr. McCue, Mr. Simonds, Mr. Lee
Prerequisite: fifth-year standing and courses 103, 151, 152, Civil Engineering 126 and 127. Required concurrently: courses 105, 106, and 153.
Complete design (exterior and interior) of a large fire-resistant building and preparation of architectural working drawings following usual office practice. Students work in teams of two.

105. Detail Design and Color Study. (1) I and II. Mr. DeMars, Mr. Lee, Mr. McCue
Prerequisite: fifth-year standing. Required concurrently: courses 104, 106, and 153.
Detail and color studies of the building designed in course 104. Students work in teams of two.

106. Structural Design and Working Drawings. (5) I and II. Mr. Leong, Mr. McClure, Mr. Steinbrugge
Prerequisite: fifth-year standing, courses 103, 151, 152, Civil Engineering 126 and 127. Required concurrently: courses 104, 105, and 153.
Complete structural design and calculations for the building designed in course 104, and preparation of working drawings following usual office practice. Students work in teams of two.
107. Fifth-Year Design Preparation. (2) I and II.
   Mr. Cardwell, Mr. DeMars, Mr. Goodman
   Prerequisite: completion of all required courses through the fourth year, or faculty approval.
   Project for study to be selected by the student with approval of the instructor. Preliminary study, conferences, and research as necessary to initiate a program of study for course 108 in the following semester.

108. Fifth-Year Design. (8) I and II. Mr. Hassid, Mr. Czaja, Mr. Reay
   Prerequisite: courses 104, 105, 106, 107, and 153, or faculty approval.
   Comprehensive design of a major architectural project as approved for course 107, including a written program and presentation of results of research.

110. The House. (1) I and II. Mr. Goodman
   A general appreciation course dealing with the development, planning, and esthetic qualities of the single-family dwelling.

121. Architectural History. (3) I. Mr. Jacobus, Mr. Moore
   Prerequisite: course 4N for architecture students. No prerequisite for others.
   Survey of Ancient and Medieval periods.

122. Architectural History. (3) II.
   Prerequisite: course 4N for architecture students. No prerequisite for others. 121 is not prerequisite to 122.
   Survey of Renaissance and Modern periods.

126. Architectural History—American. (3) I. Mr. Jacobus
   Prerequisite: courses 121 and 122 or the equivalent. Open to other students with consent of the instructor.
   Detailed investigation of architecture of the North American continent from colonial times to the present day.

127. Architectural History—Nineteenth and Twentieth Centuries. (3) II.
   Prerequisite: courses 121 and 122 or the equivalent. Open to other students with consent of the instructor.
   Detailed investigation of architecture, principally European, from the French Revolution to the present day.

131. Building Materials. (2) I and II. Mr. Stoller
   Prerequisite: consent of the instructor required. Enrollment limited.
   Study of the characteristics of building materials and their relation to architectural design. Seminar and field trips.

132. Professional Practice and Specification. (3) I and II. Mr. Simonds
   Prerequisite: courses 104, 105, 106, and 153.
   A study of architectural business relations, contracts, legal aspects of practice, and specification writing.

133. Proseminar in Architecture. (2) I and II. Mr. Wurster
   (Formerly numbered 208.)
   Prerequisite: fifth-year standing or consent of the instructor.
   Preparation of papers on subjects relating to architecture, to be presented and discussed in seminar meetings. For candidates for the degree Bachelor of Architecture only.

134. Introduction to Architectural Research. (2) I. Mr. Foley
   Prerequisite: fourth-year standing and consent of the instructor. Open to qualified students from other departments.
Research bearing on architectural design problems. Special emphasis on the relationships between the physical structures that are designed by the architect and the human values and activities that must be accommodated.

151. Architectural Mechanics. (3) I.
    Prerequisite: Physics 2B, 3B, and course 101.
    Heating, ventilating, air conditioning, and plumbing of buildings.

152. Architectural Mechanics. (3) II.
    Mr. Beamer (in charge), Mr. Soroka, Mr. Ayer
    Prerequisite: Physics 2B, 3B, and course 101. 151 is not prerequisite to 152.
    Lighting, electrical work, acoustics and sound control of buildings.

153. Architectural Mechanics. (1) I and II. 
    I: ______; II: ______.
    Prerequisite: fifth-year standing and courses 151 and 152. Required concurrently with courses 104, 105 and 106.
    Investigation of heating, ventilating, air conditioning, lighting, and acoustic problems relative to the building being designed in course 104.

198A–198B. Directed Group Study. (1–3; 1–3) Yr.
    The Staff (Mr. DeMars in charge)
    Prerequisite: consent of the instructor.
    Group studies of selected topics which may vary.

199. Special Study for Advanced Undergraduates. (1–5) I and II.
    The Staff (Mr. DeMars in charge)

GRADUATE COURSES

Admission of graduates for work under the graduate division will be restricted to those who, during their junior and senior years, have maintained in all courses, including design, a sufficiently high scholastic average to indicate ability to carry on work satisfactorily at the graduate level. For other conditions concerning admission to graduate courses, see page 18.

201. Seminar in Architectural Research. (2) I. Mr. Hassid
    Required for all graduate students.
    Research methods and problems as applied to architecture. The appraisal of selected research endeavors. Presentations by instructors and guests, discussion of student reports.

202. Major Problems of Architecture. (6) I. Mr. Esherick
    Required for all graduate students.
    Identification of major problems of architecture; development of approaches to solutions. Problems will be proposed by the instructor, or, with the permission of the instructor, may be proposed by the student.

203. Architectural Design and Research. (2) II. Mr. Esherick
    Required for all graduate students.
    Primarily for candidates for the Degree of Master of Architecture. Critical review of development of theses; exchange of content of theses.

204. Seminar in Architecture. (2) II. Mr. Hassid
    Prerequisite: graduate standing.
    The exploration of topics related to the theory and practice of architecture. Ordinarily a major thesis will be selected in advance of each semester. Presentation by instructors and guests, discussion of student reports.
298. Special Study for Graduate Students. (1–6) I and II.
By arrangement only. The Staff (Mr. DeMars in charge)

Enrollment in the following courses is subject to the approval of the faculty and is limited to former students of the University of California who have received the nonprofessional A.B. degree in architecture and who qualify also for admission to graduate school. These courses are accepted in partial satisfaction of the requirements of the M.A. degree in architecture.

200. Comprehensive Graduate Problems. (5) I and II.

201A. Design and Theory: Graduate Sketch Problems. (1) I and II.

201B. Design and Theory: Graduate Problems. (7) I and II.

207. Architectural Engineering. (3) I and II.

208. Seminar in Architecture. (3) I and II. Mr. Wurster

209. Seminar in Professional Practice. (2) I and II.

REQUIRED COURSES IN OTHER DEPARTMENTS

City Planning for Architects and Landscape Architects (City and Regional Planning 100).
First-Year Reading and Composition (English 1A, 1B) or First-Year Reading, Writing, and Speaking (Speech 1A, 1B).
General Physics Lectures (Physics 2A–2B).
General Physics Laboratory (Physics 3A–3B).
Introduction to Mathematical Analysis (Mathematics 3A, 3B).
Strength of Materials (Engineering 18A, 18B; Civil Engineering 112).
Elements of Framed Structures (Civil Engineering 125, 126, 127).
Plane Surveying (Engineering 21).
Principles of Landscape Architecture (Landscape Architecture 100).
Sculpture (Art 14A, 142).

ART

(Department Office, 238 Kroeber Hall)

Darrell A. Amyx, Ph.D., Professor of Art and Associate Curator of Ancient Mediterranean Art, Museum of Anthropology.
John C. Haley, Professor of Art.
Walter W. Horn, Ph.D., Professor of Art.
J. Ward Lockwood, Professor of Art.
Erie Loran, Professor of Art.
James McCray, M.A., Professor of Art (Chairman of the Department).
Otto J. Maenchen, Ph.D., Professor of Art.
Felix Ruvolo, Professor of Art.
Jacques Schnier, M.A., Professor of Art.
Glen A. Wessels, M.A., Professor of Art.
Eugen Neuhaus, Ph.D. (hon.c.), Professor of Art, Emeritus.
Stephen C. Pepper, Ph.D., L.H.D., LL.D., Mills Professor of Intellectual and Moral Philosophy and Civil Polity, Emeritus.
Chiura Obata, Associate Professor of Art, Emeritus.
Herschel B. Chipp, Ph.D., Associate Professor of Art.
Karl Kasten, M.A., Associate Professor of Art.

1 In residence fall semester only, 1960–1961.
2 In residence spring semester only, 1960–1961.
Letters and Science List.—All undergraduate courses in art are included in the Letters and Science List of Courses. For further information concerning this list, see page 11.

Departmental Major Advisers: Painting: Mr. Kasten, Mr. Ruvolo, Mr. Wessels; History of Art: Mr. Schulz; Sculpture: Mr. O’Hanlon.

The Major.—A student may elect an art major emphasizing painting, history of art, or sculpture. Major students are required to consult with their major advisers regarding their programs before enrolling.

Required for all art majors: 6 units chosen from courses 1A, 1B, 1C, 1D; and courses 2A, 2B and 14A. In addition, the painting major requires Art 3 and Art 4; the sculpture major requires Art 3 and Art 14B. Recommended for majors in history of art: History 4A-4B.

I. Painting. Required: 12 units of Group A courses under at least three instructors of the regular staff, Art 176A–176B (6 units), Art 132 (2 units), 2 units of any course in Group D, and 2 units of any course in Group C.

II. History of Art. Required: Art 176A–176B (6 units), 12 additional units of Group C courses of which 6 units must be in an historical sequence (such as 154A–154B), Art 132 (2 units), and 4 additional units of any courses in Groups A, B, C, and D. With approval, substitutions may be made within these 4 units of certain courses offered in other departments. Students planning to do advanced work in history of art are urged to develop their knowledge of foreign languages (especially French and German) as early as possible.

III. Sculpture. Required: 12 units of Group D courses under at least three instructors of the regular staff, Art 176A–176B (6 units), Art 132 (2 units), 2 units of any course in Group A, and 2 units of any course in Group C.

Advance Enrollment and Assignment to Sections.—Inasmuch as space and facilities for technical courses are limited, students are advised to enroll in all Group A and Group D courses during Registration Week on the day to be announced on placards on bulletin boards. Preference is given to first applicants, but the department reserves the right to deny admission to applicants who enroll in courses for which they lack adequate preparation.

Transfer Students.—Transfer students who have fulfilled unit requirements elsewhere should present examples of their work done in other institutions before being admitted to studio classes and before credit can be given toward the major for work done elsewhere. Otherwise, additional work may be required. Transfer students who qualify for upper division studio courses will be required to take course 195.
LOWER DIVISION COURSES

1A. History of Ancient Mediterranean Art. (3) I. Mr. Amyx
Lectures and weekly section meetings to be arranged. Prerequisite for all upper division courses in ancient art.
From the Stone Age to the end of the Roman Empire.

1B. History of Medieval, Renaissance, and Modern Art—Emphasis on Painting. (3) II. Mr. Chipp
Lectures and weekly section meetings to be arranged.

1C. History of Medieval, Renaissance, and Modern Art—Emphasis on Architecture and Sculpture. (3) II. Mr. Horn
Lectures and weekly section meetings to be arranged.

1D. History of Oriental Art. (3) I. Mr. Maenchen
Lectures and weekly section meetings to be arranged.
The art of India, China, and Japan.

2A–2B. Elementary Form and Color. (2–2) Yr. Beginning each semester.
Mr. Haley, Mr. Kasten, Mr. Lockwood, Mr. Loran, Mr. McCray, Mr. Bunce, Mr. Park, Mr. Ruvolo, Mr. Wessels
2A: Form in composition, using black and white media.
2B: Introduction to color in composition.

3. Intermediate Form. (2) I and II. Mr. Kasten, Mr. Loran
(Formerly numbered 3B.)
Prerequisite: course 2A–2B.
Form in composition, using the human figure as subject.

4. Materials of Painting. (2) I and II. Mr. Wessels
Prerequisite: course 2A–2B.
A study in the means of expression.

10. An Introduction to Art. (2) I. Mr. McCray
Lectures, illustrated with lantern slides. Open to nonmajors.
The understanding and appreciation of painting, sculpture, architecture, and industrial art.

14A–14B. Elements of Sculpture. (2–2) Yr. Beginning each semester.
Mr. Schnier, Mr. O’Hanlon, Mr. Gordin, Mr. Paris, Six hours per week.
14A. Introduction to basic elements of volume design, using nonobjective and representational subject matter in three dimensions and relief.
14B. An introduction to space design and materials, with construction in wood, metal, and plaster.

UPPER DIVISION COURSES

Group A: Painting

Prerequisite: courses 2A–2B, 3, 4.
The various courses in Group A differ in content, use of materials, type of subject matter, etc., depending upon the individual aims of the artists in charge. In this group, Part A is not prerequisite to Part B. All courses in this group may be repeated indefinitely without duplication of credit.
The subject matter will range from still life and landscape to life classes, figure and mural compositions.
The materials used will range from charcoal and sumi to water color, gouache, egg, tempera, oil, mixed technique, and fresco painting.
103A—103B. Advanced Drawing and Painting. (2-2) Yr. Mr. Lockwood
103A is not prerequisite to 103B. 103A: II.

104A—104B. Advanced Drawing and Painting. (2-2) Yr. Mr. Haley
104A is not prerequisite to 104B.

105A—105B. Advanced Drawing and Painting. (2-2) Yr. Mr. Loran
105A is not prerequisite to 105B.

*106A—106B. Advanced Drawing and Painting. (2-2) Yr. Mr. McCray
106A is not prerequisite to 106B.

*108A—108B. Advanced Drawing and Painting. (2-2) Yr. Mr. Kasten
108A is not prerequisite to 108B.

109A—109B. Advanced Drawing and Painting. (2-2) Yr. Mr. Ruvolo
109A is not prerequisite to 109B.

110A—100B. Advanced Drawing and Painting. (2-2) Yr. Mr. Park
110A is not prerequisite to 110B.

111A—111B. Advanced Drawing and Painting. (2-2) Yr.
111A: I, II. Mr. Loew, Mr. Ippolito
111B: I, II. Mr. Loew, Mr. Ippolito
111A is not prerequisite to 111B.

113A—113B. Advanced Drawing and Painting. (2-2) Yr. Mr. Wessels
113A is not prerequisite to 113B.

§114. Advanced Drawing and Painting. (2) I. Mr. Bunce

128. Mural Composition. (2) I and II. Mr. Haley
For graduates and advanced undergraduates who have had at least 6 units of upper division painting courses. Limited to ten students.
Creative mural composition in fresco, mosaic, and other techniques.

129A—129B. Practice in the Graphic Arts. (2-2) Yr. Mr. Kasten
129A is not prerequisite to 129B.

Group B: Theory and Criticism

132. Picture Analysis. (2) II. Mr. Wessels
Prerequisite: course 2A—2B, 14A, and one upper division art history course, or consent of the instructor.
Theory concerning value in painting and other visual arts, and its relation to studio practice. Given primarily for art majors.

Group C: History of Art and Archaeology

Open to nonmajors. General prerequisite: upper division standing and consent of the instructor.

*150. The Art of Primitive Peoples. (3) I. Mr. Chipp
An analysis of style and an aesthetic evaluation of forms in the art of several primitive cultures, developed according to art-historical principles. Special consideration is given to an integration of the art with the cultural background.

* Not to be given, 1960-1961.
§ To be offered one semester only, 1960-1961.
*153. Aegean Art. (2) I. Mr. Amyx
The art of Crete and Greece in the Bronze Age, with attention to connections with neighboring cultures.

154A-154B. Greek Art. (3-3) Yr. Mr. Amyx
From the Geometric Period to the beginning of the Roman Empire.
154A. From 1100 to 450 B.C.
154B. From 450 to 30 B.C.
154A is not prerequisite to 154B.

159. Roman Art. (3) II. Mr. Amyx
The art of Italy and the Roman Empire from the Early Iron Age to the period of Constantine.

160A-160B. History of Early Chinese Art. (2-2) Yr. Mr. Maenchen
From Shang to T'ang.
160A: II.

161. History of Later Chinese Art. (2) I. Mr. Maenchen
From Sung to Ch'ing.

*162. The Art of Japan. (3) II. Mr. Maenchen
From prehistoric times to Hokusai.

*163. The Art of India. (3) II. Mr. Maenchen
The art of Iran from the Late Bronze Age to the Arab Conquest; the art of the Steppe peoples.

175A-175B-175C. Medieval Art. (3-3-3) Mr. Horn, Mr. Baranszky-Job
One part is not prerequisite to another.
175A. Early Christian and Byzantine art. I. Mr. Baranszky-Job
Mediterranean roots of medieval art.
*175B. Germanic and Celtic art. II.
Northern roots of medieval art.
175C. Medieval Art. II. Mr. Baranszky-Job
Carolingian renaissance to the end of the thirteenth century.

176A-176B. Italian Renaissance Art. (3-3) Yr. Mr. Schulz
176A is not prerequisite to 176B.
176A. Italian art of the fourteenth and fifteenth centuries.
176B. Italian art of the sixteenth century.

177A-177B. The Renaissance in Northern Europe. (3-3) Yr.
177A is not prerequisite to 177B. Mr. Baranszky-Job
177A. Art of the Fourteenth and Fifteenth Centuries in Northern Europe.
177B. Art of the Sixteenth Century in Northern Europe.

*178. Baroque Art. (3) I. Mr. Schulz
European Art in the Seventeenth and Eighteenth Centuries.

*179. Italian Renaissance Architecture. (3) I.
Architectural planning and architectural theory in Italy from 1400 to 1600.

183A*-183B. Modern Art—Emphasis on Painting. (3-3) Yr. Mr. Chipp
183A is not prerequisite to 183B.
*183A. Art of the nineteenth century.
183B. Art of the twentieth century. II.

* Not to be given, 1960-1961.
188. History of American Art. (3) II. Mr. Frankenstein

Group D: Sculpture

General prerequisite for Group D studio courses (140, 141, 142, 143, 144, 148, 149): Art 14A-14B or Art 14A and 3 art or design courses. Courses 140, 141, 142, 143, 144, 148, and 149 may be repeated indefinitely without duplication of credit.

140. Sculptural Design: The Statue. (2) I and II. Mr. Paris
Advanced design in permanent materials, featuring three-dimensional sculptural composition in relation to architecture and the allied arts.

*141. Sculptural Design: The Relief. (2) II. Mr. O'Hanlon
Advanced design in permanent materials, featuring relief sculpture in confined and free-outline space in relation to architecture.

142. The Human Figure in Sculpture. (2) I and II.
Six hours per week. Mr. Gordin, Mr. Schnier, Mr. Paris
Design exercises with form, line, and space in three-dimensions and low-relief, featuring the human figure as subject matter.

*143. The Human Figure in Sculpture: Special Problems. (2) II.
Sculptural composition featuring the human figure, in various materials such as terra cotta, gypsum, magnesite, cast stone, and metal.

144. Metal Sculpture. (2) I and II. Mr. Gordin
Sculpture created directly with metal using soldering, brazing, welding, cutting, bending, forging, and other metal-forming, joining, and surfacing techniques.

*146. Analysis of the Creative Process. (2) I and II. Mr. Schnier
Prerequisite: upper division standing.
Application of psychological principles to the study of artistic creativity, including expressionism in sculpture and the allied arts, art symbolism, and the various processes operating in creative expression.

148. Sculpture Methods and Materials. (2) I. Mr. O'Hanlon
Six hours per week.
Design exercise, featuring the use of sculptural mediums.

149. Sculpture Methods and Materials. (2) II. Mr. O'Hanlon
Design exercises, featuring the use of stone, metal, and plaster.

Special Study Courses

190. Senior Proseminar in the History of Art. (3) II. Mr. Schulz
Lectures, discussions, and reports. An introduction to research techniques.

195. Special Study in Practice of Art. (2) I and II. Mr. Loran, Mr. Haley
Prerequisite: 8 units of practice work in drawing and painting or the equivalent, taken at another university. Restricted to art majors. Qualified upper division or graduate transfer students will be required to take course 195. Other transfer students will be required to take course 2A. May not be repeated for credit.

199. Special Study for Advanced Undergraduates. (1-4) I and II.
The Staff (Mr. Haley in charge)
Prerequisite: senior standing in art, with at least a B average in the major, and approval of the department. Permission to enroll is subject to staff re-

* Not to be given, 1960-1961.
view and is granted only for exceptionally specialized projects. Credit gained in course 199 will be accepted in fulfillment of requirement in Groups A, B, C, or D.

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

201. Advanced Practice in Selected Painting and Drawing Techniques. (3) I and II. Mr. Bunce, Mr. Loew, Mr. Ippolito
Prerequisite: at least a B average in the undergraduate major in art. Also, applicants must demonstrate ability in composition in an examination at the opening of the semester.
Original works are produced for group discussion and criticism. May be repeated for credit.

220. Seminar in Art. (3) I and II. Mr. Kasten, Mr. McCray, Mr. Park, Mr. Wessels
Prerequisite: at least a B average in the undergraduate major in art. Also, applicants must demonstrate ability in composition in an examination at the opening of the semester.
Seminar in the practice of painting and drawing. Original works are produced for group discussion and criticism. Ancillary topics of a contemporary or historical nature will be introduced. May be repeated for credit.

240. Advanced Practice in Selected Sculpture Techniques. (3) I and II. Mr. O’Hanlon, Mr. Schnier
Prerequisite: at least a B average in the undergraduate major in art. Also, applicants must demonstrate ability in composition in an examination at the opening of the semester.
Original works are produced for discussion and criticism. May be repeated for credit.

245. Seminar in Sculpture. (2) I and II. Mr. Schnier, Mr. O’Hanlon
Prerequisite: at least a B average in the undergraduate major in art. Also, applicants must demonstrate ability in composition in an examination at the opening of the semester.
Seminar in Sculpture. Original works are produced for discussion and criticism. Ancillary topics of a contemporary or historical nature will be introduced. May be repeated for credit.

254. Seminar in the History of Ancient Art. (3) I. Mr. Amyx
May be repeated for credit.

260. Seminar in the History of Oriental Art. (3) II. Mr. Maenchen
May be repeated for credit.

§274. Seminar in Medieval Manuscript Illumination. (3) II. Mr. Delaisse

275. Seminar in the History of Early Christian and Medieval Art. (3) II. Mr. Horn
May be repeated for credit.

276. Seminar in the History of Renaissance Art. (3) I. Mr. Schulz
May be repeated for credit.

*277. Seminar in the History of Northern European Art. (3) II. Mr. Schulz
May be repeated for credit.

§ To be offered one semester only, 1960–1961.
283. Seminar in the History of Modern Art. (3) I. Mr. Chipp
May be repeated for credit.

284. Seminar in the History of Modern Architecture. (3) I. Mr. Jacobus
May be repeated for credit.

298. Special Study for Graduate Students. (1–6) I and II.
The Staff (Mr. Haley in charge)
Prerequisite: at least a B average in the upper division and graduate courses taken in the Department of Art. A student may not register with more than two instructors in any one semester for credit. Permission to enroll is subject to staff review and is granted only for exceptionally specialized projects.

299. Special Study for Graduate Students in the History of Art. (1–4)
I and II. The Staff (Mr. Amyx in charge)

RELATED COURSES IN OTHER DEPARTMENTS
Architectural History (Architecture 121, 122).
Architectural History—American (Architecture 126).
Architectural History—Nineteenth and Twentieth Centuries (Architecture 127).
Classical Archaeology: Elementary Classical Archaeology (Classics 17A–17B); Vase Painting (Classics 170A–170B*–170C*).
Advanced Course in Archaeological Method (Classics 270A–270B).
History of Design since the Industrial Revolution (Decorative Art 167).
Italian Culture in Transition (History 130*).
Aesthetics (Philosophy 136A).

UNIVERSITY ART GALLERY
The University Art Gallery was established in 1933 with funds contributed for the purpose by the Class of 1933, the Regents of the University, Albert M. Bender, and other generous friends and alumni of the University. Owing to limitations of space and facilities, the gallery does not maintain a permanently installed exhibition, but presents from time to time temporarily installed exhibits covering various phases of art. The material comprising these exhibits is drawn either from University collections in storage, or borrowed from other institutions and organizations, or from private individuals. Those interested in the gallery's activities may address Mr. Herwin Schaefer, Curator of the University Art Collections, Department of Decorative Art.

ASTRONOMY
(Department Office, 601 Campbell Hall)
Louis G. Henyey, Ph.D., Professor of Astronomy and Director of the Leuschner Observatory (Chairman of the Department).
John G. Phillips, Ph.D., Professor of Astronomy.
Harold F. Weaver, Ph.D., Professor of Astronomy.
Sturla Einarsson, Ph.D., Professor of Astronomy, Emeritus, and Director of the Leuschner Observatory, Emeritus.
Otto Struve, Ph.D., Sc.D., Professor of Astronomy, Emeritus.
Leland E. Cunningham, Ph.D., Associate Professor of Astronomy.
George Wallerstein, Ph.D., Assistant Professor of Astronomy.

Albert E. Whitford, Ph.D., Director of the Lick Observatory and Astronomer.

Letters and Science List.—All undergraduate courses in astronomy are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Henyey, Mr. Weaver.

The Major.—Physics 4A–4B–4C, or the equivalents; Mathematics 3A–3B, 4A–4B, or the equivalents, and a course in statistics; Astronomy 7A–7B; a reading knowledge of French, German, or Russian.

A minimum of 24 units of upper division work in astronomy and allied subjects taken in accordance with a plan approved by the major adviser. Normally, students majoring in astronomy must take courses 104A–104B, 105A–105B, and 117A–117B.

Honors Program.—A student wishing to take part in the honors program in the Department of Astronomy may do so by enrolling for at least 3 units of Astronomy 199 during his senior year, and in this course he shall prepare an acceptable research paper on some subject which he shall choose in consultation with a staff member.

LOWER DIVISION COURSES

1. Introduction to Astronomy. (3) I and II. Mr. Phillips, Mr. Wallerstein
   Three lectures and one discussion section per week.
   General facts and principles of the science of astronomy. Not intended for advanced physical science majors.

7A–7B. General Astronomy. (3-3) Yr. Mr. Phillips
   A three-hour laboratory or observing period will be substituted occasionally for one of the lectures. Prerequisite: Mathematics 3A. Open to majors in the natural sciences and engineering. Required in preparation for a major in astronomy.
   The facts and principles underlying all branches of astronomy.

UPPER DIVISION COURSES

101. Current Problems in Astronomy. (3) I and II. Mr. Weaver
   Prerequisite: Physics 4A, 4B, 4C, Mathematics 3A, 3B, 4A, 4B.
   Introduction to the principal fields of modern astrophysical research. Differs from course 7A–7B in that selected topics are discussed from a more advanced viewpoint. Intended primarily for majors in the physical sciences and engineering.

104A–104B. Practical Astronomy. (3-3) Yr.
   Prerequisite: Mathematics 3A–3B, Physics 4A–4B, and either course 1 or 7A–7B. Course 105A–105B is recommended and may be taken concurrently.
   104A. Precise determination of latitude, time and longitude. Precession, nutation, proper motion and refraction.
   104B. Optical properties of a telescope. Differential measurement of star positions.

*105A–105B. Astronomical Computations. (3-3) Yr. Mr. Cunningham
   Prerequisite: Mathematics 4B and 119 (may be taken concurrently with course 105B), or consent of the instructor.
   Theory and application to astronomical problems of interpolation, numerical differentiation and integration, determinants and matrices, solution of linear and transcendental equations, least squares, numerical solution of differential equations.

117A–117B. Introduction to Astrophysics. (3-3) Yr. Mr. Wallerstein
   A laboratory period will occasionally be substituted for one of the regular periods. Prerequisite: consent of the instructor.

**Astronomy**

**H195. Special Study for Honors Candidates. (1–3) I and II.** The Staff

**199. Special Study for Advanced Undergraduates. (1–3) I and II.** Mr. Weaver

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**GRADUATE COURSES**

(Concerning conditions for admission to graduate courses, see page 18)

**205. Utilization of Modern Computing Machinery. (3) I.** Mr. Cunningham

Prerequisite: course 215A–215B, or consent of the instructor.

Theory and practice of the solution of large astronomical problems with punch-card and electronic calculators.

**207A–207B. Physical Foundations of Astrophysics. (4–4) Yr.** Mr. Henyey

Prerequisite: Mathematics 14B or 119, Physics 121 or the equivalent.

A discussion of the physical foundations of modern astrophysics, with emphasis on those topics bearing directly on astrophysical theories.

**215A–215B. Orbit Theory and Practice. (3–3) Yr.** Mr. Cunningham

Prerequisite: course 105 and Physics 105 (may be taken concurrently), or consent of the instructor. May be taken by qualified seniors.

Various orbit methods, reduction of observations, special perturbations, introduction to general perturbations,

**217A–217B. Astrophysics. (3–3) Yr.** Mr. Henyey

Prerequisite: course 117A–117B.

The physics of stellar atmospheres.

**217C. Physics of Stellar Atmospheres. (3) I.**

Three hours of lecture per week. Prerequisite: course 217A–217B.

A continuation of 217A–217B with special emphasis on topics dealing with the sun’s chromosphere, corona, and with granulation, flares, and prominences.

**218A–218B. Statistical Astronomy. (3–3) Yr.** Mr. Weaver

An introduction to the principal problems of galactic structure.

**225A–225B. Celestial Mechanics. (3–3) Yr.** Mr. Cunningham

Prerequisite: Physics 105.

**227A–227B. Stellar Structure. (3–3) Yr.** Mr. Henyey

Prerequisite: course 117A–117B and 207A–207B, or the equivalent.

The physics of the stellar interior, energy sources, stellar rotation, and pulsation.

**237A–237B. Astronomical Spectroscopy. (3–3) Yr.** Mr. Phillips

Prerequisite: Physics 211 or the equivalent.

The application of the principles of atomic and molecular spectroscopy to the study of the spectra of astronomical sources.

**245. Satellite Theory. (3) II.** Mr. Cunningham

Prerequisite: courses 205 and 215B, or consent of the instructor.

Theories for the motion of natural and artificial satellites. Practical determination of their orbits and perturbations.

Mr. Phillips, Mr. Wallerstein
Prerequisite: Physics 211 or the equivalent.
Advanced topics in astronomical spectroscopy: spectra of Wolf-Rayet stars, novae, Cepheid variables, spectrum variables, late-type stars, comets, planets, night sky, interstellar matter.

†291. Proseminar. (1–3) II.
Introduction to research. For new graduate students in astronomy.

292. Astrophysics Seminar. (1–3) I and II.
Mr. Henyey

†293. Seminar in Orbits. (1–3) I and II.
Mr. Cunningham

Mr. Weaver

298. Advanced Study and Research at Lick Observatory. (1–4) I and II.
The Staff (Mr. Whitford in charge)
Intended for graduate students who require observational experience as well as for those working upon observational problems for their theses.

299. Advanced Study and Research. (1–4) I and II.
The Staff (Mr. Henyey in charge)

LICK OBSERVATORY

The Lick Observatory at Mount Hamilton is a separate research facility of the University and provides opportunity for advanced astronomical work. Opportunities are available to graduate students to do research at the Observatory under the direction of the astronomers. In the course of such work a student may obtain observational material for a doctor's or a master's dissertation.

BACTERIOLOGY

(Department Office, 3573 Life Sciences Building)

Edward A. Adelberg, Ph.D., Professor of Bacteriology (Chairman of the Department).
†Michael Doudoroff, Ph.D., Professor of Bacteriology.
Sanford S. Elberg, Ph.D., Professor of Bacteriology.
Jacob Fong, Ph.D., Professor of Bacteriology.
§Roger Y. Stanier, Ph.D., Professor of Bacteriology.
§Gunther S. Stent, Ph.D., Professor of Bacteriology.
Albert P. Krueger, A.B., M.D., Professor of Bacteriology, Emeritus.
John H. Northrop, Ph.D., Sc.D., LL.D., Professor of Bacteriology, Emeritus, and Professor of Biophysics, Division of Medical Physics, Emeritus.
David W. Weiss, Ph.D., D.Phil., Associate Professor of Bacteriology.
John H. Phillips, Ph.D., Assistant Professor of Bacteriology.
Mary Human, M.A., Associate in Bacteriology.
Adelien Larson, A.B., Associate in Bacteriology.

Horace A. Barker, Ph.D., Professor of Microbial Biochemistry.
Harold P. Klein, Ph.D., Visiting Professor of Bacteriology.
Stewart H. Madin, D.V.M., Lecturer in Bacteriology.

† To be given if a sufficient number of students enroll.
Letters and Science List.—All undergraduate courses in bacteriology are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Adelberg, Mr. Weiss.

Students in the lower division are urged to consult with the major adviser concerning the specific courses to be taken as a basis for a major in bacteriology.

The Major.—The following lower division courses are required: Chemistry 1A, 1B, 5; Chemistry 8 or 12; Zoology 1A or Botany 1 or Biology 11A-11B; Physics 2A and 2B, Bacteriology 1 and 4. (Note: Students from other institutions presenting a course of 4 units in introductory bacteriology, including laboratory, must have the consent of the departmental adviser, in order to proceed with the major.)

A total of 24 units of upper division work must also be completed, and must include the following courses: Bacteriology 100 or 104; Bacteriology 101; Biochemistry 102 or 100A-100B; Biochemistry 102L or 101A; and 4 additional upper division units in bacteriology. The rest of the 24 upper division units may be chosen from the following list: Bacteriology 100, 102, 102C, 103, 104, 105, 106, 106C, 107; Botany 100; Zoology 110, 111, 117; Biochemistry 101B; Entomology 126; Public Health 147A-147B; Virology 100A; Chemistry 112, 128, 129.

Students planning to go on to graduate work are advised to select additional courses from the following list: Botany 101; Zoology 101, 102, 107, 107C; Zoology 114 or 115 or Genetics 100; Chemistry 109 or 110A-110B. It is recommended that these students offer either German or French in satisfaction of the language requirement for the College of Letters and Science.

Lower Division Courses

1. General Bacteriology. (3) II. Mr. Klein
   Three lectures per week. Prerequisite: Chemistry 1A, 1B, 8 or 12; Zoology 1A or Botany 1 or Biology 11A-11B. Course 4 must be taken concurrently.
   A course designed to acquaint the student with the morphology, physiology, biochemistry, and ecology of bacteria, with principal emphasis on nonpathogenic types.
   The basic course in bacteriology for students majoring in any of the biological sciences.

2. A Survey of Bacteriology. (2) II. Mr. Adelberg, Mr. Phillips
   Two lectures per week. Prerequisite: Chemistry 1A. Course 4 must be taken concurrently.
   An elementary course, designed for students not planning to major in any of the biological sciences.

4. Laboratory Course in General Bacteriology. (2) II. Mr. Adelberg
   Two three-hour laboratory periods per week. Prerequisite: Chemistry 1A.
   Either course 1 or 2 must be taken concurrently.
   Designed to provide an introduction to bacteriological techniques and to illustrate some important concepts of bacteriology.

Upper Division Courses

A grade of C or higher in the preceding courses in this department is required for admission to the upper division courses.

100. Bacterial Physiology. (5) I. Mr. Klein
   Two lectures and three three-hour laboratory periods per week. Prerequisite: course 1 or 2; course 4; Chemistry 5; Biochemistry 102 or the equivalent.
Bacteriology

Selected topics in bacterial physiology, with primary emphasis on quantitative aspects of growth, nutrition, metabolism, and genetics.

101. The Pathogenic Bacteria. (6) I. Mr. Elberg, Mr. Weiss
Three lectures and three three-hour laboratory periods per week. Prerequisite: course 1 or 2; course 4; Chemistry 8 or 12; Zoology 1A or Biology 11A–11B.
A course designed to acquaint the student with principles and laboratory procedures necessary for studying the pathogenesis of bacterial and other microbial infections of man.
Students who plan to take Bacteriology 101 should report to Cowell Hospital for immunization against tetanus, diphtheria, and typhoid fever.

102. Immunology. (2) II. Mr. Elberg
Prerequisite: course 101.
The factors underlying the virulence of microorganisms; mechanisms of bacterial infection; specific and nonspecific reactions in antimicrobial immunity; the antigen-antibody reaction; nature and serological specificity of antibodies.

102C. Immunology Laboratory. (3) II. Mr. Elberg
Three three-hour laboratory periods per week. Prerequisite: course 102 (may be taken concurrently).

103. Immunochemistry. (4) I. Mr. Phillips
Two lectures and two three-hour laboratory periods per week. Prerequisite: Chemistry 8 or 12.
The application of immunochemical procedures to problems in biology.

*104. The Biology of Nonpathogenic Bacteria. (5) II. Mr. Stanier
Two lectures and three three-hour laboratory periods per week. Prerequisite: Biology 11A–11B or Zoology 1A or Botany 1; Biochemistry 102 or the equivalent; course 1 or 2, or consent of the instructor.
The cytology of bacteria; enrichment, isolation, and study of representatives of the major bacterial groups.

105. The Biology of Infectious Disease. (2) II. Mr. Weiss
Prerequisite: open to juniors, seniors, and graduate students majoring in any of the biological sciences, or by special permission of the instructor.
A course designed to acquaint the student with the special biological and ecological problems of the host-parasite relationship in infectious disease.

106. Introduction to the Animal Viruses. (2) II. Mr. Fong
Prerequisite: course 101.
An introduction to the animal viruses, including pathogenesis, immunity, and virus-host relationship.

106C. Laboratory in Virology. (2) II. Mr. Fong
Prerequisite: course 106 (may be taken concurrently).
A basic course in laboratory techniques for isolation, cultivation, and identification of animal viruses. Application of these procedures in diagnosis, immunology, and pathogenesis of viral diseases. Studies on the nature and reproduction of viruses and the host-virus relationships.

107. Bacterial Genetics. (2) I. Mr. Adelberg
Prerequisite: an elementary bacteriology course, or consent of the instructor. An elementary course in genetics is recommended.
An introduction to the genetics of microorganisms, with emphasis on bacteria.

H195. Independent Study. (2–4) I and II.
Open to students in their senior year who are enrolled in the Department of Bacteriology honors program.
Independent study within the field of bacteriology, not involving laboratory work.

H197. Research. (2–4) I and II.
Open to students in their senior year who are enrolled in the Department of Bacteriology honors program.
Laboratory research in the laboratory of one of the staff.

199A–199B. Special Study for Advanced Undergraduates. (2–2) Yr.
Beginning each semester.
199A is not prerequisite to 199B. Open only to senior students in bacteriology with a grade B average. Study of a selected topic and preparation of a term paper.

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

*203. Microbial Metabolism. (2) I.
Mr. Barker, Mr. Doudoroff
Prerequisite: Biochemistry 100B, or consent of the instructor. Recommended: an elementary bacteriology course.
A course covering selected topics on the metabolism of microorganisms, with special emphasis on intermediary metabolism.

206A–206B. Experimental Pathology. (4–4) Yr.
Mr. Madin
Two lectures and two three-hour laboratory periods per week. Prerequisite: course 101, or consent of the instructor.
Abnormal mammalian biology in relationship to infectious disease and neoplasia.

212. Seminar in Current Research. (1) I.
Mr. Fong
Prerequisite: consent of the instructor.
Presentation of current research projects.

*213. Seminar in Microbial Genetics. (1) II.
Mr. Adelberg, Mr. Stent
Prerequisite: course 107.

214. Seminar in Medical Microbiology. (1) II.
Mr. Weiss

*215. Seminar in Immunology. (1) II.
Mr. Elberg

280. Research. (1–9) I and II.
The Staff (Mr. Adelberg in charge)

299. Special Study for Graduate Students. (2–4) I and II.
The Staff (Mr. Adelberg in charge)
Any properly qualified student who wishes to pursue a problem through nonlaboratory study may do so upon approval by a member of the staff with whom he wishes to work.

BIOCHEMISTRY

(Department Office, 229 Biochemistry and Virus Laboratory)
Horace A. Barker, Ph.D., Professor of Biochemistry (Vice-Chairman of the Department).

Biochemistry

William Z. Hassid, Ph.D., Professor of Biochemistry.
Choh H. Li, Ph.D., Professor of Biochemistry and Experimental Endocrinology.
Howard K. Schachman, Ph.D., Professor of Biochemistry and Virology.
Esmond E. Snell, Ph.D., Professor of Biochemistry (Chairman of the Department).
Wendell M. Stanley, Ph.D., Sc.D., LL.D., Docteur h.c., Professor of Biochemistry and Virology and Director of the Virus Laboratory.
Clinton E. Ballou, Ph.D., Associate Professor of Biochemistry.
Frederick H. Carpenter, Ph.D., Associate Professor of Biochemistry.
Charles A. Dekker, Ph.D., Associate Professor of Biochemistry.
David P. Hackett, Ph.D., Associate Professor of Biochemistry.
John B. Neilands, Ph.D., Associate Professor of Biochemistry.
Arthur B. Pardee, Ph.D., Associate Professor of Biochemistry and Virology.
Jesse C. Rabinowitz, Ph.D., Associate Professor of Biochemistry.
Roger D. Cole, Ph.D., Assistant Professor of Biochemistry.
W. Terry Jenkins, Ph.D., Assistant Professor of Biochemistry.

Miyoshi Ikawa, Ph.D., Lecturer in Biochemistry.
C. Arthur Knight, Ph.D., Professor of Virology.

Letters and Science List.—All undergraduate courses in biochemistry are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers.—Mr. Carpenter, Mr. Dekker.

Description of the Major.—The department offers two programs for the major: Plan I, which is designed especially for students expecting to pursue graduate study in biochemistry, and Plan II, a program for students who do not expect to continue beyond the Bachelor of Arts degree. Students in Plan I may elect the Honors Program.

In preparing for the upper division courses, attention should be given to the interlocking prerequisites: that is, Mathematics 3A–3B are prerequisites for Physics 4A–4B, which are in turn required for Chemistry 110A.

The Major: Plan I.—All courses with lower division numbers should be completed before the beginning of the junior year. These are as follows: Chemistry 4A–4B (or 1A–1B and 5), 12; Mathematics 3A–3B, 4A; Physics 4A–4B; Biology 11A–11B, or Botany 1, or Physiology 1, 1L or Zoology 1A. Recommended: an additional course in biological sciences selected from Bacteriology 1 and 4, or 2 and 4, or Zoology 1B; Physics 4C in addition to Physics 4A–4B; a course in statistics and a reading knowledge of German and one other foreign language.

The 24-unit upper division requirement in the major must include courses 100A–100B, 101A–101B, 112, Chemistry 110A–110B, and 112C (Chemistry 112 is recommended in place of 112C). Upper division credit may be allowed for chemistry courses taken in excess of 13 units. Additional courses in biochemistry and in allied subjects chosen in accordance with a plan approved by the departmental adviser are recommended (see Related Course List on page 56). Students planning to pursue graduate study in biochemistry should maintain a grade-point average of at least 3.0 in biochemistry courses and other courses acceptable in the major.

Honors Program.—Students who are enrolled in the major under Plan I and who have a grade-point average of at least 3.0 in courses acceptable in the major may elect the honors program at any time not later than the first semester of the senior year. In addition to the courses prescribed under the Plan I major, the students in this program will be required to complete 3
units in course 180 and write a thesis based on this research. They will also offer course 290 (1 unit) in place of course 112. Certain graduate biochemistry courses will be open to these students on approval of the instructor and adviser. To remain in the honors program a student must maintain a grade-point average of at least 3.0 in biochemistry courses and in those courses acceptable in the major.

The Major: Plan II.—All courses with lower division numbers should be completed before the beginning of the junior year. These are as follows: Chemistry 4A–4B (or 1A–1B and 5), 8, 9; Mathematics 3A–3B or 16A–16B; Physics 2A–2B, 3A–3B; Biology 11A–11B, or Botany 1, or Physiology 1, 1L or Zoology 1A and one of the following: Bacteriology 1 and 4, or 2 and 4, or Zoology 1B.

The 24-unit upper division requirement in the major must include courses 100A–100B, 101A–101B, 112 and Chemistry 109. Upper division credit may be allowed for chemistry courses taken in excess of 13 units. The balance of the 24 units required for the major must include additional courses in biochemistry or allied subjects chosen in accordance with a plan approved by the departmental adviser (see Related Course List on page 56).

### Upper Division Courses

#### 100A–100B. General Biochemistry. (3–3) Yr.
Mr. Pardee, Mr. Snell
100A: Mr. Pardee, Mr. Snell; 100B: Mr. Snell.
Prerequisite: Chemistry 8 and 9 or 12 with a grade of C or higher; Chemistry 109 or 110A, and Physiology 1, 1L or Zoology 1A (may be taken concurrently), or consent of the instructor. Designed for biochemistry majors.
Lectures on the chemical and physical factors concerned in life processes, including the chemistry and metabolism of salts, vitamins, hormones, lipids, carbohydrates, and proteins, with a survey of nutrition and energy exchange.

#### 101A–101B. General Biochemistry Laboratory. (3–3) Yr.
Mr. Cole, Mr. Jenkins, Mr. Neilands
101A: Mr. Cole, Mr. Jenkins; 101B: Mr. Jenkins, Mr. Neilands.
One lecture and two three-hour laboratory periods per week. Prerequisite: Chemistry 5, course 100A (may be taken concurrently), or consent of the instructor.
Laboratory practice with the more important constituents of living matter to illustrate their chemical behavior. The experimental work is planned to accompany the lectures in course 100A–100B.

#### 102. A Brief Survey of the Principles of Biochemistry. (3) I and II.
Mr. Hackett, Mr. Jenkins, Mr. Rabinowitz, Mr. Cole
I. Mr. Jenkins, Mr. Hackett; II. Mr. Rabinowitz, Mr. Cole.
Prerequisite: Chemistry 8. Recommended: Chemistry 9, 109 and an introductory course in bacteriology, botany, or zoology. Designed for nonbiochemistry majors. Not open for credit to students who have credit in course 100A–100B or equivalent.
A survey of the chemistry of biologically important compounds and their role in animal and plant metabolism.

#### 102L. Biochemistry Laboratory. (3) I and II.
Mr. Ballou, Mr. Barker, Mr. Dekker, Mr. Hassid
I. Mr. Barker, Mr. Hassid; II. Mr. Ballou, Mr. Dekker.
One lecture and two three-hour laboratory periods per week. Prerequisite: Chemistry 5 (or Nutrition 101A) and course 102 (may be taken concurrently). Not open for credit to students who have completed course 101A–101B or the equivalent.
Biochemistry

Experimental work to acquaint the student with the properties of biological materials, the action of enzymes, and the use of specific techniques for laboratory work in biochemistry. Planned to accompany lectures in course 102.

112. Proseminar. (1) II.
Prerequisite: courses 100A and 101A.
Biochemical literature and newer developments of the subject.

Mr. Neilands

180. Research. (3–5) I and II.
The Staff (Mr. Carpenter in charge)
Prerequisite: courses 100A and 101A with a grade of B or higher.
A limited number of advanced students will be given topics for investigation under the direction of a member of the staff.

199. Special Study for Advanced Undergraduates. (1–2) I and II.
The Staff (Mr. Ballou in charge)
Reading and conference for properly qualified students under the direction of a member of the staff.

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 18)
Courses 202 to 222 represent selected topics in biochemistry and are intended to acquaint advanced students with recent advances made in the different fields of biochemistry. Also open to senior students with honor standing by consent of the instructor.

202. Carbohydrates. (2) I.
Prerequisite: Chemistry 112 or equivalent.
The chemistry of carbohydrates, with an emphasis on the rationalization of properties and reactions according to modern theories of organic chemistry.

Mr. Ballou

203. Biochemistry of the Hormones. (2) II.
Survey of the biochemistry of the hormones.

Mr. Li

*204. Biochemistry of Proteins. (3) II.
Prerequisite: course 100A–100B.
The chemistry and metabolism of the amino acids, peptides, and proteins.

Mr. Cole

*205. Biochemistry of Nucleic Acids. (2) I.
Prerequisite: course 100A–100B, or consent of the instructor.
The chemistry and biochemistry of the nucleic acids and their constituents.

Mr. Dekker

206. Physical Biochemistry. (3) I.
Prerequisite: Chemistry 12 or 112 or 112C, 110A–110B, Physics 4A, 4B, 4C, Mathematics 4A or consent of the instructor. Recommended: course 102 or 100A–100B.
Application of modern physical concepts and experimental methods to the problems of large molecules of biological interest.

Mr. Schachman

209. Advanced Biochemical Laboratory Methods. (4) I.
Mr. Carpenter
One lecture and three three-hour laboratory periods per weeks. Prerequisite: courses 100A–100B, 101A–101B, or their equivalent, and consent of the instructor.
Experimental techniques used in research, including purification of natural materials, chromatographic analysis and isotopic tracer methods.

210. Fats, Phospholipids, and Related Compounds. (2) II. Mr. Jenkins
Prerequisite: course 100A–100B, or consent of the instructor.
Chemical constitution and biochemical relationships of fats, phospholipids, steroids, and related compounds.

211. Enzyme Chemistry. (3) I. Mr. Neilands, Mr. Pardee
Prerequisite: course 102 or 100A–100B.
Physical chemical properties and mechanism of action of enzymes, and their role in metabolic processes.

212. Enzyme Chemistry Laboratory. (3) II. Mr. Rabinowitz
One lecture and two three-hour laboratory periods per week. Prerequisite: course 211 (may be taken concurrently) or consent of the instructor.
Experimental methods of enzyme chemistry and biological oxidations.

222. Plant Biochemistry. (2) II. Mr. Hackett
(Formerly Agricultural Biochemistry 222.)
Prerequisite: course 100A–100B or 102 with a grade of C or higher.
Lectures on the chemistry of important plant constituents and on processes such as photosynthesis, respiration, and carbohydrate, nitrogen, and fat metabolism.

280. Research. (1–9) I and II. The Staff (Mr. Rabinowitz in charge)
Students must enroll for not less than 4 units, except by special permission of the chairman of the department.

290. Seminar. (1) I and II. The Staff
Advanced study in various fields of biochemistry. These fields vary from year to year. The program for 1960–1961 will include four sections each semester, each emphasizing a somewhat different area: I, Mr. Carpenter, Mr. Cole, Mr. Hackett, and Mr. Hassid; II, Mr. Ballou, Mr. Barker, Mr. Dekker, and Mr. Pardee.

299. Special Study for Graduate Students. (1–3) I and II. The Staff (Mr. Rabinowitz in charge)
Reading and conference for properly qualified graduate students under the direction of a member of the staff.

RELATED COURSES IN OTHER DEPARTMENTS
Bacteriology 100 (5), 101 (6), 102 (2), 102C (3), 103 (4), *104 (5), 106 (2), 106C (2), 107 (2).
Chemistry. All upper division courses.
Entomology 110 (3).
Food Technology 113 (3), *118 (3), 120 (2).
Genetics 100 (3), 100C (1), 104 (3).
Soils and Plant Nutrition 111 (3), 114 (3), 115 (2), 117 (2).
Virology 100A–100B (3–3), 177 (3).

BIOLOGICAL CONTROL
(Department Office, University of California Gill Tract,
1050 San Pablo Ave., Albany)

Edward A. Steinhaus, Ph.D., Professor of Insect Pathology.
Richard L. Doutt, Ph.D., LL.B., Professor of Biological Control.

Charles A. Fleschner, Ph.D., Professor of Biological Control, Riverside
(Chairman of the Department).
Carl B. Huffaker, Ph.D., Lecturer in Insect Ecology.
Mauro E. Martignoni, Ph.D., Lecturer in Insect Pathology.
Powers S. Messenger, Ph.D., Lecturer in Insect Ecology.
(For courses in biological control, see Entomology and Parasitology.)

BOTANY
(Department Office, 2017 Life Sciences Building)

Herbert G. Baker, Ph.D., Professor of Botany and Director of the Botanical Garden.
Lincoln Constance, Ph.D., Professor of Botany and Curator of Seed Plant Collections.
Ralph Emerson, Ph.D., Professor of Botany.
Adriance S. Foster, Sc.D., Professor of Botany (Chairman of the Department).
†Leonard Machlis, Ph.D., Professor of Botany.
‡Herbert L. Mason, Ph.D., Professor of Botany and Director of the Herbarium.
‡George F. Papenfuss, Ph.D., Professor of Botany and Curator of Algal Collections.
Lee Bonar, Ph.D., Professor of Botany and Curator of Mycological Collections, Emeritus.
Alva R. Davis, Ph.D., Sc.D., (hon.c.), LL.D., Professor of Plant Physiology, Emeritus.
Thomas H. Goodspeed, Ph.D., Doctor (hon.c.), Sc.D. (hon.c.), Professor of Botany, Emeritus, and Director of the Botanical Garden, Emeritus.
William A. Jensen, Ph.D., Associate Professor of Botany.
Johannes M. Proskauer, Ph.D., Associate Professor of Botany.
Robert E. Cleland, Ph.D., Assistant Professor of Botany.
Philip J. Snider, Ph.D., Assistant Professor of Botany.

‡In residence spring semester only, 1960–1961.
Botany

Roy Overstreet, Ph.D., Professor of Soil Chemistry.
Rafael L. Rodriguez, Ph.D., Visiting Professor of Botany for the fall semester.
Paul C. Silva, Ph.D., Visiting Associate Professor of Botany.
Ralph I. Smith, Ph.D., Professor of Zoology.
Edward C. Stone, Ph.D., Associate Professor of Forestry.
Frederick R. Whatley, Ph.D., Lecturer in Plant Physiology.

Letters and Science List.—All undergraduate courses in botany except course 155 are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Adviser: Mr. Proskauer.

The Major.—General Requirements: (a) Botany 1; Chemistry 1A, and 8; Physics 2A–2B, and 3A–3B; Zoology 1A. Recommended: Elementary courses in other biological sciences; German or French under the foreign language requirement. (b) Botany 100, 103, 108, and 111, and an upper division course in genetics. (c) Completion of field of emphasis I or II.

I. Morphological Botany: Additional upper division courses in botany or approved courses in related departments, to complete a minimum of 24 upper division units.

II. Physiological Botany: (a) Chemistry 1B, and 5; Biochemistry 102. Recommended: Mathematics 3A–3B, Biochemistry 102L. (b) Additional upper division courses in botany or approved courses in related departments, to complete a minimum of 24 upper division units.

Honors in Botany: Qualified students may arrange an individual program of special study in consultation with the major adviser, to begin not later than the first semester of their senior year. All candidates for Honors in Botany must pass an oral comprehensive examination.

General Biology

Biology 11A–11B. Introduction to the Science of Living Organisms. (3–3) Yr. Mr. Emerson, Mr. Smith

Lectures and laboratory. To receive credit toward the natural science requirement of the College of Letters and Science, both semesters must be taken. Not open for credit to students who have taken Botany 1, 10, Zoology 1A, IB, 10. An introductory course in biology offered jointly by the departments of Botany and Zoology. Presents and illustrates the main facts and principles of organization, function, heredity, and evolution of plants and animals, and introduces the student to methods of the life sciences.

Botany

LOWER DIVISION COURSES

1. General Botany. (5) I. Mr. Proskauer, Mr. Silva

Prerequisite: high school or introductory college chemistry.

Lectures and laboratory. Designed as the basic course in botany for all students of plant or animal science.

An introduction to the fundamental principles of biology as illustrated by plants, with emphasis on the morphology, physiology, and phylogenetic relations of the major plant groups.

10. Plant Biology. (3) I and II. Mr. Jensen, Mr. Snider

(Formerly numbered 12.)

I: Mr. Jensen; II: Mr. Snider.

Lectures and demonstrations. Open without prerequisite to all students and designed for those not specializing in botany. Not open to students who have
Botany

completed course 1 or Biology 11A–11B. Students who have taken course 10 may elect course 1 for credit.

Emphasis of the course is placed on the fundamental concepts of biology as illustrated in the structure and function of plants.

**UPPER DIVISION COURSES**

In addition to requirements specifically noted, the prerequisite for all upper division courses except Botany 115 and Botany 151 is course 1. Biology 11A–11B may fulfill this requirement with the consent of the instructor.

100. **Comparative Morphology of Thallophytes and Bryophytes.** (4) II.
   Lectures and laboratory.
   Mr. Proskauer

101. **Mycology.** (4) II.
   Lectures and laboratory. Prerequisite: course 100.
   Mr. Emerson
   The structure and development of the fungi. Myxomycetes, Phycomycetes, and Ascomycetes.

102. **Mycology.** (4) I.
   Lectures and laboratory. Prerequisite: course 100. Course 101 recommended but not required.
   Mr. Snider
   Fungi Imperfecti and Basidiomycetes.

103. **Comparative Morphology of Vascular Plants.** (4) I.
   Lectures and laboratory.
   Mr. Foster

*104. **Bryology.** (4) I.
   Lectures and laboratory. Prerequisite: courses 100 and 103. To be offered every other year.
   Mr. Proskauer
   A general treatment of the morphology and relationships of the bryophytes.

105. **Plant Anatomy.** (4) II.
   Lectures and laboratory. Prerequisite: course 103 and consent of the instructor.
   Mr. Foster
   Comparative structure and growth of the meristems; development and structure of important cell types, tissues, and tissue systems; comparative anatomy of stem, root, and leaf. Emphasis is placed upon the anatomy of gymnosperms and angiosperms.

107. **Algology.** (4) II.
   Lectures and laboratory. Prerequisite: course 100. To be offered every other year.
   Mr. Silva
   Advanced morphology and taxonomy of the algae.

108. **Taxonomy of Seed Plants.** (4) II.
   Lectures, laboratory, and field work.
   Mr. Constance
   A survey of the spermatophytes, with lectures on phylogeny and classification; laboratory and field work with collection and identification practice.

110A. **Phylogenetic Taxonomy.** (3) I.
   Lecture and laboratory. Prerequisite: courses 105 and 108.
   Mr. Rodriguez
   Analysis of morphological and logical problems fundamental to the systems of classification, with laboratory work on selected problems in morphology.

110B. Phylogenetic Taxonomy. (3) II.
Mr. Mason
Lecture and laboratory. Prerequisite: course 108 and Genetics 100. 110A is not prerequisite to 110B.
An introduction to population studies and experimental and other research methods significant to an explanation of the taxonomic system.

111. Elementary Plant Physiology. (4) I and II.
Mr. Cleland, Mr. Allen
I: Mr. Cleland; II: Mr. Allen.
Lectures and laboratory. Prerequisite: Chemistry 1A and 8.

115. Plants in Relation to Man. (3) II.
Mr. Baker
Prerequisite: a course of high school or college biology or botany, or consent of the instructor.
Lectures on man's selection and use of plants for his own purposes; the cultural significance of plants; and man's influence on natural vegetation.

115C. Plants in Relation to Man. (1) II.
Mr. Baker
Prerequisite: course 115 (may be taken concurrently) and Botany 1 or Biology 11A–11B.
Demonstrations, laboratory work, and field trips to illustrate material and processes dealt with in course 115.

130. Plant Cytology. (4) I.
Mr. Jensen
Lectures and laboratory.
A synthesis of morphological, biochemical, and genetical information on cell function, reproduction, and development.

151. Principles of Plant Distribution. (3) I.
Mr. Baker
Open to students with upper division standing in botany and major students in other biological sciences with consent of the instructor.
An assessment of the elemental facts of biogeography and their relation to the organization and distribution of vegetation and floras.

*155. Botanical Microtechnique. (2) II.
Mr. Jensen
Prerequisite: courses 105 or 130, or their equivalents, and consent of the instructor. Offered every other year.
Techniques in the preparation of plant material for histological study, and the cytohistochemical localization and measurement of cell constituents and enzymes. An understanding of the underlying concepts and the physical-chemical bases of the techniques will be stressed.

160A. Lectures in Plant Physiology. (2) I.
Mr. Allen
Prerequisite: course 111. Biochemistry 102 recommended.
An advanced undergraduate course on the physiology of the algae and fungi.

160B. Lectures in Plant Physiology. (2) II.
Mr. Cleland
Prerequisite: course 111. Biochemistry 102 recommended.
An advanced undergraduate course on the physiology of plant growth and development: embryo development, seed dormancy, germination, the hormonal control of plant growth, auxin metabolism, cellular differentiation, organogenesis, and the physiology of plant reproduction.

161A. Laboratory in Plant Physiology. (2) I.
Mr. Allen
Prerequisite: courses 111, 160A (may be taken concurrently), Chemistry 5. Biochemistry 102 recommended.
To accompany course 160A.

161B. Laboratory in Plant Physiology. (2) II. Mr. Cleland
Prerequisite: courses 111, 160B (may be taken concurrently), Chemistry 5.
Biochemistry 102 recommended.
To accompany course 160B.

H195. Special Study for Honors Candidates. (1-4) I and II.
The Staff (Mr. Proskauer in charge)
(Formerly numbered H195A–195B.)
Restricted to honors candidates.

199. Special Study for Advanced Undergraduates. (1–4) I and II.
(Formerly numbered 199A–199B.) The Staff (Mr. Proskauer in charge)
Restricted to junior and senior Botany majors.

GRADUATE COURSES
(Concerning conditions for admission to graduate courses, see page 18)

203. Seminar in Cryptogamic Botany. (1) II.
Mr. Silva (in charge), Mr. Emerson, Mr. Proskauer, Mr. Snider
Prerequisite: qualified graduate students.
A seminar on problems in fungi and lower green plants.

204. Seminar in Plant Cytology. (1) II. Mr. Jensen (in charge), Mr. Baker
Prerequisite: qualified graduate students.
A seminar for the study of advanced problems in modern plant cytology.

205. Seminar in Morphology and Taxonomy of Vascular Plants. (1) I.
Mr. Constance (in charge), Mr. Baker, Mr. Foster,
Mr. Fry, Mr. Rodriguez

206. Seminar in Plant Physiology. (1) II.
Mr. Allen, Mr. Arnon, Mr. Babcock, Mr. Broyer,
Mr. Cleland, Mr. Hackett, Mr. Jacobson, Mr. Mackinney,
Mr. Overstreet, Mr. Stone (in charge), Mr. Whaley
Prerequisite: qualified graduate students, with consent of the staff member in charge.
A seminar on problems of plant physiology in the fields of botany, food technology, forestry, plant nutrition, and soil science.
The fall semester of this seminar is listed under Plant Nutrition 206.

*211A–211B. Advanced Plant Physiology. (2–2) Yr.
Prerequisite: courses 105 and 160A–160B, 161A–161B, Biochemistry 102,
or consent of the instructor. Offered every other year.
Intensive reading of the classical and recent literature in the field of plant physiology with informal group discussions.

299. Research. I and II.
The Staff (Mr. Jensen in charge)
(Formerly numbered 201A–201B.) Credit awarded according to the work completed.
Original investigations of special problems in the field, laboratory, Herbarium, or Botanical Garden.

HERBARIA
The University maintains an herbarium representative of the floras of the world. It contains the original collections sponsored by the Geological Survey of California, the algological herbaria of Setchell and Gardner, the Ira W. Clokey herbarium, the J. P. Tracy herbarium, the H. E. Parks herbarium, the H. M. Hall herbarium, the oriental collections amassed by

E. D. Merrill and the Joseph Rock collections and the South American collections made under the auspices of the University Botanical Garden. The Jepson Herbarium, endowed by the late Professor Willis L. Jepson and maintained by the terms of the bequest as a separate herbarium, specializes almost exclusively on the flora of California and of areas in states immediately adjacent.

**BOTANICAL GARDEN**

The Department of Botany has maintained a Botanical Garden since 1892, and from 1925 onward, it has been located in Strawberry Canyon. It includes a fenced area of approximately twenty acres in a valley which, by reason of its slope toward the Pacific Ocean, enjoys a reduction in the climatic extremes of the Berkeley Hills. The garden provides opportunities for research with living plants, supplies teaching material and provides botanical instruction for the interested public. It contains six greenhouses, a lath-house and associated facilities and approximately twelve acres of outdoor space are cultivated. The garden’s collections are especially rich in succulents and South American and South African plants. A California Native Area is being developed. Experimental work is carried out in the greenhouses and in an Experimental Area which provides full facilities for the culture of population-samples outdoors.

**BUSINESS ADMINISTRATION**

(Department Office, 113 South Hall)

David A. Alhadeff, Ph.D., *Professor of Business Administration.*
John P. Carter, Ph.D., *Professor of Business Administration.*
†C. West Churchman, Ph.D., *Professor of Business Administration.*
John W. Cowee, LL.B., Ph.D., *Professor of Insurance (Vice-Chairman of the Department).*
*Leonard A. Doyle, C.P.A., Ph.D., Professor of Business Administration.*
†Delbert J. Duncan, Ph.D., *Professor of Marketing.*
Walter Galenson, C.P.A., Ph.D., *Professor of Industrial Relations.*
Joseph W. Garbarino, Ph.D., *Professor of Business Administration.*
Robert A. Gordon, Ph.D., *Professor of Economics.*
Ewald T. Grether, Ph.D., LL.D., *Flood Professor of Economics (Chairman of the Department of Business Administration).*
*Sidney S. Hoos, Ph.D., Professor of Business Administration, Agricultural Economics, and Economics.*
Roy W. Jastram, Ph.D., *Professor of Business Administration.*
Van Dusen Kennedy, Ph.D., *Professor of Industrial Relations.*
Clark Kerr, Ph.D., LL.D., *Professor of Industrial Relations.*
Frank L. Kidner, Ph.D., *Professor of Economics.*
Choh-Ming Li, Ph.D., *Professor of Business Administration.*
Julius Margolis, Ph.D., *Professor of Business Administration.*
*Maurice Moonitz, C.P.A., Ph.D., Professor of Accounting.*
David A. Revzan, Ph.D., *Professor of Business Administration.*
†Arthur M. Ross, Ph.D., *Professor of Industrial Relations.*
Lloyd Ulman, Ph.D., *Professor of Economics and Industrial Relations.*
Lawrence L. Vance, C.P.A., Ph.D., *Professor of Accounting.*
William J. Vatter, C.P.A., Ph.D., *Professor of Business Administration.*

† In residence fall semester only, 1960–1961.
† In residence spring semester only, 1960–1961.
"In residence spring semester only, 1960–1961."
Business Administration

Paul F. Wendt, Ph.D., Professor of Finance.
John T. Wheeler, Ph.D., Professor of Business Administration.
Thomson M. Whitin, Ph.D., Professor of Business Administration.
Ira B. Cross, Ph.D., LL.D., Flood Professor of Economics, Emeritus.
Charles C. Staehling, C.P.A., M.S., Professor of Accounting, Emeritus.
Catherine De Motte Quire, Ph.D., Assistant Professor of Accounting, Emeritus.
Hector R. Anton, Ph.D., Associate Professor of Accounting.
Frederick E. Balderston, Ph.D., Associate Professor of Business Administration.
Alan R. Cerf, C.P.A., Ph.D., Associate Professor of Business Administration.
Earl F. Cheit, Ph.D., Associate Professor of Business Administration.
Michael Conant, J.D., Ph.D., Associate Professor of Business Law.
* Austin C. Hoggatt, Ph.D., Associate Professor of Business Administration.
Richard H. Holton, Ph.D., Associate Professor of Business Administration.
F. Theodore Malm, Ph.D., Associate Professor of Business Administration.
Richard V. Mattessich, Dr.rer.pol., Associate Professor of Business Administration.
Frederic P. Morrissey, Ph.D., Associate Professor of Business Administration.
Jack D. Rogers, Ph.D., Associate Professor of Business Administration.
Milo W. Smith, J.D., Associate Professor of Business Law.
George J. Staebus, C.P.A., Ph.D., Associate Professor of Accounting.
D. Gordon Tyndall, Ph.D., Associate Professor of Business Administration.
* Harry E. Allison, Ph.D., Assistant Professor of Business Administration.
Louis P. Bucklin, M.B.A., Acting Assistant Professor of Business Administration.
Edward A. Feigenbaum, Ph.D., Assistant Professor of Business Administration.
Julian Feldman, Ph.D., Assistant Professor of Business Administration.
* Roy J. Hensley, Ph.D., Assistant Professor of Business Administration.
James R. Longstreet, M.B.A., Ph.D., Assistant Professor of Business Administration.
Thomas A. Marschak, Ph.D., Assistant Professor of Business Administration.
Arnold B. Moore, M.B.A., Acting Assistant Professor of Business Administration.
William G. Panschar, Ph.D., Assistant Professor of Business Administration.
Patrick J. Parker, M.B.A., Acting Assistant Professor of Business Administration.
Lee Egan Preston, Jr., Ph.D., Assistant Professor of Business Administration.
Albert H. Schaaf, Ph.D., Assistant Professor of Business Administration.
Harry J. Solberg, M.B.A., Ph.D., Assistant Professor of Business Administration.
Robert T. Sprouse, M.B.A., Ph.D., Assistant Professor of Business Administration.
Herman O. Stekler, Ph.D., Assistant Professor of Business Administration.
Donald K. Abe, M.B.A., Associate in Business Administration.
Samuel R. Arnold, B.S., Associate in Business Administration.
Edwin R. Baltimore, M.S., Associate in Accounting.
Wayne S. Boutell, M.B.A., Associate in Accounting.
Loyd D. Heath, M.B.A., Associate in Business Administration.
Tilto E. Kuhn, Ph.D., Associate in Business Administration.

1 In residence fall semester only, 1960–1961.
2 In residence spring semester only, 1960–1961.
Max E. Lupul, B.S., Associate in Business Administration.
Francesco M. Nicosia, Dottore in Economia e Commercio, Associate in Business Administration.
Frank K. Stuart, B.S., Associate in Accounting.
Eugene W. Burgess, Ph.D., Lecturer in Industrial Relations.
D. Douglas Davies, LL.B., Lecturer in Business Law.
Malcolm M. Davisson, J.D., Ph.D., Professor of Economics.
Albert A. Ehrenzweig, Dr.Jur., LL.M., J.S.D., Professor of Law.
William Goldner, Ph.D., Lecturer in Business Administration.
Alan F. Kelsey, B.S., Lecturer in Business Administration.
Raymond W. Kettler, M.A., Lecturer in Business Administration.
Samuel G. Trull, Ph.D., Lecturer in Business Administration.
Malcolm H. Gotterer, M.S., D.B.A., Visiting Assistant Professor of Business Administration.
Philburn Ratoosh, Ph.D., Visiting Associate Professor of Business Administration.
Harry S. Schwartz, Ph.D., Lecturer in Finance.
Wallace F. Smith, Ph.D., Visiting Assistant Professor of Business Administration.
Franklin C. Stark, J.D., Lecturer in Business Law.

The requirements for the curriculum in the School of Business Administration are listed in the Circular of Information.

Lower Division Courses

1A–1B. Principles of Accounting. (3–3) Yr. Beginning each semester.
   Mr. Anton, Mr. Arnold, Mr. Boutell, Mr. Baltimore, Mr. Cerf, Mr. Sprouse, Mr. Staubus, Mr. Vance
   Two lectures and one two-hour laboratory section per week to be arranged.
   Prerequisite: at least sophomore standing. 1A is prerequisite to 1B. It is recommended that students who plan to enter the School of Business Administration complete this course in their sophomore year.

10. General Accounting. (3) I and II.
   Mr. Baltimore, Mr. Boutell
   Prerequisite: at least sophomore standing in any department of the University. Not open to students who have taken or are planning to take course 1A–1B.
   A survey of accounting principles and procedures, particularly as they affect the individual.

   Mr. Conant, Mr. Stark
   Prerequisite: at least sophomore standing.
   Introduction to law; contracts; sales; and agency.

Upper Division Courses

Prerequisite: Economics 1A–1B, 2, and junior standing except where special provision has been made for students in certain curricula.

100. Economics of Enterprise. (3) I and II.
   Mr. Bucklin, Mr. Goldner, Mr. Lupul, Mr. Margolis, Mr. Marschak, Mr. Moore, Mr. Nicosia, Mr. Stekler
   (Formerly numbered 101.)
   Prerequisite: Economics 1A–1B, 2. Not open to students who have taken Economics 100B.
   The development of economic analysis applicable to the problems of busi-
ness enterprises in the areas of price, output, and utilization of resources; examination of the effects of business practices and policy on industry structure, consumers, labor and government.

101. Business Fluctuations and Forecasting. (3) I and II.
   Mr. Carter, Mr. Hensley, Mr. Lupul, Mr. Marschak, Mr. Moore,
   (Formerly numbered 100.) Mr. Nicosia, Mr. Schauf, Mr. Stekler
   Prerequisite: course 100. Not open to students who have taken Economics 100A.
   General analysis of the factors responsible for economic instability and of the forecasting and other management problems thereby created for the business firm.

102. Advanced Managerial Economics. (3) II.
   Mr. Margolis
   Prerequisite: courses 100 and 101.
   Advanced analysis of the theory and practice of decision-making in business firms, utilizing the concepts and techniques of managerial economics. The business decisions to be investigated include pricing policies, product choice, investment policies, internal transfer pricing, inventory management.

   Mr. Conant, Mr. Davies, Mr. Votaw
   Prerequisite: course 18.
   Legal aspects of various types of business organization, including partnerships and corporations; general survey of the law of trade regulation.

106. Real Estate Law. (3) I.
   Mr. Davies
   Prerequisite: course 180.
   Historical development of the law of real property; estates in land; other legal matters affecting real estate.

   (3) I and II.
   Mr. M. Smith
   Prerequisite: course 18.
   Negotiable instruments, particularly as devices for transferring credit; a survey of various mechanisms for securing credit such as mortgages, conditional sales, trust receipts, pledges.

121A–121B. Advanced Accounting. (3–3) Yr. Beginning each semester.
   Mr. Anton, Mr. Mattessich, Mr. Staubus, Mr. Sprouse
   A two-hour laboratory period per week to be arranged. Prerequisite: course 1A–1B. Required for those specializing in accounting.
   Intensive study of the advanced theory of accounts and its application. Selected problems and reading on the various phases of accounting procedure.

122. Cost Accounting. (3) I and II.
   Mr. Mattessich, Mr. Sprouse, Mr. Staubus
   Lectures, and a two-hour laboratory period per week to be arranged. Prerequisite: course 1A–1B.
   Principles of cost compilation and cost accounting techniques, including the methods of job order, process and standard costs, with attention to cost control devices and managerial use and analysis of cost accounting data; primary emphasis on industrial applications.

123. Auditing. (3) I and II.
   Mr. Vance, Mr. Boutell
   Lectures, and a two-hour laboratory period per week to be arranged. Prerequisite: course 121A.
   Procedures for verification of financial records used by public accountants and internal auditors, including ethical, legal, and other aspects of the public accountant's work.
124. Budgetary Control and Accounting Systems. (3) II. Mr. Staubus
Prerequisite: courses 121A–121B and 122.
The preparation and administration of budgets, the design and main­tenance of efficient accounting systems for managerial control, and the quantitative analysis of specific problems confronting business management.

126. Problems of Financial Reporting. (3) I. Mr. Anton
Prerequisite: course 121A–121B.
Consolidated statements, funds statements, index numbers in accounting, special problems in analysis of financial statements.

131. Corporation Finance. (3) I and II.
Mr. Abe, Mr. Carter, Mr. Longstreet, Mr. Morrissey
Prerequisite: course 1A–1B.
The corporation as one form of business organization; financial aspects of promotion and organization, operation as a going concern, expansion and consolidation, failure and reorganization; the capital market, financial instruments and institutions; public regulation of security issues and security exchanges.

132. Interpretation of Financial Statements. (3) I and II. Mr. Cerf
Prerequisite: courses 1A–1B, 131, and consent of the instructor. Not open to students who have taken course 121C or 126. Should not be elected by students specializing in accounting.
Methods of analyzing and interpreting financial statements, primarily in terms of their use in banking, corporation finance, and investment management.

133. Investments. (3) I and II. Mr. Heath, Mr. Longstreet
Prerequisite: course 131.
A study of the sources of, and demand for, investment capital, operations of security markets, determination of investment policy for individuals and institutions, and current procedures for analysis of different classes of securities.

135. Economics of Insurance. (3) I and II. Mr. Solberg
An introduction to the underlying principles of insurance, followed by a descriptive study of the practices in the more important branches of the insurance business.

136. Life Insurance. (3) I and II. Mr. Solberg
Prerequisite: course 135.
A nontechnical study of principles and practice.

137. Property Insurance. (3) I. Mr. Solberg
Prerequisite: course 135.

138. Casualty Insurance. (3) I and II. Mr. Cowee, Mr. Solberg
Prerequisite: course 135.

140. Production Organization and Management. (3) I and II.
Primarily for juniors. Mr. Abe, Mr. Gotterer, Mr. Rogers, Mr. Whitin
An introduction to the theory and practice of production management; the problems of internal organization; the management of physical resources; product development; materials control; production control; production standards; managerial controls.

141. Facilities Planning. (3) I and II. Mr. Gotterer
Prerequisite: Economics 1A–1B, 2; course 140.
Economic and administrative aspects of the conception and establishment of industrial facilities. Market and resource considerations in location; re-
lations between production operations and plant requirements; economic analysis applied to problems of plant size, arrangement, and structure; equipment purchase decisions.

142. Production Planning and Control. (3) I and II. Mr. Trull, Mr. Whitin
Prerequisite: course 140. Recommended: course 145.
Production planning and budgeting; development of the production control system, including product development, materials control, plant and equipment analysis, production standards and methods, personnel and supervision; control of production quantity through routing, scheduling, and dispatching; quality control—inspection and statistical quality control; measurement of production efficiency.

145. Industrial Procurement. (3) II.
Prerequisite: course 160.
The problems met in purchasing by industrial organizations. A study of major buying policies, the sources of material, the quantity and quality needed, and the relation to price and production cost. Inspection, inventory control, storage, and reciprocal buying are subjects for oral discussion and for the study of executive report writing.

150. Industrial Relations. (3) I and II.
Mr. Galenson, Mr. Garbarino, Mr. Kennedy, Mr. Ross, Mr. Ulman
Students will not receive credit for both Economics 150 and course 150.
Designed to help beginning students understand labor-management issues through a study and interpretation of labor history, labor law, unionism, employer organization and policies, collective bargaining, wages, employment, social security, and problems of public policy.

151. Personnel Administration. (3) I and II.
Mr. Burgess, Mr. Malm, Mr. Rogers
Prerequisite: course 150 or Economics 150, or consent of the instructor.
Personnel policies and procedures, with special attention to the structure of personal relationships within the enterprise as it affects personnel management, and to the development and administration of the wage structure of a firm.

152. Collective Bargaining System. (3) I and II.
Prerequisite: course 150 or Economics 150. Mr. Galenson, Mr. Kennedy

153. Labor Law. (3) I and II.
Mr. Davisson
Prerequisite: course 150 or Economics 150.
A study of federal and state laws and court decisions affecting hours, wages, strikes, boycotts, picketing, union recognition and operation, legality of collective agreements, etc. A discussion of the National Labor Relations Act, Fair Labor Standards Act, and other legislation.

160. Marketing. (3) I and II.
Mr. Bucklin, Mr. Holton, Mr. Lupul, Mr. Nicosia, Mr. Panschar, Mr. Revzan, Mr. Preston
The evolution of markets and marketing; market structure, organization and behavior; marketing functions; pricing and price policy, marketing problems of producers of raw materials, agriculturists, manufacturers, wholesalers and retailers; marketing costs and efficiency; public and private regulations.

161. Foreign Marketing. (3) I and II.
Mr. Holton, Mr. Li
Prerequisite: course 160.
The marketing functions in foreign trade; organization and structure of
import and export markets; export selling; foreign market analysis; price policies and price quotations; shipping procedure; customs requirements; government control; settlement of commercial disputes.

162. Retail Store Management. (3) I and II.  Mr. Panschar
(Formerly numbered 162A–162B.)
Prerequisite: course 160.
A study of retailing including: history and development of major management types; the geographical structure of retail trade; assortments of goods and services in various stores; the internal structure and problems of store management for the important types; important trends; and forms of government regulation.

163. Advertising. (3) I and II.  Mr. Preston
Prerequisite: course 160.
The basic concepts of advertising dealing with the preparation and execution of copy for various types of media. Study of the English used in advertising, illustration, and other elements of copy. The evaluation of principal types of media. Study of underlying psychology in copy and the psychology of the consumer as developed through product and market research.

165. Sales Analysis and Sales Management. (3) I and II.
Prerequisite: course 160.  Mr. Balderston
Sales analysis and forecasting; organization of sales department; planning and policy determination; selection, training, compensating and supervising sales force; territorial analysis; cost analysis, business and economic appraisal of selling.

166. Wholesaling. (3) II.  Mr. Revzan
Prerequisite: course 160.
The meaning and importance of wholesaling; its place in the marketing structure; functions of wholesaling; the agency structure of wholesaling; internal managerial aspects; government regulations; trends and costs, profits, and efficiency.

169. Marketing Policies and Problems. (3) I and II.
Prerequisite: senior standing with marketing as field of emphasis, and with 6 units in the marketing field (beyond course 160) already completed, or taken concurrently. Not open to graduate students.
Integration of the marketing field at top management level through case studies of marketing programs of extractive, manufacturing, wholesale, and retailing organizations. Includes: product determination; market potential; location; channels; advertising and sales promotion; price; and integration of policies.

170. Transport Economics. (3) I and II.  Mr. Carter
The demand for transportation; cost behavior of the important transport technologies, including private transportation; rate structures; government regulation; duties and responsibilities of carriers; government subsidies and promotional policies; growth rates and profit rates. Several field trips to be arranged.

171. Ocean Transportation. (3) I.  Mr. Tyndall
Historical development of ships and shipping; ocean routes, ports, and terminals; rates, documents; legislation; current problems of American shipping.

173. Air Transportation. (3) I.  Mr. Kuhn
A survey of civil aviation: physical characteristics of aircraft, airports,
and airways; government aviation agencies; air-carrier operations, services, rates, costs and finances; airport management; legal problems arising from the use of the airspace; international air transport; evaluation of employment opportunities.

174. Traffic Management. (3) II. Mr. Kuhn
A technical survey of the purchase and sale of transportation; selection of routing; tariffs and their interpretation; rate structures and rate construction; rate claims and commission proceedings; analysis of bills of lading, loss and damage claims; plant and warehouse location.

175. Public Utilities. (3) I. Mr. Morrissey
The basis of control, administrative and judicial machinery employed, problems of service, price, competition, and monopoly.

176. Problems of Highway Transport. (3) I and II. Mr. Kuhn
The movement of goods and people on highways; the organization, rates, and practices of the for-hire branch of the industry; the general economic effects of highway transport developments; important problems in regulation, taxation, and public policy.

180. Introduction to Real Estate and Urban Land Economics. (3) I and II. Mr. W. Smith.
The nature of real property; the principles of urban land utilization; classification of property rights; urban development; real property valuation; the real estate market and its functions; the organization of the real estate business; government regulation of real estate practices.

181. Valuation of Real Property. (3) I. Mr. Wendt
Prerequisite: course 180.
The concepts, methods, and principles of land valuation; the factors influencing real estate values and income; trends in real property values and appraisal procedures in the urban real estate market.

182. Economics of the Building Industry. (3) I. Mr. Li
Prerequisite: course 180 or consent of the instructor.
Building as a problem in industrial organization; the variety, size, and instability of the market for buildings; the industry as presently constituted, contracting, subcontracting, financing; and problems of costs and efficiency.

183. Real Estate Financing. (3) II. Mr. Schaaf
Prerequisite: course 180.
The nature of real estate markets and their financing. Emphasis is on allocation of financial resources; market structure; problems of equity financing; mortgage lending; construction lending; institutional practices and authority; financing risks; and government activity in real estate financing.

185. Foreign Exchange. (3) I. Mr. Li
Prerequisite: Economics 135.
Comparison of foreign and domestic exchange operations and problems; import-export banking; structure and operation of the free and controlled exchange markets; exchange rate policies and problems; payments arrangements; monetary areas; gold markets; and similar institutions and arrangements.

190. Organization and Administration. (3) I and II. Mr. Feigenbaum, Mr. Feldman, Mr. Marschak
Organizational environment and other influences; choice and balancing of objectives. Formal organization structures; organization planning and con-

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trol. Informal organizations and their relationship to formal structures; groups, leaders, and behavior standards; communication. Theoretical considerations, and the relevance of various social sciences.

191. Management Problems and Policies. (3) I and II.
Mr. Balderston, Mr. Feigenbaum
Prerequisite: senior standing and courses 100, 140, 160.
Integration of the subject matter of the required courses in business administration through the study of the problems of top management organization, administrative techniques, and policy formulation. The case method supplements extensive reading. Written reports are required.

193. Introduction to Operations Research. (3) I and II.
Mr. Churchman, Mr. Ratoosh
Prerequisite: Mathematics 3A–3B, Statistics 130A–130B, or equivalent and junior standing.
Introduction to the history, practice, and nature of operations research; applications to business and industry; formulation of the problem; measuring costs; forecasting by probabilities. Models. Inventory, waiting line, and allocation models; sampling; recommendations; implementation and control; organization of operations research groups.

198A–198B. Directed Group Study. (1–3; 1–3) Yr.
The Staff (Mr. Votaw in charge)

199A–199B. Special Study for Advanced Undergraduates. (1–3; 1–3) Yr.
The Staff (Mr. Votaw in charge)
Designed for senior students with at least a B average.

First-Year Courses for Graduate Students

Designed for graduate students who did not have an undergraduate major in business administration. For information concerning the graduate curriculum in business administration, see the Announcement of the School of Business Administration.

100G. Quantitative Methods and Their Use in Business Operation. (6) I.
Mr. Parker, Mr. Vatter
The development of statistical data and its use in managing a business enterprise; the economic theory of the firm and the place and use of quantitative methods in applying theory to business operations; the relation between the individual firm and the economy as a whole.

101G. Analytical Techniques and Their Use in Business Operation. (4) I
and II.
Mr. Alhadeff, Mr. Maisel
An intensive development of the economic analysis necessary for decision-making in the firm. Topics covered are: decision theory; output, scale and price decision under conditions of certainty, uncertainty, and different market structures; forecasting; asset preferences; complementary relations through income effects.

103G. Statistical Analysis. (2) I and II.
Mr. Goldner
Prerequisite: two years of high school algebra or the equivalent.
A general introduction to statistical analysis, as used in managerial and other business problems. Covers frequency distributions and their analysis, sampling theory and problems of inference, linear correlation, index numbers, and analysis of time series.

118G. Legal Aspects of Business Administration. (3) I and II.
Mr. M. Smith, Mr. Votaw
Legal problems of organizing, operating, and terminating a business.
120G. Managerial Accounting. (3) I and II. Mr. Parker, Mr. Vatter
The measurement and recording of financial events; the reporting and
analysis of these events; the use of accounting data in the management of
an enterprise.

131G. Financial Policies of Business. (3) I and II. Mr. Longstreet, Mr. Morrissey
Prerequisite: course 100G or consent of the instructor.
A study of business finance, with emphasis upon financial problems and
policies of corporations; attention is given also to the role of commercial
banks and that of institutional and other investors in supplying funds for
corporations.

140G. Production Organization and Management. (3) I and II. Mr. Malm, Mr. Parker, Mr. Vatter
Prerequisite: course 100G or consent of the instructor.
A study of the principles of organization and production manage­­­ment. Emphasis is placed on the theory of business organization and the
principles of planning, directing, and controlling product development,
plant layout and location, equipment selection, inventory, and production
standards.

150G. Industrial and Personnel Relations. (3) I and II. Mr. Kennedy, Mr. Garbarino
Prerequisite: course 100G or consent of the instructor.
Objectives and problems of management and labor in the modern indus­­­trial enterprise. Historical development of American industrial relations,
unionism, collective bargaining, and industrial conflict. Elements of per­­sonnel administration.

160G. Marketing Organization and Policies. (3) I and II. Mr. Panschar
Prerequisite: course 100G or consent of the instructor.
The evaluation of marketing, markets, and theory of marketing; mar­­ket structure, organization, and behavior; marketing functions; pricing
and price policies; marketing problems of extractive industry producers,
manufacturers, wholesalers, retailers; trends; marketing costs and efficiency;
public and private regulations.

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

222A. Seminar in Controllership. (3) I. Mr. Mattessich
Prerequisite: courses 121A–121B, 122.
A critical review of cost accounting practice from the viewpoint of the
theory and objectives of cost analysis. Attention is given to the relations
between cost accounting, statistics, economic theory and management
philosophy.

222B. Seminar in Controllership. (3) II. Mr. Doyle
Prerequisite: courses 121A–121B, 122.
An intensive study of the nature and scope of controllership, as related
to organization, policy, strategy and evaluation. Cases and literature deal
with various aspects of financial controls and reports which serve to imple­­ment managerial objectives.

223A. Public Accounting Practice and Problems. (3) II. Mr. Vance
Prerequisite: courses 121A–121B, 122.
Historical background of the public accounting profession; development
and current status of auditing standards; prominent recent and current pro­­fessional problems; application of statistical sampling theory to auditing
procedure.
223B. Public Accounting Practice and Problems. (3) I.
Prerequisite: course 123. Mr. Kettler, Mr. Vance
Accounting methods used by governmental and nonprofit institutions and concerns in particular lines such as banks, stock and grain brokers, insurance companies, and regulated public utilities.

228A. Income Taxation. (3) I and II. Mr. Cerf
Prerequisite: course 1A-1B, or the equivalent.
Income determination; sources of law; rates and returns; personal, corporation, estate and gift taxes; tax planning.

228B. Income Taxation. (3) I and II. Mr. M. Smith
Prerequisite: courses 121A-121B, 228A.
More intensive professional study of tax accounting practice, including gross income, deductions, depreciation, capital gains and losses, estates and trusts, corporate problems, and administrative procedure.

229A-229B. Seminar in Accounting Theory. (3-3) Yr.
Prerequisite: course 121A-121B. Mr. Anton, Mr. Staubus, Mr. Vance
229A. A survey of accounting literature, with emphasis upon development of accounting theory. Includes early history, formal statements of principles, special depreciation problems, relation of economics and accounting, and the effect of price-level changes upon financial statements.
229B. Intensive study of current issues in accounting theory, e.g., asset valuation and income determination, with emphasis upon controversial issues, special problems of regulated industries, consolidated financial statements.

230. Seminar in Financial Intermediaries. (3) I and II. Mr. Alhadeff
Prerequisite: Economics 135.
Structure and operations of commercial banks and other financial intermediaries. Impact of money and capital market developments and of monetary authorities upon interest rates and financial institutions.

232. Money Markets and Capital Markets. (3) I and II. Mr. Schwartz
Prerequisite: course 131 and Economics 135.
The organization and functions of, and the important influences upon, money and capital markets in the United States. Primarily concerned with private institutions operating in these markets. The influence of government financing operations and regulations is also considered.

233A. Securities Markets and Investment Policies. (3) I and II.
Prerequisite: course 133 or consent of the instructor. Mr. Wendt

233B. Security Analysis and Selected Investment Problems. (3) II.
Prerequisite: 233A or consent of the instructor. Mr. Wendt
Consideration of selected investment problems. Cases and readings in analysis of railroad, public utility, municipal, industrial, bank, insurance, and investment companies' securities.

234. Problems in Business Finance. (3) I and II. Mr. Morrissey
Application of principles of finance to the financial management of corporate enterprises, with special emphasis upon the financing of expansion. Program includes reading assignments on principles and methods of finance, and individual student reports on financial problems of particular corporations.
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239. Seminar in Insurance. (3) I and II. Mr. Cowee, Mr. Ehrenzweig

241. Facilities Planning and Production Control. (3) I.
Prerequisite: course 140 or 140G, and graduate standing.
Nature of production planning and control; factory planning and its relationship to production planning. Functions of production-control organizations; types of manufacturing and associated control systems. Layout, equipment selection, and building construction decisions. Trends in production control and factory planning.

242. Analysis of Production Management Problems. (3) II. Mr. Rogers
Prerequisite: graduate standing.
Decision-making in production planning; types of decisions and variables involved; possibilities for quantification of variables; criteria for decision; methods of analysis. Emphasis is placed on applications of modern analytical methods in the solution of practical production problems.

248. Seminar in Production Management. (3) II. Mr. Malm
Open to graduate students in business administration, economics, and engineering.
Analysis of selected topics in production management, especially those involving recent developments and important trends.

255. Seminar in Industrial Relations. (3) I and II. Mr. Garbarino
Prerequisite: two industrial relations courses and consent of the instructor.
Theoretical background for advanced study of collective bargaining and personnel administration. Wage determination; structure and operation of labor markets; origin and direction of labor movements; theory of industrial peace and conflict.

256. Seminar in Collective Bargaining. (3) II. Mr. Garbarino
Prerequisite: course 152 or the equivalent. Open to a limited number of senior students with consent of the instructor.
Studies of the bargaining process; the legal and factual basis of collective bargaining; the provisions of collective agreements; administration of agreements, including negotiation and arbitration of grievances; processes of disputes settlement; influence of the larger environment, particularly mobilization and war.

257. Managerial Policies and the Labor Factor. (3) I and II.
Mr. Burgess, Mr. Malm
Sources and objectives of managerial policies. Analysis of specific problems in terms of general situations. Selection of tools of personnel administration, procedures and special policies which are most appropriate and effective. Unconscious changes in or departures from broad policy.

259. Wage Policies and Wage Behavior. (3) I and II.
Mr. Kerr, Mr. Galenson, Mr. Ulman

260. Advanced Marketing. (3) I and II. Mr. Revzan
Prerequisite: course 160 and graduate standing. Intended primarily for graduate students in business administration who are candidates for the professional M.B.A. degree but are not qualified for course 269A-269B.
Readings, case, problem, and special report work.

261. Seminar on Foreign Marketing. (3) II. Mr. Li
Prerequisite: courses 161 and 185, or consent of the instructor.
Study of managerial and operational problems in foreign trade, including
(1) the development of international trade theory and discussion of national commercial policies from the standpoint of a firm, and (2) case studies of foreign business operations and researches on topics of current interests.

262. Retailing Policies and Problems. (3) I. Mr. Duncan
Prerequisite: courses 160 (or 160G), 162, 260, or their equivalent. Course 260 may be taken concurrently.
Case studies of executive determination of: organizational structure; nature and scope of policies; merchandising policies; advertising and sales promotion; personnel management; operating policies; accounting and control policies; and general management problems. Study of the nature of competition at the retail level.

264. Advertising Policies and Problems. (3) II.
Prerequisite: course 160 (or 160G); 163; 260, or their equivalent. Course 260 may be taken concurrently.
Case studies of executive determination of: basic strategy; promotional programs; advertising administration; selection of media; determination of appropriations; physical and psychological aspects; determination of effectiveness; coordination aspects. Special problems of government regulation, ethics, and economic justification.

266. Marketing Organization. (3) I and II. Mr. Revzan
Meanings and evolutionary aspects of market organization; marketing organization at the wholesale and retail levels and of the marketing channel; spatial aspects; general marketing strategy at each level and throughout the channel; specialization and integration in marketing organization; problems of "orderly" marketing.

268. Marketing Investigation. (3) II.
Prerequisite: courses 160, 260, 290, Economics 2, and Psychology 180.
Nature and significance of marketing research; development of marketing research methods; investigation and analysis of specific marketing research projects including class research problems involving punch-card analysis; presentation of marketing research results; and evaluation of the effectiveness of marketing research.

269A–269B. Seminar in Marketing. (3–3) Yr. Mr. Grether
269A. Critical review of the literature of marketing, including background and historical materials, market organization (the marketing channel, agency structure and vertical integration), marketing functions.
269B. Prices and price policies, area structure, costs and efficiency, commodity marketing, and public and private regulation.

270. Transportation Management and Government Regulations. (3) I. Mr. Carter
Management attitudes toward restrictive and promotional legislation. Restriction and promotion contrasted: entry and price control; forms of subsidies. A critical analysis of transportation demand and cost behavior. Interpretation of statistical evidence; comparison with management and commission positions. Aspects of national policy.

279. Seminar in Transportation. (3) II. Mr. Carter
Analyses in selected topics of importance in the transportation field.

280. Real Estate and Urban Land Economics. (3) I. Mr. Schaaf
Intensive review of literature in theory of land utilization and urban growth; property rights and valuation; commercial, residential, and industrial real estate markets; government housing policy; and public controls over land use.
289. Seminar in Real Estate and Urban Land Economics. (3) II.
   Mr. Wendt
   Analysis of selected problems and special studies; cases in residential,
   commercial, and industrial real estate financing, investment, and develop-
   ment, urban redevelopment, real estate taxation, housing, market analysis,
   mortgage market developments, valuation, and zoning.

290. Seminar in Organization and Administration. (3) I and II.
   Mr. Balderston, Mr. Feldman, Mr. Wheeler
   Prerequisite: graduate standing.
   An intensive inquiry into the techniques of business administration, such
   as the determination of business objectives, policy formulation, planning,
   executive staffing, organization, direction, and management controls. Special
   emphasis is placed upon the theory of organization, business leadership,
   and decision-making.

291. Seminar in Business Policy. (3) I and II.
   Mr. Jastram
   A study of business problems and the formulation of policies to meet
   these problems from the viewpoint of a top-management executive commi-
   ttee. The objective is to develop skill in the formulation of policy in particular
   functions and for enterprises as a whole.

   Critical study of the historical development and current content of a
   scientific approach to management. Examination and critical appraisal of
   both early and recent literature dealing with various concepts and prin-
   ciples of administration.

293. Seminar in Operations Research. (3) II.
   Mr. Whitin
   Prerequisite: course 193.
   An advanced seminar. Discussion of the problems of mathematical models,
   measurement, organization of research, and implementation. This seminar
   relates research and top-level organizational decision-making. The student will
   report on a topic of major interest selected by him.

294. Measurement of Decision Criteria. (3) I.
   Mr. Churchman
   This seminar is essentially a study of models for measuring the values of
   objectives, and a critical discussion of the problems involved.

295. Inventory and Waiting Line Theory. (3) II.
   Prerequisite: consent of the instructor.
   Application of mathematical models of inventory and waiting lines to busi-
   ness problems: in production, in financial control, in planning facilities, in
   maintenance, in marketing. Emphasis is placed on practical problems occur-
   ring in business.

298. Business Research Methods. (3) I. and II.
   Mr. Balderston, Mr. Churchman, Mr. Feigenbaum,
   Mr. Jastram, Mr. Ratoosh
   Meaning of research and scientific method. Forms of scientific method
   applicable to business research. Types of business research problems, and
   available types of materials. Actual research procedure, and application by
   student to his Business Administration 299 research project.

299. Research in Business Problems. (1–6) I and II.
   The Staff (Mr. Wheeler in charge)
   Primarily for candidates for the degree of Master of Business Adminis-
   tration.
**CHEMICAL ENGINEERING**

(=Department Office, 211 Gilman Hall=)

LeRoy A. Bromley, Ph.D., Professor of Chemical Engineering.
Donald N. Hanson, Ph.D., Professor of Chemical Engineering.
Charles W. Tobias, Ph.D., Professor of Chemical Engineering.
Theodore Vermeulen, Ph.D., Professor of Chemical Engineering.
Charles R. Wilke, Ph.D., Professor of Chemical Engineering (Chairman of the Department).
Andreas Acrivos, Ph.D., Associate Professor of Chemical Engineering.
Eugene E. Petersen, Ph.D., Associate Professor of Chemical Engineering.
Donald R. Olander, Sc.D., Assistant Professor of Chemical Engineering.
John M. Prausnitz, Ph.D., Assistant Professor of Chemical Engineering.

E. Morse Blue, M.S., Lecturer in Chemical Engineering.
Edward A. Grens, B.S., Lecturer in Chemical Engineering.
David N. Lyon, Ph.D., Lecturer in Chemical Engineering.
Charles F. Oldershaw, M.S., Lecturer in Chemical Engineering.

**Degree Requirements.**—For curriculum for the Bachelor of Science degree in chemical engineering, see under College of Chemistry, CIRCULAR OF INFORMATION.

**Higher Degrees.**—See the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION.

**Upper Division Courses**

143. Introduction to Chemical Engineering. (3) I and II.

Mr. Hanson, Mr. Grens

Prerequisite: Chemistry 109 or 110A or Mechanical Engineering 105A (may be taken concurrently).

Principles of material and energy balances and their use in chemical industry. Introduction to thermodynamic concepts and their application to chemical engineering problems.

144. Chemical Engineering Thermodynamics. (3) I and II.

Mr. Bromley, Mr. Acrivos

Prerequisite: course 143 (with a grade of C or higher); Chemistry 110B (may be taken concurrently); or Mechanical Engineering 103 and 105A.

Thermal and volumetric properties of liquids and gases; interrelations of thermodynamic functions; power and refrigeration cycles; solutions and phase equilibria of multicomponent systems; critical phenomena; reaction energetics and equilibria.

145A. Unit Operations Laboratory. (1) I and II.

Mr. Prausnitz, Mr. Hanson, Mr. Tobias, Mr. Grens

Prerequisite: course 146A, 146B (may be taken concurrently) and Mechanical Engineering 107 (may be taken concurrently).

Material and energy measurements and performance analysis on separation equipment of representative industrial types.

145B. Unit Operations Laboratory. (1) I and II.

Mr. Prausnitz, Mr. Hanson

Prerequisite: course 146B; 145A (may be taken concurrently); and Mechanical Engineering 107.

Continuation of course 145A.
145C. Unit Operations Laboratory. (1-2) I and II.
(Formerly numbered 145B.)
Mr. Prausnitz, Mr. Hanson
Prerequisite: course 145B (may be taken concurrently). An elective course for second-semester seniors and graduate students in chemical engineering.
Additional experiments in unit operations.

146A. Chemical Engineering Unit Operations. (4) I and II.
Mr. Grens, Mr. Acrivos, Mr. Tobias, Mr. Petersen
Prerequisite: Chemistry 110B (may be taken concurrently); course 143 (with a grade of C or higher), or consent of the instructor.

146B. Chemical Engineering Unit Operations. (4) I and II.
Mr. Hanson, Mr. Olander, Mr. Vermeulen
Prerequisite: Chemistry 110B, courses 143 and 146A or the equivalent. Open to seniors in the College of Engineering concurrently enrolled in course 144 or Mechanical Engineering 154, or with honor standing.
Separation operations: distillation, absorption, humidification, extraction, crystallization, adsorption, and drying.

147. Chemical Kinetics of Industrial Processes. (2) I and II.
Mr. Petersen, Mr. Vermeulen
Prerequisite: Chemistry 110B; 112 or 112C; course 143; course 144 or Chemistry 114H (may be taken concurrently).
Interpretation and prediction of reaction rates under flow conditions in tubular and stirred systems, with and without catalysis. Applications to economic reactor design for typical processes, especially in the organic-chemical industry.

148. Industrial Kinetics Laboratory. (2) I and II.
Mr. Petersen, Mr. Vermeulen, Mr. Olander
Prerequisite: course 147 (with a grade of C or better), 146A; or consent of the instructor.
Bench-scale determination of reaction rates and other process variables in industrially important flow and nonflow systems. Design of experiments for scale-up of reaction equipment.

149–149H. Design of Chemical Process Plants. (2–3) I and II.
Mr. Oldershaw, Mr. Blue, Mr. Prausnitz
Prerequisite: courses 144 and 146A, 146B.
Class discussion of sources of data and of design principles, with individual and team study of selected plant design and process evaluation problems. Students with honor standing will be permitted to enroll for 3 units and will complete a comprehensive design project.

152. Principles of Inorganic and Electrochemical Processes. (3) I and II.
Mr. Tobias, Mr. Bromley, Mr. Lyon
Prerequisite: courses 143 and 144 with a grade of C or better.
Discussion of typical processes of the inorganic chemical industry, with emphasis on equilibrium considerations. Introduction to electrode processes and their applications in inorganic and metallurgical industries.

180H. Research in Chemical Engineering. (2–6) I and II.
The Staff (Mr. Connick in charge)
Prerequisite: course 146B. The consent of the instructor must be obtained.
Students with honor standing may prosecute original research under the direction of one of the members of the instructing staff.
199. Special Study for Advanced Undergraduates. (1-3) I and II.
   The Staff (Mr. Bromley in charge)

   Any properly qualified student who wishes to pursue a problem of his own
   choice, through reading or nonlaboratory study, may do so if his proposed
   project is acceptable to the member of the staff with whom he works.

   **GRADUATE COURSES**

   Chemical Engineering 146B or its equivalent is prerequisite to all courses in
   this group.

243. Theoretical Methods in Chemical Engineering. (3) I. Mr. Acrivos
   Prerequisite: course 146B or consent of the instructor.
   Treatment of certain fundamental operations primarily in the fields of
   heat and mass transfer, fluid mechanics, and reaction kinetics. Particular
   emphasis on the mathematical formulation and rigorous solution of chemical
   engineering problems.

244. Multistage Operations. (3) II. Mr. Hanson
   General theory and application of multistage separation processes. Particular
   consideration to design methods for binary and multicomponent distillation.

245. Diffusional Operations. (3) I. Mr. Wilke
   Modes of mass transfer, diffusion in gases and liquids, material transfer
   in static and flow systems, momentum-mass transfer analogies, prediction
   of mass transfer coefficients for packed column separations, plate effi-
   ciency, diffusion and chemical reaction, equipment-design methods.

246. Phase Equilibria. (2) II. Mr. Prausnitz
   Prerequisite: Chemical Engineering 146B or equivalent.
   Thermodynamics of multicomponent systems. Application to separation
   operations such as extraction, high-pressure absorption, and azeotropic
   distillation.

247. Chemical Reactor Design. (2) III. Mr. Petersen
   Prerequisite: courses 146A, 146B, 147, and 243 or Mathematics 122A, or
   consent of the instructor.
   The application of the principles of reaction kinetics, heat and mass
   transfer to the design of chemical reactors. Particular emphasis on hetero-
   geneous reactions in fixed and fluidized beds.

249. Special Study for Graduate Students in Chemical Engineering. (2-4)
   I and II. The Staff (Mr. Hanson in charge)
   Properly qualified graduate students who wish to pursue independent
   study may work on the development of new calculation methods for a
   single unit operation or the application of existing design data to a single
   process.

250. Research in Chemical Engineering. (1-6) I and II.
   The Staff (Mr. Wilke in charge)
   Research facilities will be provided for graduate study in the unit physi-
   cal operations and the unit chemical processes.

252. Principles of Electrochemical Engineering. (2) I. Mr. Tobias
   Prerequisite: courses 144, 146B, Chemistry 104 or course 152.
   Application of the principles of current distribution, electrode kinetics,
   and unit operations to the design of electrochemical processes.
255. Nuclear Chemical Engineering. (2) II.
Mr. Olander
Prerequisite: open to undergraduates with consent of the instructor.
Brief review of nuclear chemistry: decay chains and neutron reactions; fuel cycles in nuclear reactors and neutron balances; chemical processing techniques, including solvent extraction and pyrometallurgical methods; isotope and other special separations.

256. Cryogenic Engineering. (2) I.
Mr. Lyon
Prerequisite: course 144, 146A and 146B or equivalent.
Gas liquefaction and magnetic cooling cycles. General thermodynamics of reversible systems with variables other than temperature, pressure, and composition. Transport properties of substances at low temperatures. Applications of cryogenic techniques to chemical engineering problems.

*257A. Seminar in Petroleum Processing. (2 or 3) I.
Mr. Wilke
(Formerly Petroleum Engineering 209A.)
Prerequisite: course 146B or consent of the instructor.

*257B. Seminar in Petroleum Processing. (2 or 3) II.
Mr. Wilke
(Formerly Petroleum Engineering 209B.)
Prerequisite: course 257A or consent of the instructor.
Evaluation of crude oils, raw stocks, and finished products. Study of factors which determine plan of processing in a petroleum refinery.

260. Seminar in Chemical Engineering. (2–4) I and II.
The Staff (Mr. Wilke in charge)
Open to properly qualified graduate students.
Reports, discussions, and group design studies in advanced fields of chemical engineering. Topics offered previously include: applications of thermodynamics; technology of high temperature; isotope-separation processes; mathematics in chemical engineering; transport properties of fluids; selected topics in chemical engineering unit operations.

Related Courses in Other Departments
Mechanical Engineering *163. Flow Problems of the Process Industries. (3)
Mechanical Engineering 266. Heat Convection. (3)
Process Engineering *100. Project Engineering of Process Plants. (3)

Chemistry

Leo Brewer, Ph.D., Professor of Chemistry.
Melvin Calvin, Ph.D., Sc.D., Professor of Chemistry.
James Cason, Jr., Ph.D., Professor of Chemistry.
Robert E. Connick, Ph.D., Professor of Chemistry.
Burris B. Cunningham, Ph.D., Professor of Chemistry.
William G. Dauben, Ph.D., Professor of Chemistry.
William F. Giauque, Ph.D., Sc.D., Professor of Chemistry.
William D. Gwinn, Ph.D., Professor of Chemistry.
Harold S. Johnston, Ph.D., Professor of Chemistry.
George Jura, Ph.D., Professor of Chemistry.

Donald S. Noyce, Ph.D., Professor of Chemistry.
Chester T. O’Konski, Ph.D., Professor of Chemistry.
Edwin Orlemann, Ph.D., Professor of Chemistry.
Isadore Perlman, Ph.D., Professor of Chemistry and Associate Director of the Lawrence Radiation Laboratory.
*George C. Pimentel, Ph.D., Professor of Chemistry.
Kenneth S. Pitzer, Ph.D., Professor of Chemistry.
Richard E. Powell, Ph.D., Professor of Chemistry (Chairman of the Department).

Henry Rapoport, Ph.D., Professor of Chemistry.
Glenn T. Seaborg, Ph.D., Sc.D., LL.D., Professor of Chemistry.
Kenneth Street, Jr., Ph.D., Professor of Chemistry.
†David H. Templeton, Ph.D., Professor of Chemistry.
Joel H. Hildebrand, Ph.D., Sc.D., LL.D., Professor of Chemistry, Emeritus.
Charles W. Porter, Ph.D., Professor of Chemistry, Emeritus.
Frederick R. Jensen, Ph.D., Associate Professor of Chemistry.
William L. Jolly, Ph.D., Associate Professor of Chemistry.
Rollie J. Myers, Ph.D., Associate Professor of Chemistry.
Norman E. Phillips, Ph.D., Associate Professor of Chemistry.
John O. Rasmussen, Ph.D., Associate Professor of Chemistry.
Andrew Streitwieser, Jr., Ph.D., Associate Professor of Chemistry.
Ignacio Tinoco, Jr., Ph.D., Associate Professor of Chemistry.
William C. Agosta, Ph.D., Assistant Professor of Chemistry.
Jon B. Applequist, Ph.D., Assistant Professor of Chemistry.
Philip E. Eaton, Ph.D., Assistant Professor of Chemistry.
John P. Fackler, Jr., Ph.D., Assistant Professor of Chemistry.
Dudley R. Herschbach, Ph.D., Assistant Professor of Chemistry.
John A. Howe, Ph.D., Assistant Professor of Chemistry.
Bruce H. Mahan, Ph.D., Assistant Professor of Chemistry.
Samuel S. Markowitz, Ph.D., Assistant Professor of Chemistry.
Charles H. Sederholm, Ph.D., Assistant Professor of Chemistry.
David A. Shirley, Ph.D., Assistant Professor of Chemistry.

John A. Barltrop, Ph.D., Visiting Professor of Chemistry.
Charles W. Koch, Ph.D., Lecturer in Analytical Chemistry.
Edward J. Prosen, M.A., Lecturer in Chemistry.

Letters and Science List.—All undergraduate courses in chemistry are included in the Letters and Science List except Chemistry 125 and 125L. For regulations governing this list, see page 11.

Entrance with Advanced Standing.—All undergraduate students entering the University with advanced standing who desire to take courses in chemistry more advanced than course 1B, must present themselves on or before the date of their registration to Mr. Noyce, 110 Gilman Hall, who will determine from their credentials or by an informal examination which courses they may undertake.

Choice of College.—A student may pursue the study of chemistry by enrolling either in the College of Chemistry (see the CIRCULAR OF INFORMATION) or in the College of Letters and Science with a major in chemistry. In order to decide between the two alternatives, the student may note that the College of Letters and Science has certain general requirements (see the CIRCULAR OF INFORMATION) outside the major, while the curriculum of the College of Chemistry has somewhat different requirements (see page 86 of the CIRCULAR OF

* In residence spring semester only, 1960-1961.
Information) and allows the election of professional courses in the upper division.

The Major in the College of Chemistry.—For the requirements of the Major in the College of Chemistry, see page 87 of the Circular of Information.

Letters and Science Major Advisers: Mr. Giauque and Mr. Phillips.

The Major in the College of Letters and Science.—The major consists of preparation in mathematics and physics, the basic lower division courses in chemistry, and from 24 to 30 units of upper division courses in chemistry and allied subjects, taken in accordance with a plan approved by the departmental adviser. The major must include the following: Chemistry 1A, 1B, 5 (or 4A, 4B in place of the preceding three), 12, 112, 110A, 110B, and one of courses 105, 106, 111 and 120; Mathematics 3A, 3B, 4A; and Physics 4A, 4B, 4C. If one year of quantitative analysis has been completed elsewhere, Chemistry 104 may be substituted for course 105. A reading knowledge of German is recommended. Students wishing to prepare for graduate work in chemistry or who wish to be certified to the American Chemical Society as having taken an accredited program in chemistry, will need Mathematics 4B, additional courses in chemistry, and a reading knowledge of German.

All units in chemistry in excess of 13 are counted as upper division units.

High school students should note that the preparation for the major is simplified if their high school programs include chemistry, physics, four years of mathematics, and two years of German.

Honors Program in the College of Letters and Science.—Honor students (see the Circular of Information) may with the consent of their adviser enter the honors program, usually in the senior year. Honor students are given a larger share of personal instruction and a greater opportunity to choose courses, and work within courses, in the manner best suited to individual needs and aims. Students will not ordinarily be recommended for honors in chemistry at graduation unless their work includes Chemistry 114H and other advanced courses approved by the Committee on Honors. These students will include in their programs undergraduate research, Chemistry 180H, and will submit to their research director a thesis based on this work.

Higher Degree.—See the Announcement of the Graduate Division, Northern Section.

Lower Division Courses

1A. General Chemistry. (5) I and II.
   Mr. Applequist, Mr. Brewer, Mr. Gwinn, Mr. Herschbach, Mr. Howe, Mr. Johnston, Mr. Jura, Mr. Markowitz, Mr. Phillips, Mr. Pitzer, Mr. Powell, Mr. Rasmussen, Mr. Sederholm, Mr. Shirley, Mr. Street, Mr. Tinoco, Mr. Fackler
   Lectures (I: Mr. Powell, Mr. Sederholm; II: Mr. Rasmussen).
   Prerequisite: high school chemistry or high grades in high school physics and mathematics. Admission will be determined by the student's high school grade, and by proficiency in arithmetic and first-year algebra, which will be tested by the examination in elementary mathematics given during the week of enrollment.

1B. General Chemistry, Qualitative Analysis. (5) I and II.
   Mr. Applequist, Mr. Brewer, Mr. Gwinn, Mr. Herschbach, Mr. Howe, Mr. Johnston, Mr. Jura, Mr. Markowitz, Mr. Phillips, Mr. Pitzer, Mr. Powell, Mr. Rasmussen, Mr. Sederholm, Mr. Shirley, Mr. Street, Mr. Tinoco
   Lectures (I: Mr. Markowitz; II: Mr. Rasmussen).
   Prerequisite: course 1A.

4A–4B. General Chemistry. (5-5) Yr.
   Mr. Mahan
   Prerequisite: high school chemistry, Mathematics 3A, which may be taken concurrently, and superior performance on an examination to be given during the week of enrollment.
Lectures and laboratory for students of superior facility and preparation in chemistry. Covers fundamental principles of chemistry with emphasis in the laboratory on quantitative work, and is equivalent to course 5 as a prerequisite for further courses in chemistry.

5. Quantitative Analysis. (3) I and II.
   Mr. Cunningham, Mr. Koch, Mr. Orlemann, Mr. Jolly
   Lectures and laboratory. Prerequisite: course 1B with a grade of C or higher.
   In the fall semester a special section (lecture section 1) will be organized for chemistry majors.

8. A Short Survey of Organic Chemistry. (3) I and II.
   Mr. Barltrop, Mr. Agosta, 
   Three lectures and one discussion section per week.
   Prerequisite: course 1A. Primarily for students not majoring in chemistry.

9. Organic Chemistry—Laboratory. (3) I and II.
   Lectures and laboratory. Prerequisite: course 1B with a grade of C or higher and course 8 (may be taken concurrently).

12. Organic Chemistry. (5) I and II.
   Mr. Jensen, Mr. Noyce, Mr. Rapoport, Mr. Streitwieser, Mr. Agosta
   Lectures (I: Mr. Jensen; II: Mr. Streitwieser).
   Lectures and laboratory work designed for students whose major is chemistry. Prerequisite: course 1B with a grade of C or higher. Students with previous credit in course 8 may receive only 2 units of credit for course 12.
   Introduction to the general theory of organic chemistry and the chemistry of aliphatic compounds.

**Upper Division Courses**

104. Inorganic Chemistry. (3) I.
   Prerequisite: course 5.
   Mr. Brewer
   The interpretation and correlation of inorganic reactions.

105. Advanced Quantitative Analysis. (3) I and II.
   Mr. Orlemann, Mr. Cunningham
   Lectures and laboratory. Prerequisite: course 5.

106. Synthetic Inorganic Chemistry. (3) II.
   Mr. Jolly
   Lecture and laboratory. Prerequisite: course 5.

109. Physical Chemistry—Brief Course. (3) I.
   Mr. Prosen
   Prerequisite: course 5 and one year of college physics. Primarily for non-chemistry majors.
   Selected topics in physical chemistry.

110A–110B. Physical Chemistry. (3–3) Yr. Beginning each semester.
   Mr. Jura, Mr. Phillips, Mr. Johnston,
   Mr. Templeton, Mr. Street, Mr. Myers
   Lectures 110A. (I: Mr. Templeton; II: Mr. Myers).
   Lectures 110B. (I: Mr. Johnston, Mr. Myers; II: Mr. Jura, Mr. Street,
   Mr. Templeton).
   Prerequisite: Mathematics 4A, Physics 4B, and course 5 or junior standing in a curriculum in physical science or engineering.
   The general principles of physical chemistry and elementary thermodynamics.
111. Physical Chemistry—Laboratory. (3) I and II.  
Mr. Tinoco, Mr. Jura, Mr. O'Konski  
Prerequisite: courses 5 and 110A (with a grade of C or higher), and 110B (which may be taken concurrently), or 109 with consent of the instructor; also calculus.

112. Organic Chemistry. (5) I and II.  
Mr. Rapoport, Mr. Jensen  
Prerequisite: course 12 or 8 and 9.  
Introduction to the chemistry of aromatic and heterocyclic compounds. Simple enolate condensations.

112C. Organic Chemistry. (3) I and II.  
Mr. Rapoport, Mr. Jensen  
Prerequisite: open only to students who receive grade C or higher in course 12, taken at this University. Equivalent to the lecture part of 112. Primarily for students in the chemical engineering curriculum of the College of Chemistry, but open to students from other colleges with consent of the instructor.

114H. Physical Chemistry—Thermodynamics. (3) I and II.  
Mr. Giauque, Mr. Pitzer, Mr. Brewer  
Prerequisite: courses 5, 110A–110B; Physics 4C or the equivalent; familiarity with differential and integral calculus; and honors standing.

115. Microchemistry. (3) II.  
Mr. Koch  
Prerequisite: beginning courses in quantitative analysis, organic chemistry and physical chemistry.  
Principles of chemical experimentation on the milligram and microgram scale. Students may select laboratory exercises to emphasize either bio-organic or inorganic chemistry.

*118. Chemistry of Surfaces and Colloids. (2) II.  
Mr. Jura  
Before enrolling, the student must satisfy the instructor that he has sufficient preparation in chemistry and physics to be able to read the literature in this field intelligently.

120. Advanced Inorganic Chemistry. (3) I and II.  
Mr. Connick  
Lecture and laboratory. Prerequisite: courses 5, 104 or 105, and 109 or 110B.

*122. Heterogeneous Equilibria. (2) I.  
Mr. Brewer  
Prerequisite: course 109 or 110B.  
Application of modern solution theory to the quantitative prediction of binary and ternary phase diagrams.

123. Nuclear Chemistry. (2) I.  
Mr. Perlman  
Prerequisite: senior standing.

125. Chemical Instrumentation. (1) II.  
Mr. O'Konski  
Prerequisite: course 111.  
A lecture course dealing with the principles of instrumentation as applied to chemistry. Special attention will be given to electronic instrumentation.

*125L. Chemical Instrumentation Laboratory. (1–3) II.  
Mr. O'Konski  
Prerequisite: course 111 and consent of the instructor. Course 125 must be taken concurrently.  
Laboratory work to accompany course 125. Continuation of course 111, with special emphasis on the application of instruments to chemical problems. Laboratory work to include basic electronic systems and optical and spectrographic equipment.

127. **Advanced Organic Chemistry. (3) I.**
Mr. Streitwieser
Prerequisite: courses 112, 109 or 110A; and a reading knowledge of German.
Applications of electron structures and resonance to the chemical and physical properties of organic compounds, kinetics and mechanism of organic reactions.

128. **Organic Chemistry—Analytical Methods. (3) I and II.**
Mr. Noyce, Mr. Dauben
Lecture and laboratory. Prerequisite: courses 5 and 112.

129. **Organic Chemistry—Synthetic Methods. (3) I and II.**
Mr. Cason, Mr. Rapoport
Lecture and laboratory. Prerequisite: a reading knowledge of German; course 128 and consent of the instructor.

180H. **Research. (2-15) I and II.**
The Staff (Mr. Connick in charge)
Prerequisite: course 110B, honors standing, and consent of the instructor.
Students who have completed with high credit a satisfactory number of advanced courses may prosecute original research under the direction of one of the members of the instructing staff.

185. **Chemical Preparations. (2-5) I and II.**
The Staff (Mr. Connick in charge)
Prerequisite: course 111, and one of the following courses: 105, 106, 120, 129; consent of the adviser and consent of the instructor.
Special laboratory work for advanced undergraduates.

199. **Special Study for Advanced Undergraduates (1-3) I and II.**
The Staff (Mr. Connick in charge)
Any properly qualified student who wishes to pursue a problem of his own choice, through reading or nonlaboratory study, may do so if his proposed project is acceptable to the member of the staff with whom he works.

**Graduate Courses**

(Concerning conditions for admission to graduate courses, see page 18)

206. **Organic Chemistry. (3) II.**
Mr. Cason
Emphasis is placed on typing of reactions according to mechanism, and the application to synthetic studies of current knowledge of reaction mechanism, molecular structure, and steric factors. Particular attention is given to displacement reactions, enolate condensations, and the Grignard reaction.

207B. **Organic Chemistry. (3) I.**
Mr. Rapoport
Prerequisite: course 206.
The chemistry of heterocyclic compounds, with emphasis on those of natural origin.

207C. **Organic Chemistry. (3) I.**
Mr. Dauben
Prerequisite: course 206.
The chemistry of polycyclic compounds of biological interest, with emphasis on sterols and related compounds.

208. **Organic Chemistry. (3) II.**
Mr. Noyce
Prerequisite: course 206 (students with previous credit in Chemistry 207D may receive only 1 unit of credit for Chemistry 208).
Kinetics and mechanism of organic reactions; mechanism of rearrangements.

* Not to be given, 1960-1961.
216. Physical Chemistry—Advanced. (3) II. Mr. Giauque
   Prerequisite: courses 111 and 114H. Open to senior honor students with
   consent of the instructor.
   Selected topics. Use of variables other than pressure, temperature, and
   composition. Third Law of Thermodynamics. Evaluation of thermodynamic
   quantities from spectroscopic and other molecular data. Interionic attrac-
   tion theory of electrolytic solutions.

217. Quantum Theory. (3) II. Mr. Pitzer
   Recommended preparation: differential equations or advanced calculus,
   atomic physics and thermodynamics. Open to senior honor students with
   consent of the instructor.

223. Advanced Nuclear Chemistry. (2) II. Mr. Perlman
   Prerequisite: course 123. Primarily for chemistry students.
   Advanced survey of nuclear theory and experimentation.

280. Research. (1-9) I and II. The Staff (Mr. Powell in charge)
   Students limited to a program of 4 units may be allowed to enroll for 1
   unit.
   The laboratory is open at all times to a limited number of qualified
   graduate students who wish to pursue original investigations. Students
   who wish to enroll for this work should communicate with the chairman
   of the department well in advance of the opening of the semester in which
   the work is to be done. Such work will ordinarily be under the direction
   of some member of the instructing staff who will determine the credit
   value. A list of publications indicating the types of problems now under
   investigation in the laboratory will be sent on request.

290. Seminar. (1-4) I and II. The Staff (Mr. Powell in charge)
   Open to properly qualified graduate students.
   As a rule, several seminars are offered each semester. The subjects will
   vary from year to year and will be announced at the beginning of each
   semester. The following subjects have been studied in recent seminars:
   Mechanisms of chemical reactions; X-ray diffraction in crystals; group
   theory and its applications to chemistry; spectroscopy; nuclear chemistry;
   high temperature reactions; organic synthesis; determination of structures
   of natural products.

299. Special Study for Graduate Students. (1-4) I and II.
   The Staff (Mr. Powell in charge)
   Any properly qualified graduate student who wishes to pursue a problem
   of his own choice, through reading or nonlaboratory study, may do so if
   his proposed project is acceptable to the member of the staff with whom
   he works.

Research Conference. (No credit)
   Members of the instructing staff and students engaged in graduate re-
   search meet once a week to discuss the various investigations in progress
   in the laboratory.

CHILD DEVELOPMENT

An undergraduate Group Major in Child Development is offered in the Col-
lege of Letters and Science. There is also an undergraduate major in child
development in the Department of Nutrition and Home Economics. Informa-
tion concerning these majors is presented in the Circular of Information.
Graduate work leading to the master's and Ph.D. degrees is offered in the
field of child development and also in education, nutrition and home economics, and psychology. Requirements for the field are given in the Graduate Division bulletin entitled ANNOUNCEMENT IN THE SOCIAL SCIENCES.

Students interested in undertaking professional preparation as teachers, psychometrists, school psychologists, social welfare or public health workers, or home demonstration agents will be helped by consulting faculty advisers in the professional schools indicated as early as possible in their undergraduate careers.

Upper division offerings relevant to the interests of students in child development and related fields are listed below:

Anatomy 25.
Anthropology 118, 120, 125, 153, 170.
City and Regional Planning 110.
Criminology 100A–100B.
Economics 180.
Education 116, 153, 181.
Genetics 100, *103A–103B.
Geography 176.
History 175A–175B.
Nutrition and Home Economics 111, 132, 135, 137, 138, 139, 140, 142, 144.
Philosophy 104, *108.
Physical Education 105, 140.
Physiology 102, 104, *107.
Public Health 125.
Social Welfare 100.
Sociology and Social Institutions 130, 132, 178.
Zoology 100.

CITY AND REGIONAL PLANNING

(Department Office, 101 City and Regional Planning Building)

T. J. Kent, Jr., M.C.P., Professor of City Planning (Chairman of the Department).

Jesse Reichek, Professor of Design.

Francis Violich, B.S., Professor of City Planning and Landscape Architecture.

Donald L. Foley, Ph.D., Associate Professor of City Planning and of Architecture.

Melvin M. Webber, M.C.P., Associate Professor of City Planning.

Barclay Jones, M.R.P., Assistant Professor of City Planning.

Catherine Bauer (Catherine Bauer Wurster), A.B., Lecturer in City and Regional Planning.

M. Justin Herman, A.B., Lecturer in City Planning.

Mellier G. Scott, Jr., A.B., Lecturer in City Planning.

Jerrold R. Voss, M.C.P., Lecturer in City Planning.

James M. Webb, M.C.P., Visiting Professor of City Planning.

Letters and Science List.—All undergraduate courses in city and regional planning are included in the Letters and Science List of Courses. For regulation governing this list, see page 11.


1 In residence fall semester only, 1960–1961.
The Department of City and Regional Planning offers a two-year graduate program of professional training in the field of city and metropolitan regional planning leading to the degree of Master of City Planning.

The program includes courses in the theory and practice of urban planning offered by the department, and courses in related fields of study offered by members of other departments. Some of these courses may be open to qualified undergraduate and graduate students in related fields.

**Upper Division Courses**

100. City Planning for Architects and Landscape Architects. (4) I and II. Mr. Jones, Mr. Voss
Prerequisite: Architecture 102, advanced standing in landscape architecture, or consent of the instructor. Not open to students who have taken course 110.
Survey of the physical, social, economic, and governmental considerations involved in the planning of cities and metropolitan areas; the development of the urban planning function and profession; the roles of the architect and landscape architect in city planning and community development.

110. Introduction to City Planning. (3) I. Mr. Scott
Prerequisite: open to majors in all fields except Architecture. Not open to students who have taken course 100.
Survey of city planning as it has evolved in United States since 1800 in response to serious physical, social, and economic problems; examination of major concepts and procedures used by contemporary city planners and local governments to improve the urban environment.

111. Introduction to Housing. (3) II. Mr. Scott
Lectures and five field trips. Open to majors in all fields.
Survey of historical development of housing problems in Western Europe and the United States; local, state, and federal housing programs in the United States; critical issues and the future of housing.

121. Urban Aesthetics. (2) I. Mr. Jones
Open to majors in all fields.
Perception of the city in concept and actuality through both vicarious and direct experience; development of the form of the urban environment; influence of utopian and ideal concepts; current criticisms of, and proposals for, the design of urban areas.

199. Special Study for Advanced Undergraduates. (1-3) I and II.
The Staff (Miss Bauer in charge)
Prerequisite: consent of the instructor.

**Graduate Courses**

(Concerning conditions for admission to graduate courses, see page 18)

222. Housing and Urban Redevelopment Policy. (2) I.
Prerequisite: consent of the instructor. Mr. Herman, Miss Bauer
Social, economic, and civic aspects of the housing problem. The development of federal and local policies with respect to private home building, public housing, slums, and blight. Current trends and issues. Lectures, student research and reports, field trip.

223. Visual Aspects of the Urban Environment. (2) II. Mr. Reichek
Prerequisite: open to graduate students from all departments upon consent of the instructor.
Seminar and laboratory designed to develop deeper awareness and understanding of the visual components of the contemporary urban environment. Recording, analysis, and communication of visual experiences; impact of increased visual sensitivity to urban form upon individuals in various disciplines.

226. The Metropolitan Region. (2) II. Mr. Foley
The functional and spatial organization of the metropolitan community. Population trends; the location of the linkages among economic activities; governmental organization; transportation and communication systems; local versus metropolitan functions; decentralization questions; public policy formation and future metropolitan structure.

231. Seminar in City and Metropolitan Planning. (2) I. Mr. Scott
Prerequisite: graduate standing in a social science department or professional school or consent of instructor.
Survey of history of American city planning; role of physical planning in local government; the urban general plan and its effectuation; relations between city planners and other professionals.

232. City and Metropolitan Planning for Engineers. (2) II. Mr. Webber
Prerequisite: graduate standing in transportation or civil engineering or consent of the instructor.
Survey of contemporary city and metropolitan planning theory and method; role of physical planning in local government; function and nature of the long-range, general plan; analytic and design methodologies of plan preparation and effectuation; relationships to transportation and municipal engineering.

251. Introduction to City Planning Theory and Practice. (3) I. Mr. Violich
Historical background of contemporary city planning; introduction to the theory and practice of city planning; principles, standards, and procedures of physical urban planning. Laboratory problems.

252. Seminar in City Planning Function and Organization. (3) II. Mr. Kent
The general physical planning function in municipal government, in county government, and at the metropolitan regional level; relationships between the city planning program and staff organization; general problems of agency organization.

253. City Planning Analysis. First Course. (3) I. Mr. Foley
The urban community context within which city planning operates. Community structure, values, and decision-making. Laboratory problems.

254. City Planning Analysis. Second Course. (3) II. Mr. Foley
Analytical methods in urban planning. Land use surveys, population and economic analyses, and circulation studies. Laboratory problems.

255. Seminar on the Urban General Plan. (2) I. Mr. Kent
The legislative, administrative, and technical functions of the urban general plan; general-plan characteristics suggested by these functions; organization and presentation of general-plan reports.

256. The Urban General Plan—Laboratory. (4) I. Mr. Kent, Mr. Webber
Steps involved in developing and maintaining a general plan; field problems in each major phase of general-plan work; preparation or revision of a general plan for a selected community; problems of group work and staff organization.
257. Principles and Methods of Plan Effectuation. (3) II.
Methods by which general-plan policy may be effectuated. Precise plans, zoning, subdivision control, capital improvement programs and other methods.

258. Urban Design. (3) II.
The three-dimensional design of specific development projects within the context of general-plan policy. The process of collaboration among the city planner, the architect, the landscape architect and others in large-scale site planning and urban design. Laboratory problems.

297. Field Study. (no credit) Summer course.

299. Individual Study or Research. (1-5) I and II.
The Staff (Miss Bauer in charge)
Prerequisite: consent of the instructor.

## CLASSICS

(Department Office, 5224 Dwinelle Hall)

Murray B. Emeneau, Ph.D., Professor of Sanskrit and General Linguistics (Chairman of the Department of Classics).
Joseph Fontenrose, Ph.D., Professor of Classics.
Arthur E. Gordon, Ph.D., Professor of Latin.
William M. Green, Ph.D., Professor of Latin.
William C. Helmbold, Ph.D., Professor of Classics.
Louis Alexander MacKay, M.A., Professor of Latin.
William Kendrick Pritchett, Ph.D., Professor of Greek.
Ivan M. Linforth, Ph.D., LL.D., Professor of Greek, Emeritus.
†H. R. W. Smith, Ph.D., Professor of Latin and Classical Archaeology and Associate Curator of Classical Archaeology, Emeritus.
John K. Anderson, M.A., Associate Professor of Classical Archaeology.
*Elroy L. Bundy, Ph.D., Associate Professor of Classics.
W. Gerson Rabinowitz, Ph.D., Associate Professor of Greek.
William S. Anderson, Ph.D., Assistant Professor of Latin.
Anne R. Amory, Ph.D., Associate in Classics.


Letters and Science List.—All undergraduate courses in Classics, Greek, Latin, and Sanskrit are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Adviser (Classics, Greek, Latin): Mr. Fontenrose.

The Major in Classics. Greek 1 or 1A–1B, 100, 101, 102, 103; Latin 1 or 1A–1B, 2, 3 (or the corresponding high-school courses), 104, 105, 106, 107; Latin 9A–9B or Greek 40A–40B.

The Major in Greek. Greek 1 or 1A–1B, 40A–40B, 100, 101, 102, 103, and at least 6 units in advanced upper division courses in Greek; at least six additional units must be chosen, with the advice of the department, from the fol-

‡ In residence fall semester only, 1960–1961.
lowing: upper division courses in Classics, Greek, Latin, Sanskrit, and in the History of Ancient Art; History 111A. Recommended: Latin 1 or 1A–1B, 2, 3.

The Major in Latin. Latin 1 or 1A–1B, 2, 3 (or the corresponding high-school courses), 9A–9B, 104, 105, 106, 107, and at least 6 units in advanced upper division courses in Latin; at least 6 additional units must be chosen, with the advice of the department, from the following: upper division courses in Classics, Greek, Latin, Sanskrit, and in the History of Ancient Art; History 111B. Recommended: Greek 1 or 1A–1B.

The 6 additional units in the Greek and Latin majors may, with the adviser’s consent, be satisfied by suitable courses other than those indicated.

Honors Programs. Classics: (a) the major program; (b) two courses chosen from Greek 115, 120, Latin 145, 150; (c) either Greek 150A–150B or Latin 109A–109B; (d) two semesters of Classics H195 taken during the senior year. Greek: (a) the major program, including Greek 115 (A, B, or C), 120 (A, B, or C), 150A–150B; (b) two semesters of Greek H195 taken during the senior year. Latin: (a) the major program, including Latin 109A–109B, 145 (A, B, or C); 150 (A, B, or C); (b) two semesters of Latin H195 taken during the senior year.

Students in the honors programs must maintain a grade-point average of at least 3.0 in all courses taken in the Classics department, and of at least 3.5 in all courses taken in the department during the junior year.

CLASSICS

Courses Which Do Not Require a Knowledge of Greek, Latin, or Sanskrit

Courses in this group are designated Classics 10A, Classics 10B, etc.

Lower Division Courses

10A–10B. Ancient Greek and Roman Civilization. (3–3) Yr. Mr. Gordon
10A: Greek. 10B: Roman.
Two lectures and one weekly section meeting. Against a background of Greek and Roman history, the reading of several literary masterpieces, in whole or in part, in translation. Course 10A is not prerequisite to 10B.

17A–17B. Elementary Course in Classical Archaeology. (3–3) Yr. Mr. J. K. Anderson
A. The development of Greek civilization from the Late Bronze Age to the fourth century, B.C., as illustrated by the monuments with particular reference to the life of the citizen. B. Monuments of Western civilization from the Hellenistic Age to the Age of the Antonines, with particular reference to urban development and provincial organization. Both parts illustrated with slides. Course 17A is not prerequisite to 17B.

28. The Classic Myths. (3) I. Mr. Fontenrose
A study of the Greek and Roman myths and legends which have an important place in European and American literature and art.

34. Epic Poetry: Homer and Vergil. (2) I. Mr. Bundy
A study of the *Iliad*, *Odyssey*, and *Aeneid* with reference to content, structure, significance, and influence.

35. Greek Tragedy. (2) II. Mr. Fontenrose
The reading of twelve Greek tragedies, with lectures on them.

36. Plato. (2) II. Mr. Rabinowitz
Lectures and readings. Selected dialogues.

UPPER DIVISION COURSES

100A-100B. Greek and Latin Literature in Translation. (3-3) Yr.
100A. Greek. I. Mrs. Amory
100B. Latin. II. Mr. MacKay
Lectures, essays, and group discussions. Limited to fifteen students.
Course 100A is not prerequisite to 100B.

§135. Greek Drama. (3) I. Mr. Kitto
Lectures on selected plays read in English translation.

138. The Greek and Roman Historians. (2) II. Mr. Pritchett
The five historians, Herodotus, Thucydides, Polybius, Livy, and Tacitus,
are read in English translation. The lectures take up the intellectual back­ground
of each historian, the documentary sources available to him, and his
philosophy of history.

*151. Ancient Greek Religion. (3) I. Mr. Fontenrose
The worship of the gods in ancient Greece; cults and religious ideas.

§155. Archaeological Problems of Greek and Italic Religion. (2) I. Mr. Smith

170. Classical Archaeology. (2) I. Mr. J. K. Anderson
170A. Vase-painting in Greece and Italy to 600 B.C. I.
*170B. Vase-painting in Greece and Italy in the sixth century.
*170C. Vase-painting in Greece and Italy from 500 B.C.

175. Pausanias, Book I. (2) II. Mr. J. K. Anderson
An ancient description of the topography of Athens as illustrated by
modern archaeological discoveries.

178. Mythology. (3) II. Mr. Fontenrose
An introduction to the study of mythology based upon Greek mythology
and its relations to Near Eastern and Indo-European mythologies.

185. Political and Social Thought of the Ancient Greeks. (2) II. Mr. Fontenrose
A study of Greek ideas about society and the State, from Homer to
Aristotle. For Classics H195 and graduate courses in Classics, see pages 93–94.

GREEK

(Courses in this group are designed Greek 1, Greek 1A, Greek 1B, etc.)

Language and Literature

LOWER DIVISION COURSES

1. Greek for Beginners. Double Course. (5) II. Mr. Helmbold
1A-1B. Greek for Beginners. (3-3) Yr. Mr. Pritchett, Mr. Bundy
40A-40B. Greek Prose Composition, first course. (2-2) Yr. Mrs. Amory
Prerequisite: Greek 1 or 1A-1B.

§ To be given, 1960–1961 only.
UPPER DIVISION COURSES

Greek 100, 101, 102, 103 should be completed before the other courses are undertaken.

100. Xenophon, Anabasis. (3) I. Mr. J. K. Anderson
101. Homer. (3) II. Mr. Helmbold
102. Plato: Apology and Crito. (3) I. Mr. Rabinowitz
103. Drama. (3) II. Mr. Pritchett

115. Senior Course in Greek Drama. (3)
  *115A. Aristophanes.
  *115B. Sophocles.
  115C. Aeschylus. II.

120. Senior Course in Greek Prose Authors. (3) Mr. Pritchett
  *120A. Demosthenes.
  120B. Thucydides. I.
  *120C. Herodotus.

§135. Greek Drama. (1) I. Mr. Kitto
  Reading of the original texts of several plays. To accompany Classics 135.

150A–150B. Advanced Greek Prose Composition. (2–2) Yr. Mr. Rabinowitz
  Prerequisite: Greek 40A–40B.

H195. Honors Course. (3) I and II. Mr. Fontenrose in charge
  Advanced and independent study for honor students in Greek. Special study of a philosophical, an historical, and a literary text. Conferences and thesis.

199. Special Study for Advanced Undergraduates. (1–5) I and II. Mr. Pritchett in charge

LATIN

(Courses in this group are designated Latin 1, Latin 2, etc.)

Language and Literature

LOWER DIVISION COURSES

1. Elementary Latin. Double Course. (5) I and II. Mr. Green, Mr. Bundy, ———

1A–1B. Elementary Latin. Beginners' Course. (3–3) Yr. Mr. Gordon, Mr. W. S. Anderson, ———

2. Elementary Latin (continuation of 1A–1B). (4) I and II. Mrs. Amory
  Prerequisite: two years of high-school Latin or Latin 1 or consent of the instructor.

3. Latin Prose Readings. (4) I and II. Mr. W. S. Anderson, Mr. Green
  Prerequisite: Latin 2 or the equivalent.

9A–9B. Latin Composition. (2–2) Yr. Mr. Green
  Prerequisite: at least completion of Latin 2. Recommended to accompany Latin 3.

§ To be given, 1960–1961 only.
UPPER DIVISION COURSES

Prerequisite: Latin 3. Latin 104, 105, 106, 107 should be completed before the other courses (except 109A–109B) are undertaken.

104. Vergil: Aeneid. (3) I.  
(Formerly numbered Latin 4.) Mr. McKay

105. Livy. (3) I. Mr. Gordon

106. Horace: Odes and Epodes. (3) II. Mr. MacKay

107. Cicero. (3) II. Mr. Green

109A–109B. Composition and Sight Reading. (2–2) Yr. Mr. W. S. Anderson, Mr. MacKay

145. Senior Course in Latin Poetry. (3) Mr. Fontenrose
   *145A. Roman Comedy (formerly numbered 108).
   145B. Lucretius (formerly numbered 145A). I.
   *145C. Elegiac Poets (formerly Augustan Poets, numbered 145B).

150. Senior Course in Latin Prose Authors. (3) Mr. W. S. Anderson
   *150A. Sallust.
   *150B. Seneca.
   150C. Tacitus. II.

166. Latin Verse Composition. (1) I. Mr. MacKay

H195. Honors Course. (3) I and II. Mr. W. S. Anderson in charge
   Advanced and independent study for honor students in Latin. Special study of a philosophical, an historical, and a literary text. Conferences and thesis.

199. Special Study for Advanced Undergraduates. (1–5) I and II. Mr. Gordon in charge

SANSKRIT

(Courses in this group are designated Sanskrit 190A, Sanskrit 190B, etc.)

Language and Literature

UPPER DIVISION COURSES

190A–190B. Elementary Sanskrit. (3–3) Yr. Mr. Emeneau

199. Special Study for Advanced Undergraduates. (1–5) I and II. Mr. Emeneau

CLASSICS

H195. Honors Course. (3) I and II. Mr. Fontenrose in charge
   Advanced and independent study for honor students in Classics. Special study of a philosophical, an historical, and a literary text, two of which are in one language (Greek or Latin), and one in the other. Conferences and thesis.

* Not to be given, 1980–1981.
GRADUATE COURSES

All graduate courses in this department are designated Classics (Classics 200, etc.).
(Concerning conditions for admission to graduate courses, see page 18)

200. Proseminar. (3) I. 
Mr. Helmbold 
An introduction to the general literature of classical philology, to methods of research, and to textual criticism.

205. Livy. (3) II. 
Mr. Gordon 
Reading course.

213. Euripides. (3) II. 
Mr. Helmbold

215. Herodotus. (3) II. 
Mr. Pritchett

220. Aristotle: Metaphysics. (3) I. 
Mr. Rabinowitz

227. Hesiod. (3) I. 
Mr. Fontenot

255. Lucan. (3) I. 
Mr. MacKaye

256. Juvenal. (3) II. 
Mr. W. S. Anderson

263. Latin Palaeography. (3) I. 
Mr. Green

270A-270B. Seminar in Classical Archaeology. (2-2) Yr. 
Mr. J. K. Anderson

290. Advanced Sanskrit. (1-5) I and II. 
Mr. Emeneau 
Such texts are read as are suited to the students' needs. Pali and Prakrit also will be studied as the occasion arises.

298. Special Study. (1-4) I and II. 
Mr. MacKay in charge 
This course is normally reserved for students writing the doctoral dissertation.

299. Special Study. (1-5) I and II. 
Mr. MacKay in charge

Latin for Graduate Students. (No credit) I and II. Mr. Gordon in charge 
First course.

Latin for Graduate Students. (No credit) I and II. Mr. Gordon in charge 
Second course.

The Medieval Mind. (English 220A-220B). (3-3) Yr. 
Mr. Delaisé

Linguistic History of the Roman Empire. (Romance Philology 200). 
(2) I. 
Mr. Malkiel

Late Latin Language and Literature. (Romance Philology 201). (2) I. 
Mr. Sandmann

Humanistic Literature in Latin. (Romance Philology 204). (1) II. 
Mr. Scaglione

Medieval Latin and Romance Learning. (Romance Philology 206). (2) II. 
Mr. Carmody
COMPARATIVE LITERATURE

Committee in Charge:
Marianne Bonwit, Ph.D., Associate Professor of German.
Bertrand H. Bronson, Ph.D., Professor of English.
Elroy L. Bundy, Ph.D., Associate Professor of Classics.
Yuen Ren Chao, Ph.D., Litt.D., Agassiz Professor of Oriental Languages and Literature, Emeritus.
Assar G. Janzen, Ph.D., Professor of Scandinavian.
Warren Ramsey, Ph.D., Professor of French and Comparative Literature (Chairman of the Committee).
David W. Reed, Ph.D., Associate Professor of English.
Alain Renoir, Ph.D., Assistant Professor of English.
Aldo Scaglione, Dottore in Lettere, Associate Professor of Italian.
Gleb Struve, A.B., Professor of Slavic Languages and Literatures.
Arturo Torres-Rioseco, Ph.D., Professor of Latin American Literature.

Instruction in comparative literature is not organized as a single administrative unit in the University, but the relevant courses are offered by a number of departments. The degree of Master of Arts will be conferred upon qualified graduate students who complete the requirements. Prospective candidates for the degree should consult the chairman of the committee in charge.

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Preparation for the Major.—Required: an adequate knowledge of two foreign languages; 12 upper division units in each of two literatures, read in the original, or an equivalent competence, tested by examination. Recommended: further study in courses dealing with more than one literature, such as Modern European Drama; Dramatic Art 160A, 160B, Analysis of the Content and Structure of Dramatic Composition; English 44A—44B, Masterpieces of Literature; English 125B, The Novel in Western Civilization; English 247, Theory of Poetry; English 257B, Methods and Assumptions of Recent Literary Critics; English 269, Theory of Fiction; Philosophy 136A—136B, Aesthetics; 137, Aesthetic Theories; Philosophy 146, Philosophy in Literature; Slavic 170, Survey of South Slavic Literatures.

The Major.—Twenty units of upper division or graduate courses and a thesis, in accordance with Plan I of the requirements for the degree of Master of Arts. A subcommittee will be in charge of the candidate’s program and will be responsible for approving and directing the work on the thesis.

UPPER DIVISION COURSES

151A-*151B. The Literature of the Renaissance in Western Europe. (2-2)
Yr.
Mr. Scaglione

A course in the ramifications of the Renaissance movement in the Western European countries, with special reference to Italy, including discussions of the different phases of the movement and the contribution of various great writers to it.

199. Special Study for Advanced Undergraduates. (1-4) I and II.
Mr. Renoir

GRADUATE COURSES

200. Methods of Study in Comparative Literature. (2) I.
Mr. Ramsey

* Not to be given, 1960—1961.
201A*-201B. The Symbolist Movement in European Literature. (2-2) Yr. Mr. Ramsey
A study of Symbolism, especially in French, German, English, and Spanish Literatures.

*202A-202B. The French Heritage in Spanish-American Literature. (2-2) Yr. Mr. Torres-Rioseco
Studies in the Parnassian, Symbolist, and Modernist movements.

221. Romanticism in Western Europe. (3) II. Miss Bouwit
Prerequisite: knowledge of French or German (preferably both) required.
The movement in France and Germany, with references to English Romanticism.

298. Special Study for Graduate Students. (1-4) I and II. Mr. Ramsey in charge
Humanistic Literature in Latin. (Romance Philology 204.) (1) II. Mr. Scaglione
Prerequisite: graduate standing and consent of the instructor.
A study of the growth of Humanism through the reading and interpretation of selected Latin texts, from Petrarch to Erasmus.

The Medieval Mind. (English 220A-220B.) (3-3) Yr. Mr. Jones
220A. Readings in Medieval Latin.
Prerequisite: two years of high school Latin or the equivalent.
An introduction to the central language and literature of the Middle Ages.
220B. Dominant Themes in Medieval Literature.
Prerequisite: course 120 or 220A or the equivalent.
Bibliography and special problems. Accent upon medieval European literature without geographical or linguistic distinctions.

The Popular Ballad. (English 225A-225B.) (3-3) Yr. Mr. Bronson

CRIMINOLOGY

(Department Office, 218 Building T-2)

Paul L. Kirk, Ph.D., Professor of Criminalistics.
Arthur H. Sherry, A.B., LL.B., Professor of Criminology and Law.
Austin H. MacCormick, M.A., Professor of Criminology, Emeritus.
Orlando W. Wilson, A.B., Professor of Criminology, Emeritus.
M. Edwin O’Neill, M.S., Associate Professor of Criminalistics.

Herbert S. Breyfogle, M.D., Lecturer in Criminology for the fall semester.
George W. Harman, B.S.E., Lecturer in Criminology for the spring semester.
†John D. Holstrom, A.B., Lecturer in Criminology.
Robert D. Shaner, A.B., Lecturer in Criminology.
Victor D. Vieira, A.B., Lecturer in Criminology for the spring semester.
David H. Wilson, M.D., LL.B., Lecturer in Criminology.

The requirements for the curricula in the School of Criminology are listed in the Circular of Information.

UPPER DIVISION COURSES

Prerequisite: junior standing, except sophomore students scheduled to attain junior standing in midyear who may enroll in basic courses in the fall semester.

* Not to be given, 1960-1961.
100A–100B. Crime Causation, Prevention, and Correction. (3–3) Yr.

100A is not prerequisite to 100B.
Orientation survey of the causes of juvenile delinquency and adult crime, methods of prevention, and current practices in the correctional treatment of offenders in institutions and on probation and parole.

101. Crime Investigation. (2) I. Mr. O’Neill
Principles involved in the investigation of crimes; police organization and procedures for the investigation of crime.

103. Psychological Aspects of Criminology. (3) I. Mr. D. H. Wilson
Prerequisite: Psychology 1A.
Analysis of personality is undertaken, with emphasis on constitutional, personal, social, and cultural components, and relationships to criminal behavior are surveyed. Methods of personality measurement are presented as potential tools for the criminologist.

105A–105B. Police Administration. (3–3) Yr. 105A is not prerequisite to 105B for criminalistics majors.
Introduction to the principles of police organization and administration, discussion of police statistics, criminal identification, and investigation; educational methods for combating crime and vice, and controlling traffic.

107. Personal Identification. (3) II. Mr. O’Neill
A study of methods used in the identification of persons, living and dead; fingerprint identification; Bertillonage; sight recognition; portrait parle; anatomical bases, including skeletal remains to ascertain sex, race, age, size, and identity.

111. Physical Evidence. (3) I. Mr. O’Neill
Lecture and laboratory. Prerequisite: course 101 (may be taken concurrently). Enrollment limited to criminology majors.
Search at crime scenes for physical evidence and photographing, recording, preserving, and transporting it to the laboratory. Cast preparation and tests conducted at crime scenes.

113. Legal Medicine. (3) I. Mr. Breyfogle
Prerequisite: Physiology 1.
Effect of impact of criminal actions upon the human body; physical, chemical, and other traumatic influences. Survey of body fluids, tissues, different classes of poisons, their recognition, and untoward effects. Pathological changes in death and their significance in criminology.

115A–115B. Legal Relations Involved in Criminology. (3–3) Yr.
Enrollment restricted to criminology majors. Mr. Sherry
Basic principles of the law of crimes, criminal procedure and evidence; the enforcement processes of the criminal law; the legal relation of the police function to the prosecuting function, the judicial function and the administration of justice; constitutional limitations of the police power.

151A–151B. Microscopy and Microchemistry of Physical Evidence. (4–4) Yr.
(Formerly numbered 151.) Mr. Kirk
Lectures and laboratory. Prerequisite: Chemistry 5, 12, 112C (112C may be taken concurrently) with a grade of C or higher.
Principles and practice of identification through the use of chemical microscopy, physical constants, and microchemical tests. Identification and testing of physiological fluids, poisons, and other inorganic and organic materials significant as physical evidence.
153A-153B. Quantitative and Instrumental Techniques. (2-2) Yr. Mr. Kirk
(Formerly numbered 153.) Laboratory. Prerequisite: Chemistry 5, 12, 112C with a grade of C or higher.
Advanced identification methods through the use of quantitative microchemistry and special instruments, including the spectrophotometer, spectrograph, comparison microscope, and chromatographic and electrophoretic equipment.

*155. Comparative Microscopy. (3) II. Mr. O'Neill
Lecture, demonstrations, and laboratory. Prerequisite: course 111. Recommended: Botany 1 and Zoology 400.
Comparative studies of gross and microscopic characteristics of crime exhibits, including glass, metal, wood, cloth, paper, string, and rope; examinations of tools and tool marks; principles of comparison of bullets and cartridge cases; reproduction by impressions, casts, and photographs.

157. Questioned Documents. (3) II. Mr. O'Neill
Lecture, demonstrations, and laboratory. Prerequisite: course 111 and consent of the instructor.
Problems of handwriting, handprinting, and typewriting in the examination of questioned documents, including studies of erasures, alterations, and obliterations; methods of restoring and deciphering effaced writing; document photography; investigation of anonymous letters.

161. Psychiatric Aspects of Criminology. (3) II. Mr. D. H. Wilson
Prerequisite: course 103.
Abnormal personalities are examined from a clinical diagnostic viewpoint in relation to anti-social activities; the etiology, psychopathology, prognosis, and treatment of the common mental disorders are considered in their medico-legal aspects.

162. Therapy in Criminology. (3) II. Mr. D. H. Wilson
Prerequisite: course 161 (may be taken concurrently) or satisfactory equivalent.
Study of various theories and techniques useful in the treatment of criminal behavior and in the prevention of its development.

163. Interrogation and Detection of Deception. (4) I. Mr. D. H. Wilson
Three lectures and one three-hour laboratory section per week. Prerequisite: course 161.
All phases of interrogation, including techniques for deception detection, are studied from an historical, psychological, physiological and psychiatric point of view. Laboratory experiments and techniques designed to uncover attempts at deception in unlawful situations, together with theory and practice of report writing, are presented.

164. Instrumental Detection of Deception. (2) II. Mr. Harman
One lecture and one three-hour laboratory section per week. Prerequisite: course 163.
Advanced evaluation is undertaken of instrumental methods studied in their physiological, psychological, and legal aspects. Past and present techniques are surveyed through study with various apparatus, and from this experience theoretical postulations for future development are evolved and appraised.

171. Police Planning. (2) I and II.
Prerequisite: course 105B or consent of the instructor.
Considerations in discovering and analyzing needs, formulating policies,
developing plans and procedures, and evaluating their effectiveness. Analysis of distribution of personnel, measures of performance and service, selection, training and discipline, M. O., operating programs, procedural manuals, and tactics.

*172. Plant Security. (2) I.

The prevention of losses to private enterprises and government establishments from sabotage, other crimes, and accidents. Problems related to national defense, the organization and operation of security forces, and the use of protective devices.

180. Juvenile Delinquency Control in Law Enforcement. (2) II. Mr. Vieira

A survey of the development and present status of juvenile delinquency control in law enforcement agencies. The organization, function, and methods used in modern law enforcement to control juvenile delinquency in relation to the courts, schools, and other community agencies are studied and evaluated.

182. Institutional Treatment of the Criminal and Delinquent. (2) I. 

Modern philosophy and methods in the treatment of adult criminals and juvenile delinquents in correctional institutions.

184A–184B. Noninstitutional Treatment of the Criminal and Delinquent.

(2–2) Yr. Mr. Shaner

184A is not prerequisite to 184B.

Modern philosophy and methods in the noninstitutional treatment of adult criminals and juvenile delinquents through probation, parole, and community services.

*186. Theory of Rehabilitation Techniques for the Actual Criminal. (2) I. Prerequisite: course 162.

Proper evaluation of the manifestations of already established criminal behavior is considered in view of potential rehabilitation through theoretical methods of counseling, with emphasis on techniques of supervision and control.

199. Research and Special Study for Advanced Undergraduates. (1–4) I and II. The Staff

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

290A–290B. Seminar in Crime Investigation. (2–2) Yr. Mr. O’Neill

291A–291B. Seminar in Police Administration. (2–2) Yr. Mr. Holstrom

*292. Seminar in Problems in Criminal Law Enforcement. (2) I. Open also to students in the School of Law. Mr. Sherry

*293A–293B. Seminar in the Administration of Criminal Justice. (2–2) Yr. Mr. Holstrom

294. Seminar in Advanced Psychologic Theory of Criminality. (2) II. Mr. D. H. Wilson

295A–295B. Seminar in Criminalistics. (2–2) Yr. Mr. Kirk
296A–296B. Seminar in the Correctional Treatment of Offenders. (2–2) Yr.

298. Directed Group Study. (1–4) I and II. The Staff
299. Individual Research and Special Study. (1–4) I and II. The Staff

**DECORATIVE ART**

(Department Office, 104 Decorative Art Building)

†Anna Hadwick Gayton (Anna Gayton Spier), Ph.D., Professor of Decorative Art and Curator of Textiles, Museum of Anthropology.
Lea Van Puymbroeck Miller, M.F.A., Professor of Design.
Lucretia Nelson, M.A., Professor of Design (Chairman of the Department of Decorative Art).
Herwin Schaefer, Ph.D., Professor of Decorative Art and Curator of the University Art Collections.
Hope M. Gladding, Professor of Decorative Art and Design, Emeritus.
*Mary A. Dumas, M.A., Associate Professor of Design.
Willard V. Rosenquist, M.A., Associate Professor of Design.
Charles E. Rossbach, M.F.A., Associate Professor of Design.
Imogene B. Gieling, M.F.A., Assistant Professor of Design.
William R. McIntyre, M.S., Assistant Professor of Design.
Alan R. Meisel, M.F.A., Assistant Professor of Design.
Peter H. Voulkos, M.F.A., Assistant Professor of Design.
Mae L. Gruber, M.F.A., Instructor in Design.
Ragnhild L. Kingsbury, Instructor in Design.

Letters and Science List.—All undergraduate courses in decorative art are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Wellington, Mr. Meisel, Mr. Schaefer.

Entrance with Advanced Standing.—All undergraduate transfer students requesting advanced standing are required to present examples of their work for evaluation by the staff.

The Major.—The following lower division courses are required: 1A or 1B, 6A–6B, 7A–7B; Art 2A and 1B or 1C; History 4A–4B. Recommended: Anthropology 2A–2B; Art 1A, 1D, 3, 14A–14B; Classics 10A–10B; History 8A–8B; Philosophy 6A–6B; Sociology and Social Institutions 1.

A total of 27 to 29 units of upper division work must also be completed, and must include the following: (1) courses 180A, 190; Philosophy 136A. (2) 8 to 10 units selected from at least two of the following history-theory groups, including one year-sequence: (a) 130A–130B, 195A–195B; (b) 175A–175B, 193A–193B; (c) 180B; (d) 167; (e) 140A–140B; (f) 127A–127B–127C. (3) 2 units selected from each of the following practice-theory groups: (a) 160A, 176A; (b) 141A†, 166B; (c) 196A†, 166A. (4) 5 units chosen

† Prerequisites for this course should be noted, as they must be included in the maximum of 30 upper division units offered for the degree.
* In residence spring semester only. 1960–1961.
Decorative Art

from the remaining upper division courses in the department (of which 3 may be taken in related upper division subjects in other departments).

Honors Program in the Major.—The general requirements and privileges of the honors program are those of the College of Letters and Science. As a special requirement, the honor student must satisfactorily complete a thesis which may be scholarly research or creative design. The latter must be accompanied by a written statement of aim and method. As a special privilege (subject to the consent of the instructors), the honor student may write one term paper in satisfaction of the requirements of two related courses taken concurrently. As a further privilege, the honor student will be furnished materials for courses in advanced experimental design.

Exhibits.—Students’ work may be retained by the department as exhibit material.

Lower Division Courses

1A-1B. Decorative Art Survey. (3-3) Yr. Beginning each semester.
Mr. Schaefer
From the beginning of civilization in the ancient Near East to the present time, emphasizing the development of style and the evaluation of form.
1A is not prerequisite to 1B.

6A-6B. Theory of Design. (2-2) Yr. Beginning each semester.
Miss Gruber, Mr. McIntyre, Mr. Meisel, Mr. Rosenquist, Mr. Pugliese, Mrs. Kingsbury, ———
Laboratory survey of the basic elements of space and color in both two- and three-dimensional design.

7A-7B. Theory of Design. (2-2) Yr. Beginning each semester.
Mr. McIntyre, Mr. Meisel, Mrs. Gieling, ———
Prerequisite: course 6A-6B; 7A is not prerequisite to 7B.
7A. Laboratory problems emphasizing line and space, based upon calligraphy and the history of the alphabet from Pre-Roman times.
7B. Laboratory problems in three-dimensional design; the nature and use of materials, such as paper, wood, plastic.

Upper Division Courses

101. Reading Course in the Decorative Arts. (2) II.
Prerequisite: courses 6A-6B and 7A-7B. Enrollment limited to twenty students.
A course designed to acquaint students majoring in decorative art with the significant literature of the decorative arts. To know the important artists’ work of the past and its effect on the present time. Required reading, museum reports, and discussion.

125. American Decorative Art from the First Colonial Periods to 1850. (3) II.
(Formerly numbered 195B.)
Spanish, English, Dutch Colonial periods, and the Federal Period. Lectures with slides, from material in museum collections and private houses showing the work of the more significant artists, housewrights, and craftsmen.

127A-127B-127C. Primitive Art. (3-3-3) Miss Nelson
Analysis of salient art styles in their cultural contexts.
127A. Paleolithic West Europe, South and West Africa. II.
*127B. Oceania and South America. I.
127C. Middle and North America. I.
127A is not prerequisite to 127B or 127C.

* Not to be given, 1960-1961.
130A–130B. Interior Design. (2–2) Yr. Mr. Wellington
Lectures: the design, selection, and arrangement of furniture, with special consideration for its relation to the architectural background.

140A–140B–140C. A Survey of Ceramic and Glass Forms. (3–3–3) Mr. Pugliese
Ceramic and glass form and decoration as expressions of aesthetic and social values.
140A. Ceramics: Classic Mediterranean; the Near East; Medieval and Renaissance Europe. I.
140B. Ceramics: The Far East; Pre-Columbian America; Modern Europe and the United States. II.
140C. Glass. II.
Course 140A is not prerequisite to 140B or 140C.

141A–141B. Advanced Design: Ceramics. (2–2) Yr. Beginning each semester. Mr. Youlkos
Prerequisite: upper division standing in decorative art or the equivalent, and course 140A or 140B. Course 140A or 140B may be taken concurrently.
A study of processes of construction and glazing, especially in relation to their influence upon design.

†160A–160B. Advanced Design: Printed Textiles. (2–2) Yr. Beginning each semester. Mr. Rossbach, Mrs. Kingsbury
Prerequisite: upper division standing in decorative art or the equivalent.
Laboratory problems in printed textiles, emphasizing the development of pattern through the processes of stencil, screen, block, and batik.

166A–166B. Advanced Design: Principles of Three-Dimensional Design. (2–2) Yr. Beginning each semester. Mr. Rosenquist, Mrs. Gieling
Prerequisite: upper division standing in decorative art or the equivalent.
166A. The visual interrelation of space and material as problems of abstract design, emphasizing color, light, and motion.
166B. Studies of volume and spatial relationships in metal.
166A is not prerequisite to 166B.

167. History of Design since the Industrial Revolution. (3) II. Mr. Schaefer
The theory and practice of design from the Industrial Revolution to the present; the problem of adjustment from preindustrial handcrafts to mechanical production, and the evolution of a machine aesthetic.

175A–175B. History of the Textile Arts. (2–2) Yr. Miss Gayton
Textile arts in their historical and cultural settings.
175A. The New World: Native America; Oceania.
*175B. The Old World: Europe, India, Asia.
175A is not prerequisite to 175B.

176A–176B. Advanced Design: Woven Textiles. (2–2) Yr. Beginning each semester. Mrs. Miller, Mr. Rossbach
176B. II.
Prerequisite: upper division standing in decorative art or the equivalent, and course 175A or 175B. Course 175A or 175B may be taken concurrently.
Laboratory survey of basic elements of woven design, emphasizing structure in relation to color, texture, and pattern.

† To be given spring semester only, 1960–1961.
‡ To be given fall semester only, 1960–1961.
*179. Textile Analysis. (2) II. Miss Gayton
Prerequisite: courses 175A, 176A–176B, or consent of the instructor. Enrollment limited by laboratory facilities; preference will be given to students majoring in decorative art.
Basic problems in the construction and design of ethnic and historic textiles.

180A–180B. Survey of Expression in Materials. (3-3) Yr. Mr. Wellington
A study of form as exemplified by significant objects made from metals, wood, glass, clay, etc.
180A is not prerequisite to 180B.

190. Proseminar in Decorative Art. (2) I and II.
The Staff (Mrs. Gieling, Mr. Rosenquist in charge, fall semester; Mr. McIntyre in charge, spring semester)
Prerequisite: senior standing in decorative art or the equivalent.
Systematic analysis of contemporary developments in the decorative arts, emphasizing the dependence upon historical antecedents and the interrelationships with other areas of the visual arts.

193A–193B. Historic Costume. (3-3) Yr. Miss Gayton
Costumes of various times and places with reference to design, material, cultural factors, and contemporary arts.
193A. Native America; Indonesia; Asia.
193B. Classic Mediterranean; Medieval to Modern Europe.
193A is not prerequisite to 193B.

195A–*195B. The History of Interior Design. (3-3) Yr. Mr. Schaefer,
The interior as an aesthetic composition and as an expression of domestic culture from the Middle Ages to the present.
Course 195A is not prerequisite to 195B.

196A–196B. Interior Design. (2-2) Yr. Beginning each semester.
Prerequisite: upper division standing in decorative art or the equivalent; courses 130A–130B, 195A, and some mechanical drawing. 130A and 130B may be taken concurrently with 196A and 196B, respectively.
Drawn problems. Individual criticism and discussion of theory involved.

*197. Special Study in the Practice of Design. (2) I and II. The Staff
Prerequisite: senior standing and at least a grade B average in upper division design courses basic to the special study, subject to the consent of the instructor.

*197A. Enamel design. (2) I. Mr. Rosenquist

*197B. Metal design. (2) II. Mrs. Gieling

*197C. Design of woven textiles. (2) II. Mr. Rossbach

*197D. Design of printed textiles. (2) II. Miss Dumas

199. Special Study for Advanced Students. (1-4) I and II.
Open to senior and graduate students only. Prerequisite: consent of the department and at least a B average in all decorative art courses undertaken.

GRADUATE COURSES

Concerning conditions for admission to graduate courses, see the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION. Candidates for the master’s degree will be expected to consult with the graduate adviser concerning specific requirements.

Seminars in Decorative Art.

*294A. American Decorative Art. (2) II.
   The Staff

*294B. Textiles. (2) II.
   Miss Gayton
   Studies based upon textiles in the collections of the Department of Decorative Art and in the Museum of Anthropology.

294C. Decorative Motifs in Oriental Art. (2) I.
   Mr. Wellington

294D. Components of Costume. (2) I.
   Miss Gayton
   Analysis of the tangible and intangible determinants of style in ethnic or historic costume.

294E. Form in Primitive Art. (2) II.
   Miss Nelson
   Studies in form and style based upon selected material from the collections of the Museum of Anthropology.

*294F. Industrial Design. (2) II.
   Mr. Schaefer
   Analytic and critical studies of selected phases of industrial design.

294G. Ceramic Design. (2) II.
   Mr. Pugliese
   Analytic and critical studies of selected periods and phases of ceramic design.

299. Directed Research. (2-4) I and II.
   The Staff (Mr. Wellington in charge)

RELATED COURSES IN OTHER DEPARTMENTS

Anthropology 101A–101B, 103, and courses on specific culture areas; Architecture 121, 122; Art; Business Administration 163; City and Regional Planning 110, 121; Classics 170; Geography 176; History *122, *131A–131B, *176A–176B; Philosophy 136B; Psychology 131, *184.

For detailed descriptions see the announcement section of the respective departments.

DRAMATIC ART

(Department Office, 1205 Dwinelle Hall)

Travis M. Bogard, Ph.D., Professor of English (Acting Chairman of the Department of Dramatic Art).

Fred Orin Harris, M.F.A., Professor of Dramatic Art.

Marvin Rosenberg, Ph.D., Professor of Dramatic Art.

Garff B. Wilson, Ph.D., Professor of Speech and Dramatic Art.

†Robert W. Goldsby, M.F.A., Associate Professor of Dramatic Art.

John T. Dreier, Ph.D., Assistant Professor of Dramatic Art.

Henrietta G. Harris, M.A., Assistant Professor of Dramatic Art.

William I. Oliver, Ph.D., Assistant Professor of Dramatic Art.

George Angelo Marchi, M.A., Instructor in Dramatic Art.

Harry M. Ritchie, D.F.A., Lecturer in Dramatic Art.

Frederick Thon, M.F.A., Lecturer in Dramatic Art.

Letters and Science List.—All undergraduate courses are included in the Letters and Science List, except the following: courses 30, 190, 191, 192, 193. For regulations governing this list, see page 11.

Departmental Major Adviser: Mr. Bogard.

The Major.—Required: courses 10A-10B (3-3), Theory of Acting; 20A-20B (3-3), Great Plays, Reading and Analysis; 30 (2), Stage Crafts.

Twenty-four units of upper division courses, including not more than 15 units in dramatic art theory and practice, with not more than 6 units of Dramatic Art 190, 191, 192, 193, and with not less than 9 units in dramatic literature, history of drama, and history of theater. In addition, students with a major emphasis in acting and directing will be required to complete 6 units of supervised laboratory work in the University Theater without credit. The department will certify to the completion of a major program for graduation only on the basis of at least a C average in courses taken in the department.


(B) Dramatic Art courses: Practice. Courses 190, 191, 192, 193, not more than 6 units of which will apply to the major.


The University Theater

Under the direction of the Department of Dramatic Art, the University Theater presents a major and a studio series of play productions. These presentations have a twofold purpose: (1) to present to the University community a program of distinguished dramas of all times and all countries; (2) to afford the students in the University an effective experience in dramatic art. Participation in the presentations is open to all students.

LOWER DIVISION COURSES


10A. Resources for Acting. A study of physical, psychological, and spiritual resources for acting. Miss Harris, Mr. Harris, Mr. Marchi

10B. Methods of Acting. Approaches and practices in characterization, The fundamentals of stage speech and movement. Miss Harris, Mr. Harris.

20A–20B. Great Plays, Reading and Analysis. (3–3) Yr. Beginning each semester.

20A. The tragic vision.

20B. The comic vision.
30. Stage Crafts. (2) I and II. Mr. Dreier
A survey of the procedures employed in the principal areas of Play Production including the building, painting and manipulation of scenery, and stage lighting. Demonstrations and laboratory experience.

**Upper Division Courses**

**Group A. Dramatic Art: Theory and Practice**

110A–110B. Approaches and Problems in Play Directing. (3–3) Yr. Mr. Harris, Mr. Thon

115A is not prerequisite to 115B. Mr. Dreier
115A. History of Visual Theater.
115B. Aesthetics of Visual Theater.

Prerequisite: courses 10A–10B, 20A–20B, 407 or consent of the instructor.
130A. Acting in Greek Plays and Plays of Classical Derivation. (2) II. Mr. Marchi

*130B. Acting in Plays in the European Tradition. (2)*
*130C. Acting in Twentieth-Century Plays. (2)*
130D. Acting in Plays in the Major Modes. (2) I. Mr. Ritchie

159A–*159B. History of Dramatic Theory and Criticism. (3–3) Yr.* Mr. Oliver
Prerequisite: course 20A–20B or consent of the instructor. 159A is not prerequisite to 159B.
159A. A study of the major texts in dramatic criticism from Aristotle to the twentieth century.
*159B. A study of contemporary dramatic theory, as it is reflected in the major critics and dramatists.

160A–160B. Analysis of the Content and Structure of Dramatic Composition. (3–3) Yr. Mr. Rosenberg

180A–180B. Creative Playwriting. (3–3) Yr. Beginning each semester. Mr. Oliver, Mr. Rosenberg, Mr. Thon
Prerequisite: course 160A–160B or equivalent by consent of instructor. Course 160A–160B may be taken concurrently. Interested students should confer with the instructor as to preparation as early as possible in their college career.
Practice in the fundamentals of dramatic composition. Group readings and discussions of written work.

190. Laboratory Projects in Acting. (1–6) I and II. Miss Harris
Prerequisite: course 10A–10B, 20A–20B, 407, and consent of instructor.

191. Laboratory Projects in Directing. (1–6) I and II. Mr. Thon
Prerequisite: course 10A–10B, 110A–110B, 115A–115B, and consent of instructor.

192. Laboratory Projects in Stagecrafts. (1–6) I and II. Mr. Dreier
Prerequisite: course 115A–115B, 30 and consent of the instructor.

193. Laboratory Projects in Playwriting. (1–6) I and II. Mr. Rosenberg
Prerequisite: course 180A–180B and consent of instructor.

199. Special Study for Advanced Undergraduates. (1–5) I and II.  
   The Staff (Mr. Bogard in charge)

407. Speech for the Stage. (3) I and II.  
   Miss Harris  
   A study of the fundamentals of speech for acting: support, resonance, 
   variety of tone, clarity of diction and pronunciation. A phonetic analysis of 
   speech sounds. Lectures, exercises, and scene studies.

**Group B. Dramatic Literature and History of Drama**

The attention of the student is directed to the Group Major in English, Dra­matic Art, and Speech that leads to a Secondary Teaching Credential.

**Lower Division Course**

40A–40B. Twentieth-Century World Theater. (3–3) Yr.  
   Mr. Thon  
   40A is not prerequisite to 40B.

   Characteristic forms of the various kinds of theater within the twentieth 
   century. A survey of the present condition of the major theatrical modes.
   40A: Drama, opera, ballet.
   40B: Film, television, radio, musical comedy.

**Upper Division Courses**

120. History of Greek Drama and Drama of Classical Derivation. (3) I.  
   Mr. Marchi

123A–123B. History of Drama in the European Tradition. (3–3) Yr.  
   Mr. Ritchie  
   Prerequisite: course 20A–20B. 123A is not prerequisite to 123B.

125. History of the Twentieth-Century Drama. (3) II.  
   Mr. Ritchie

*140A–140B. The Theater in Western Civilization. (3–3) Yr.  
   Prerequisite: course 20A–20B.

   Mr. Wilson  
   Prerequisite: course 20A–20B or consent of the instructor. 145A is not pre­requisite to 145B.

   The development of the American Theater from Colonial times to the 
   twentieth century: the actors and playwrights; the playhouses and stage­craft; 
   the motion picture, radio and television. The relationship of these elements 
   to the social and cultural history of the country.
   145A. From Colonial times to the theater of Edwin Booth.
   145B. From the time of David Belasco to the present.

**Related Courses in Other Departments**

Classics 28. The Classic Myths. (3) I.  
   (Given in English.)

Classics 35. Greek Tragedy. (2) II.  
   (Given in English.)

Classics 178. Mythology. (3) II.  
   (Given in English.)

English 114A. The English Drama to 1642. (3) II.  

English *114B. The English Drama from 1660 to 1850. (3) II.  

English 114C. British and American Drama from 1850 to the Present. (3) I.  

English 117A–117B. Shakespeare. (3–3) Yr.  

English 117E. Shakespeare. (3) II.  

French 115A–115B. Modern French Drama. (2–2) Yr.

Dramatic Art; Economics

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Year</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>French 120A-120B</td>
<td>The Seventeenth Century</td>
<td>(2-2) yr.</td>
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<tr>
<td>Greek 103</td>
<td>Drama</td>
<td>(3) II.</td>
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<td>German 104B</td>
<td>Nineteenth-Century German Drama</td>
<td>(3) II.</td>
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<td>German 106</td>
<td>The Early Works of Goethe and Schiller</td>
<td>(3) II.</td>
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<td>Latin 145A</td>
<td>Roman Comedy</td>
<td>(3) I.</td>
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<td>Scandinavian 106</td>
<td>History of Scandinavian Drama up to 1900</td>
<td>(2) I.</td>
<td>(Given in English.)</td>
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<td>Scandinavian 107</td>
<td>The Plays of Ibsen</td>
<td>(3) I.</td>
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<td>(Given in English.)</td>
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<td>Scandinavian 109</td>
<td>Scandinavian Drama of the Twentieth Century</td>
<td>(2) II.</td>
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<td>Slavic 135</td>
<td>The Russian Drama</td>
<td>(2) I.</td>
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<td>(Given in English.)</td>
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<tr>
<td>Spanish 105</td>
<td>Modern Peninsular Drama: From the Romantic Movement to the Present</td>
<td>(3) I.</td>
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<tr>
<td>Spanish 109A-109B</td>
<td>The Spanish Drama of the Sixteenth and Seventeenth Centuries</td>
<td>(2-2) yr.</td>
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<tr>
<td>Spanish 111A-111B</td>
<td>Cervantes</td>
<td>(3-3) yr.</td>
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**ECONOMICS**

(Department Office, 119 South Hall)

Joe S. Bain, Jr., Ph.D., Professor of Economics.

Carlo M. Cipolla, Laurea, Professor of Economics for the fall semester.

Malcolm M. Davisson, J.D., Ph.D., Professor of Economics.

Howard S. Ellis, Ph.D., LL.D., Flood Professor of Economics.

Walter Galenson, C.P.A., Ph.D., Professor of Industrial Relations and Business Administration.

Robert A. Gordon, Ph.D., Professor of Economics (Chairman of the Department).

Ewald T. Grether, Ph.D., LL.D., Flood Professor of Economics.

Charles A. Gulick, Ph.D., Professor of Economics.

Sidney S. Hoos, Ph.D., Professor of Economics, Agricultural Economics and Business Administration.

Emily H. Huntington, Ph.D., Professor of Economics.

Clark Kerr, Ph.D., LL.D., Professor of Industrial Relations.

Frank L. Kidner, Ph.D., Professor of Economics.

George M. Kuznets, Ph.D., Professor of Economics, Agricultural Economics, and Statistics.

David S. Landes, Ph.D., Professor of History and Economics.

Harvey Leibenstein, Ph.D., Professor of Economics.

John M. Letiche, Ph.D., Professor of Economics.

Andreas G. Papandreou, Ph.D., Professor of Economics.

Earl R. Rolph, Ph.D., Professor of Economics.

Tibor Scitovsky, M.Sc., J.D., Professor of Economics.

Paul S. Taylor, Ph.D., Professor of Economics.

Lloyd Ulman, Ph.D., Professor of Economics and Industrial Relations.

Robert A. Brady, Ph.D., Professor of Economics, Emeritus.


Ira B. Cross, Ph.D., LL.D., Flood Professor of Economics, Emeritus.


Melvin M. Knight, Ph.D., Professor of Economics, Emeritus.

Carl Landauer, Ph.D., Professor of Economics, Emeritus.

George F. Break, Ph.D., Associate Professor of Economics.

* Not to be given, 1960-1961.
Letters and Science List.—All undergraduate courses in economics are included in the Letters and Science List. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Rolph (chairman), Mr. Gulick, Mr. Rosovsky, Mr. B. Ward, Mr. Schran.

The Major.—Required: either (A) Economics 1A–1B and 2; or (B) Social Science 1A–1B and Economics 2, and 24 units of upper division economics. For students electing alternative (A) above, Economics 100A–100B and either Economics 112A, 112B, or 113 are required and should be taken prior to the senior year. For students electing alternative (B) above, Economics 103A–103B, 100B and either 112A, 112B, or 113 are required and should be taken prior to the senior year. The remaining courses shall be selected by the student with the advice and approval of the departmental major adviser. The selection shall contain one two-semester sequence of courses. A course (3 units) in another department may be included if it is approved by the chairman of the major advisers' committee.

It is strongly recommended that each student elect upper division courses in other related social sciences. Students interested in improving their mathematical background should consider Mathematics 190A–190B, a course designed for their needs.

Except under extraordinary circumstances, no more than 10 units of economics and business administration combined may be taken in one semester.

The Honors Program.—The honors program of the Department of Economics is devised to give interested and promising students special opportunities for development of breadth and depth in their departmental major work. Students with an average of 3.0 or better, both over-all and in their course work in economics, are eligible to apply for honors work at the beginning of or during their junior year. They will normally take one tutorial unit of Economics H195 each semester of their junior year under the general guidance
of the chairman of the honors program; in their senior year they will take three units each semester of Economics H196, write an honors thesis under the direction of a member of the department, and take a comprehensive written examination upon completion of their other work. For students thought to be eligible for an award of Highest Honors, an oral examination in addition to the comprehensive written examination will be administered by members of the department. Sophomore students who may be interested in undertaking honors work in the junior year would do well to consult with the chairman of the department honors program at an early stage to facilitate planning of their course work leading to the honors program.

**LOWER DIVISION COURSES**

**1A-1B. Elements of Economics.** (3–3) Yr. Beginning each semester.

Mr. Rolph, Mr. B. Ward, Mr. Break

1A. I: Mr. Rolph, Mr. B. Ward; II: Mr. Break; 1B. I: Mr. Break; II:

Mr. Rolph, Mr. B. Ward.

Two lectures and two recitation sessions per week to be arranged. 1A is prerequisite to 1B. Credit will not be given for both 1A-1B and 103A-103B.

2. Economic Statistics. (4) I and II.

Mr. Break (in charge), Mr. Folk, Mr. Marris

Three lectures and one two-hour laboratory section per week to be arranged. Credit is limited to 2 units for students who have received credit for Education 114 or Psychology 5, Sociology and Social Institutions 106, Statistics 2 or 12.

Introduction to modern methods of analyzing numerical data, including descriptive statistics, sampling and statistical inference, index numbers, correlation, and time series. Emphasis is on the logic of procedures, interpretation, and application. Illustrative material from economics and business.

**UPPER DIVISION COURSES**

Primarily for undergraduates. Prerequisite: for major students in economics, courses 1A-1B, 2, and junior standing; for others, 1A-1B and junior standing except where course 2 is prerequisite for a specific course.

**100A-100B. Economic Analysis and Economic Policy.** (3–3) Yr. Beginning each semester. Mr. Leibenstein (in charge), Mr. Schran, Mr. Garlin

100A. I: Mr. Garlin, Mr. Wolfe; 100A. II: Mr. Schran; 100B. I: Mr. Schran; 100B. II: Mr. Garlin, Mr. Leibenstein, Mr. Wolfe.

Not open to students who have completed Business Administration 100 or 101.

100A. The problem of economic stability; the problem of economic progress; and problems in the foreign economic relations of the United States.

100B. The problems of monopoly and power, economic opportunity, motivation, efficiency, and freedom.

**101A-101B. History of Economic Doctrine.** (3–3) Yr.

Mr. I. Ward, Mr. Sorensen

The classical school and its antecedents, beginning with the Greeks, through Adam Smith and down to Keynes, historical and doctrinal analysis.

101A. Through Ricardo.

101B. After Ricardo.

**102. Advanced Economic Theory.** (3) II.

Prerequisite: course 100A–100B.

Analysis of the determinants of the aggregate level of output and employment, and of the allocation of resources. Includes advanced value and distribution theory, and a brief review of modern monetary theory.

Economics

103A–103B. Introduction to Economic Principles, Institutions, and Policies. (3–3) Yr. Mr. Folk
Prerequisite: Social Science 1A–1B.
103A. Income and employment theory and its applications.
103B. Price theory and its applications. Credit will not be given for both 1A–1B and 103A–103B.

105. Economics of Consumption. (3) II. Miss Huntington
A general survey of consumption in the United States, with an analysis of the determination of consumer demands, and of the relation of the consumer to the price systems.

*106A–106B. Social Reform Movements. (3–3) Yr. 
106A. European and American movements for social reform prior to 1914.
106B. II. European and American movements for social reform since 1914.

110. Economic Development. (3) I. Mr. Wolfe
Theories of economic development and of underdevelopment; historical aspects; policies for achieving development in poor countries; favorable conditions for development in rich countries.

112A–112B. Economic History of Europe. (3–3) Yr. Mr. Cipolla, Mr. Landes
Survey of the development of the economic institutions of Europe; analysis of economic problems and policies in their historical setting.

113. Economic History of the United States. (3) I and II.
Survey of trends in main components of the American economy; emphasis on factors making for economic growth and on the analysis of economic problems and policies in their historical setting.

114. Economic Development and Problems of Latin America. (3) I.
Evolution of Latin-American economy in terms of basic institutions and international influences; standards of living; problems of mono-economies; land tenure systems; problems of improving agricultural methods; foreign investment; industrialization and related problems.

115. Economic Development and Problems of the Far East. (3) I. Mr. Li
Resource allocation and economic organization of an underdeveloped economy; certain problems of carrying through a self-generative process of economic growth, with particular reference to China, India and Pakistan, Japan, and Southeast Asia.

116A–*116B. Comparative Economic Systems. (3–3) Yr. Mr. B. Ward
Economic organization and institutions, and their impact on economic variables.
116A. Theory; models of economic systems.
*116B. Studies of types of actual economies. Prerequisite: course 116A or consent of the instructor.

118A–*118B. Economic Development, Institutions, and Problems of the Soviet Union and Eastern Europe. (3–3) Yr. Mr. Campbell
118A. The Soviet economy.
*118B. The Soviet economy (advanced topics); other East European economies; the Communist bloc as a whole. Prerequisite: course 118A or consent of the instructor.

121A-121B. Industrial Organization. (3-3) Yr. Mr. I. Ward, Mr. Bain
The organization and structure of industries and their markets in the American economy, competitive behavior, price policy, and market performance in such industries; public policy in the regulation of industry.

122. Theory of Domestic Trade. (3) II. Mr. Holton
Primarily for seniors. Prerequisite: course 100A, Business Administration 101, or their equivalent.
Interregional trade and the location of economic activity; determinants of the channels of distribution; the economics of marketing policies; resale price maintenance and public regulation of domestic trade; productivity in the distributive sector; the distributive sector and economic growth.

*125. Economics of Regulation and Control. (3) II.
The role of government in the regulated sectors of the American economy; economic criteria for efficient control of prices, production, and the flow of investment funds.

*126. Economics of Extractive Industries. (3) II.
Structure, social performance, and special economic and public policy problems of industries engaged in extraction or use of basic natural resources, including agricultural, forest, fishery, mining, and coal and petroleum industries.

130. Government Finance. (3) II. Mr. Davisson
(Formerly numbered 130A.)
A general survey, at federal, state, and local levels, of budget-making, expenditures, public debt, taxation, fiscal policy, and the effects of government programs on income distribution. Primarily for students not majoring in economics. Credit will not be given for both course 130 and 131A.

131A–131B. Economics of Public Finance. (3-3) Yr. (Formerly numbered 130B–130C.) Mr. Davission, Mr. Break
Prerequisite: course 131A, or 130 and consent of the instructor, is prerequisite to course 131B. Credit will not be given for both course 130 and 131A.
A comprehensive analysis of fiscal theory and policy and of the incidence and effects of taxation, governmental expenditure programs, and public debt operations. Some attention will be paid to fiscal problems of underdeveloped areas.

133. Dynamic Economics and Business Fluctuations. (3) II. Mr. Garlin
Prerequisite: courses 135 and 100A or Business Administration 101. It is recommended that this course be taken in the senior year.

135. Money and Banking. (3) I and II. Mr. Ellis, Mr. Minsky
Two lectures and one discussion section per week.
Commercial banks, the Federal Reserve, and the supply of money; monetary theory and monetary policy in the American economy. Credit will not be given for both course 135 and 136A. Primarily for students not majoring in economics.

136A–136B. Money, Banking, and the Monetary Policy. (3-3) Yr. (136B formerly numbered 137.) Mr. Minsky
136A: The monetary economy; survey of types of monetary theory and theories of interest; commercial and central banks, the Treasury, and the supply of money. Credit will not be given for both course 136A and 135.
136B: Prerequisite: course 136A, or 135 and consent of the instructor.
Monetary standards and international finance; competing objectives of monetary policy; recent monetary experience; current issues.

* Not to be given, 1960-1961.
138. Economic Accounting. (3) I. Mr. Mattessich
A simultaneous introduction to micro- and macro-accounting. Accounting statements; the link between business and national income accounting; input-output tables; flow of funds accounting.

*142. Economic Statistics. (3) II.
Prerequisite: course 2 or the equivalent.

150. Labor Economics. (3) I and II. Mr. Gulick, Mr. Galenson
Students will not receive credit for both course 150 and Business Administration 150.
The social background of labor legislation and trade unionism.

152. Labor Economics. (3) II. Mr. Gulick
Comparative survey of American and foreign labor movements.

153. Wage Theory and Policy. (3) I. Mr. Ulman
Prerequisite: course 150 or consent of the instructor.
Theoretical analysis and empirical description of wage issues, both at the micro- and macro-economics level; national wage and employment policy.

180. Problems of Poverty. (3) I. Miss Huntington
Facts, conditions, and current explanations of poverty; public and private action to prevent destitution; theories concerning minimum standards of living.

185. Social Insurance. (3) II. Miss Huntington
An analysis of the theories underlying social insurance and social insurance legislation throughout the world.

*188. Population and Migration. (3) I.
(Formerly numbered 188A-188B.)
Social and economic consequences of population change, with special reference to economic opportunities, employment, investment, and problems of international trade; population trends, theories, and problems, methods of population measurement and population forecasting. Population and migration problems in economic development.

190A-190B. International Economic Relations. (3-3) Yr. Mr. Scitovsky, Mr. Letiche
The theory of international economic relations developed within the context of modern history.

H195. Junior Honors Course. (3) I and II. The Staff (Mr. Caves in charge)

H196. Senior Honors Course. (3) I and II. The Staff (Mr. Caves in charge)

*197. Advanced International Economics. (3) I.
Prerequisite: course 100A-100B or consent of instructor.
Problems of international economic theory and policy.

198. Directed Group Study for Advanced Undergraduates. (3) I and II. Mr. Caves
Prerequisite: consent of the instructor. Primarily for students on the Honors List of the College of Letters and Science.
Designed to afford opportunity for seminar-type instruction and individual research. Topics to be decided upon at the beginning of the course.

199. Special Study for Advanced Undergraduates. (1-3) I and II. The Staff (Mr. Rosovsky in charge)

* Not to be given, 1960-1961.
Graduate Courses

Admission to graduate courses requires, in all cases, the consent of the instructor. Undergraduate courses are not prerequisite to graduate courses, except where indicated.

   Mr. Leibenstein, Mr. Scitovsky, Mr. Papandreou, Mr. Minsky

   200A. Micro-economics: the behavior of firms and households, and the
determination of prices and resource allocation patterns in a decentralized
economy. Mr. Leibenstein, Mr. Scitovsky, Mr. Papandreou.
   200B. Macro-economics: general interdependence and the behavior of aggre­
gregates in a decentralized economy. National income and employment de­
termination. The impact of fiscal and monetary policies on employment,
national income and its distribution. Mr. Wolfe, Mr. Scitovsky, Mr. Papan­
dreou.

201A–201B. History of Economic Thought. (3–3) Yr.
   Mr. Letiche
   Analysis of the classical system of value and distribution theory; neo­
classical thought; contributions of eclectics, socialists, and institutionalists.

   (3–3) Yr.
   Mr. Uzawa, Mr. Scitovsky
   Prerequisite: course 200A–200B.
   A review and critical analysis of contemporary and traditional literature
   on these subjects.

203. Advanced Topics in Economic Theory. (3) II.
   Mr. Marris
   Contemporary trends and problems in the theory of the firm.

*204A–204B. Advanced Theory of Interest, Capital, and Employment.
   (3–3) Yr.
   Prerequisite: course 200A–200B.

   (3–3) Yr.
   Mr. Leibenstein, Mr. Ellis
   Theory of economic change; relation of such theories to general economic
   theory. Institutional patterns of development; changes in resource and
   product composition.

*206A–206B. Social Reform Movement. (3–3) Yr.
   Mr. Arrow

207A–207B. Mathematical Economics. (3–3) Yr.
   Mr. Radner,
   Prerequisite: course 200A–200B, Mathematics 4, 111, Statistics 113; or
   consent of the instructor.
   207A. Theories concerning individual economic agents: decision under
   uncertainty, planning through time; investment, production, inventory con­
trol, other applications.
   207B. Groups of agents: organization and game theories; equilibrium,
stability, welfare aspects of various price systems and of other processes of
   economic adjustment.

*208. Seminar in Economic Theory. (3) I.
   Prerequisite: course 200A–200B or equivalent and consent of the in­
tstructor.
   A course devoted to the presentation of research papers by students on
topics to be decided in consultation with the instructor.

210A-*210B. Advanced Study in Economic History. (3–3) Yr.
Prerequisite: consent of the instructor. Mr. Cipolla, ________
The purpose of this course is to enable graduate students with special
interest in economic history to carry out advanced study in some phase of
the field. Topics will be announced annually.
210A. Sec. 1: World demographic history from the time of the Roman
Empire to the present day. Mr. Cipolla
*Sec. 2: The Industrial Revolution.
*210B. Sec. 1.

211. Economic History of Japan. (3) I. Mr. Rosovsky
The economic development of Japan, with emphasis on the modern period.

212A–212B. Topics in Economic History. (3–3) Yr. Mr. Cipolla, Mr. Rosovsky
A course devoted to the historical treatment of some of the following
analytical categories: population, consumption patterns, income distribu-
tion, geographical extension of markets, the role of government, entrepre-
neurship, capital, technology, and resources.

215. Seminar on the Chinese Economy. (3) II. Mr. Li
A study of the Chinese economy: national income, capital formation,
public finance, industry, agriculture, internal and external trade, popula-
tion, labor force, and consumption.

216. Comparative Economic Systems. (3) II. Mr. B. Ward
Comparative study of economic systems in terms of their organization
and institutions, their prevailing values and goals, and various aspects of
their economic performance.

Prerequisite: course 100A–100B or consent of the instructor.
217A. The theory and techniques of economic planning.
217B. Studies of planning in selected countries.

218. Seminar on the Soviet Economy. (3) I. Mr. Campbell
Population and labor force, national income, investment, structure of the
economy, financial system, prices, planning. Problems in research and
analysis.

221A–221B. Industrial Organization. (3–3) Yr. Mr. Bain
The organization and structure of the American enterprise economy, with
special reference to manufacturing and processing industries. Competitive
behavior, price policy, and workability of competition in such industries.

230A–230B. Public Finance. (3–3) Yr. Mr. Rolph, Mr. Break
Public finance and taxation theory; public debt and fiscal policy; public
policy with respect to taxation.

233A–233B. Dynamic Economic and Business Fluctuations. (3–3) Yr.
Mr. Gordon

235A–235B. Advanced Money and Banking. (3–3) Yr. Mr. Ellis
Analysis of banking institutions and money, monetary theory, and mone-
tary policy.

236. Seminar in Monetary and Fiscal Theory, and Policy. (3) II.
Mr. Gordon, Mr. Minsky, Mr. Ulman
Prerequisite: course 233A–233B, 235A–235B, or 230A–230B.

Analysis of fiscal monetary devices under varying conditions, with particular reference to the United States and Western Europe.
In 1960–1961 this seminar will deal with the process of inflation in Western countries, particularly the United States.

238. Theory and Measurement of the National Income. (3) II.
Mr. Mattessich
Prerequisite: courses 2 and 100A–100B. Recommended: some knowledge of accounting.
Survey of the theory underlying alternative methods of measurement and review of the methods used in the United States and other countries.

Mr. Radner, Mr. Lee
Prerequisite: Statistics 131 or equivalent.
Special problems in the application of statistical methods to economics, illustrated by a representative selection of empirical studies.

243. Introduction to Econometrics. (3) II.
Mr. Lee
Prerequisite: course 242; Mathematics 190A–190B or equivalent.

250A–250B. Advanced Labor Economics. (3–3) Yr.
Mr. Gulick
Prerequisite: two courses in labor, including some European labor history, and consent of the instructor. 250A is not prerequisite to 250B.
An intensive reading course covering classic and current material.

252A–252B. Seminar in Labor Economics. (3–3) Yr.
Mr. Galenson, Mr. Kerr, Mr. Ulman

254A–254B. Seminar in Agricultural Labor in Advanced and in Underdeveloped Countries. (3–3) Yr.
Mr. Taylor
Prerequisite: consent of the instructor.
Agricultural workers of wage and lower tenure status, in advanced and underdeveloped countries, including such aspects as status, collective bargaining, social legislation, land reform, productivity, impact of mechanization, and role in economic development and politics.

288. Population and Economic Development. (3) II.
Population and migration problems in economic development.

290A–290B. International Economics. (3–3) Yr.
Mr. Caves
The world economy as a general equilibrium system; growth, short-run disturbances, and adjustment in the balance of payments of member countries; restrictions, welfare, and policy.

291. Research in International Economic Relations. (3) I and II.
Open to graduate students in any department.
Research on current problems of international economic interest.

292. International Finance. (3) I.
Balance of payments analysis; national and international currencies; variations of exchange rates, prices and national incomes and international equilibrium; capital movements and investments; exchange controls, international payment systems and institutions; United States foreign policy.

293. Economic Development and Industrialization. (3) II.
Prerequisite: course 290A–290B or consent of the instructor.
Problems of capital accumulation, foreign borrowing, saving, inflation, patterns of industry, economic development and trade, improved efficiency.

in labor and land utilization, etc., in relation to deliberate development ef­
forts in low income areas.

298. Research. (1–6) I and II. The Staff (Mr. Minsky in charge)
Open to candidates for the Ph.D. degree who have passed the qualifying
examination and who are engaged in research for the thesis, and in special
cases, with consent of the instructor in charge, to graduate students who
desire to do special work in a particular field.

299. Individual Study. (3) I and II. The Staff (Mr. Minsky in charge,
fall semester; Mr. Rosovsky, spring semester)
Economics of Agricultural Production and Consumption (Agricultural
Economics 200A–200B). (3–3) Yr. Mr. Hoos, Mr. Kuznets
Rural Sociology (Agricultural Economics 112A–112B). (2–2) Yr.
Mr. Taylor
Introduction to Social Science (Social Science 1A–1B). (3–3) Yr.
Mr. Feuer, Mr. Burdick
Statistical Inference for Social Scientists. (Statistics 131.) (3) I and II.
Mr. Cogburn, Mr. Radner
Laboratory Course in Statistical Inference for Social Scientists. (Statistics
131L.) (1) I and II.
Mr. Radner in charge, Mr. Cogburn
Survey of Algebra and Analysis. (Mathematics 190A–190B.) (3–3) Yr.
Mr. Helson, Mr. Uzawa
Seminar on Statistical Problems in Economics and Agricultural Economics
(Statistics 290W). (2–4) I.
Mr. Kuznets

EDUCATION

(Department Office, 207 Haviland Hall)

William A. Brownell, Ph.D., LL.D., Professor of Education (Chairman of the
Department).
Harold D. Carter, Ph.D., Professor of Education.
Jack A. Holmes, Ph.D., Professor of Education.
Frederic Lilge, Ph.D., Professor of Education.
Thomas R. McConnell, Ph.D., LL.D., D.H.L., Professor of Education.
Leland L. Medsker, Ed.D., Professor of Education.
John U. Michaelis, Ph.D., Professor of Education.
Edgar L. Morphet, Ph.D., Professor of Education.
J. Cecil Parker, Ed.D., Professor of Education.
Theodore L. Reller, Ph.D., Professor of Education.
David H. Russell, Ph.D., Professor of Education.
James C. Stone, Ed.D., Professor of Education and Director of Teacher Edu­
cation.
J. Chester Swanson, Ph.D., Professor of Education.
Frederick T. Tyler, Ph.D., Professor of Education.
Edna W. Bailey, Ph.D., Professor of Education, Emeritus, and Associate Di­
rector of Supervised Teaching, Emeritus.
Guy T. Buswell, Ph.D., LL.D., Professor of Education, Emeritus.
Frank N. Freeman, Ph.D., LL.D., D.Sc., Professor of Educational Psychology,
Emeritus.

Luther C. Gilbert, Ph.D., Professor of Education, Emeritus.
Frank W. Hart, Ph.D., LL.D., Professor of Education, Emeritus.
Merton E. Hill, Ed.D., Professor of Education, Emeritus.
Mary C. Jones, Ph.D., Professor of Education, Emeritus.
George C. Kyte, Ed.D., Professor of Education, Emeritus.
George A. Rice, Ed.D., Professor of Education, Emeritus, and Director of Supervised Teaching, Emeritus.
Lars H. Peterson, Ph.D., Associate Professor of Education, Emeritus.
Thomas Bentley Edwards, Ph.D., Associate Professor of Education.
*Walter D. Loban, Ph.D., Associate Professor of Education and Supervisor of the Teaching of English.
†Jack London, Ph.D., Associate Professor of Education.
S. E. Torsten Lund, Ph.D., Associate Professor of Education.
Richard D. Mosier, Ph.D., Associate Professor of Education.
Lawrence H. Stewart, Ed.D., Associate Professor of Education.
Val E. Arnsdorff, Ph.D., Assistant Professor of Education.
Arthur R. Jensen, Ph.D., Assistant Professor of Education.
Aubrey H. Roden, Ph.D., Assistant Professor of Education.
Royce R. Ronning, Ph.D., Assistant Professor of Education.
John G. Ross, Ed.D., Assistant Professor of Education.
Lloyd F. Scott, Ph.D., Assistant Professor of Education and Coordinator of Laboratory Schools.
Walter R. Stellwagen, Ph.D., Assistant Professor of Education.
Martin A. Trow, Ph.D., Assistant Professor of Education and Sociology.

‡Stanley B. Brown, Ed.D., Lecturer in Education and Supervisor of Audio-Visual Education.
Enoch Dumas, Ed.D., Lecturer in Education, Associate Director of Teacher Education, and Supervisor of Elementary Education.
Leah Hirsch, M.D., Lecturer in Education.
M. Ray Hitch, M.A., Lecturer in Education and Supervisor of the Teaching of Business Education.
Barbara Kirk, M.A., Lecturer in Education.
George H. Kyme, Ph.D., Associate in Music and Supervisor of the Teaching of Music.
Robert D. Muscio, Ed.D., Lecturer in Education.
Karl E. Schevill, Ph.D., Lecturer in Education, Associate Director of Teacher Education and Supervisor of the Teaching of Foreign Languages.

Meidel Applegate, M.A., Associate Supervisor of Secondary Education.
Neva Aubin, M.A., Supervisor of Elementary Education.
Donetta C. Brainard, A.B., Assistant Supervisor of the Teaching of English.
Marilyn H. Cutright, M.A., Supervisor of Elementary Education.
Edmund Farrell, M.A., Supervisor of Secondary Education.
Barbara J. Grant, M.A., Supervisor of Elementary Education.
Robert F. Hogan, M.A., Supervisor of Secondary Education.
Katharyn Hole, Supervisor of the Teaching of Art.
Margaret C. Jackson, M.A., Supervisor of Elementary Education.
Lena S. Jaggard, A.B., Supervisor of the Teaching of Social Studies.
Constance C. L'Aventure, A.B., Supervisor of Secondary Education.
Mark C. Luca, Ph.D., Supervisor of Elementary Education.
William G. McCarthy, Ed.D., Supervisor of Elementary Education.
Eugene McCreary, M.A., Supervisor of Secondary Education.

† In residence spring semester only, 1960–1961.
Education

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Grace M. Maertins, M.A., Supervisor of Secondary Education.
Anne F. Merrill, M.A., Supervisor of Elementary Education.
Elizabeth A. Mott, M.A., Supervisor of Secondary Education.
John A. Nelson, Jr., M.A., Supervisor of Secondary Education.
Heber A. Newsom, M.A., Supervisor of Physical Education and Supervisor of the Teaching of Physical Education for Boys.
Arnold R. Pagano, M.A., Supervisor of Elementary Education.
Claire N. Pederson, Ed.D., Supervisor of Secondary Education.
T. Clyde Polson, Ph.D., Supervisor of the Teaching of Science.
Lorine Prochaska, Ed.D., Supervisor of Secondary Education.
Leo P. Ruth, A.B., Supervisor of Secondary Education.
Philip J. Sinnott, M.A., Supervisor of Elementary Education.
Josie W. Stewart, M.A., Supervisor of the Teaching of Kindergarten Work.
Mary K. Stiles, M.S., Supervisor of Secondary Education.
Staten W. Webster, Ph.D., Supervisor of the Teaching of Social Studies.
Rosalie V. Zari, M.A., Supervisor of Junior High School and Elementary Education.

Letters and Science List.—Course 100A, and not more than 3 units from 101, 102, and 105 are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Advisers: Mr. Lund, Mr. Tyler.

TEACHER-EDUCATION CURRICULA

Special provision is made for the professional education of teachers of two classes:
A. Those preparing to become teachers in elementary and secondary schools or in colleges.
B. Those preparing to engage in school administration or supervision, to become principals or superintendents of public schools, or to teach in teachers colleges or in college departments of education.

For detailed requirements, see the ANNOUNCEMENT OF THE SCHOOL OF EDUCATION.

For courses offered at Davis, see the GENERAL CATALOGUE, DAVIS.

UPPER DIVISION COURSES

Prerequisite: junior standing and Psychology 1A or the equivalent.

100A. Learning and the Learner. (4) I and II.
Prerequisite: Psychology 1A. Mr. Roden, Mr. Ronning, Mr. Tyler
Individual differences and their measurement; physical and mental growth; learning and the evaluation of learning; personality development and mental hygiene. Systematic observations of children in the public schools.

100B. The School in American Society. (3) I and II.
Mr. Lund, Mr. Edwards, Mr. Loban, Mr. Schevill, Mr. Stone, Mrs. Zari
The school as a social institution; historical development of current purposes and programs of education; the role of the teacher. Systematic observations in schools and other social agencies. Ordinarily to be taken after 100A, but may be taken concurrently. Sections 1–5 elementary, sections 6–10 secondary.

101. The History of Education—General Course. (3) I. Mr. Mosier
The development of educational thought and practice viewed as a phase of social progress.

102. The History of American Education. (2) II. Mr. Mosier
The leading ideas and ideals of American education and the institutions in which they have been embodied.
105. **Education in Foreign Countries.** (2) I. Mr. Lilge

Education as an instrument of political power and propaganda; its dependence on national cultural traditions. Especially valuable to students pursuing the study of a specific region.

106. **Philosophy of Education.** (2) I and II. Mr. Lilge

The great educational classics and their meaning for modern man.

*109. **Problems in the Sociology of Education.** (3) I. Mr. Trow

The basic perspectives and methods of contemporary sociology as applied to selected problems in education. Readings in significant sociological theory and research, with a critical examination of their usefulness to the field of education.

112. **The Improvement of Reading in Schools.** (2) I. Mr. Holmes

Psychology of learning as it relates to effective reading readiness programs, development of word meaning, organization and analysis, improvement of comprehension, recall, skimming and speed reading, study skills and higher mental processes, provision for individual differences in ability and interest, place of skills in modern reading program.

114. **Statistical Methods in Education.** (3) I and II. Mr. Stellwagen

Prerequisite: 100A or former course 110. Mathematics D is also recommended.

115. **Objective Tests and Measurements.** (2) II. Mr. Ronning

Prerequisite: 100A or former course 110 or the equivalent, and 114.

Principles and functions of measurement in education; varieties of measurement in common use; the construction and validation of objective examinations; the improvement of school marks.

116. **The Exceptional Child.** (2) I and II.

Prerequisite: 100A or former course 110 or a course in psychology in addition to Psychology 1A.

*117. **Psychology of High School Subjects.** (2) I.

Prerequisite: 100A or former course 110.

A psychological analysis of the various subjects of the high school curriculum, with a survey of psychological experiments.

119. **Standard Tests in Education.** (3) I and II. Mr. Carter

Prerequisite: course 100A or equivalent.

A critical survey and evaluation of standard tests, including achievement and psychological tests available for school purposes; practice in giving and scoring tests, and interpreting results for the improvement of instruction; organization of a testing program.

127. **Principles of Teaching the Slow Learner.** (2) I.

Prerequisite: teaching experience. This course may be counted toward the special credential for working with mentally retarded children.

Principles of adapting the curriculum, materials, and methods of teaching to the needs of the mentally handicapped child.

130. **The Elementary School Curriculum.**

Prerequisite: course 100A and 100B, except by special permission of the teacher education adviser.

Selection and placement of content; organization of program; analysis of instructional materials; evaluation. 130A, B, C, and D may be taken in any sequence.

* Not to be given, 1960-1961.
130A. Arithmetic. (2) I and II. Mr. Dumas, Mr. Muscio, Mr. Scott
(Formerly numbered 131.)

130B. Art and Music. (2) I and II. Mrs. Aubin, Mr. Kyme, Mr. Luca
(Formerly numbered 132.)
Prerequisite: Decorative Art 6A, Music 10.

130C. Reading and the Other Language Arts. (3) I and II.
(Formerly numbered 134.)

130D. Social Studies and Science. (3) I and II.
(Formerly numbered 138.) Mr. Arnsdorf, Mr. Michaelis

151. Administration of the School Health Program. (2) I and II.
Mrs. Hirsch
Organization and administration of school health work; public health aspects of school hygiene in relation to school physician, nurse, principal, and teachers.

*152. Health Problems in the Secondary Schools. (2) I.

153. Mental Hygiene—Elementary. (2) I and II.
Mr. Roden
Prerequisite: 100A or former course 110.
A basic course concerned with problems of childhood.

*154. Mental Hygiene—Advanced. (2) I.
Mr. Roden
Prerequisite: course 153 or the equivalent.

160. Vocational Education. (2) I.
Philosophy and organization of vocational education of less than college grade, with particular reference to principles underlying education for industry, agriculture, commerce, homemaking, and continuation education.

164. Pupil Personnel, Counseling, and Guidance. (2) I and II.
Mr. Hitch
This course is for nonmajors in student personnel and counseling psychology.
Nature, scope, organization, and administration of personnel services in educational institutions. Basic guidance techniques.

167. Personality Theory in Counseling. (2) II
Mr. London
Critical analysis of personality theories and their relationships to counseling theories.

170. Junior High School Education. (2) I.
Prerequisite: 100A or former course 110 (may be taken concurrently).

174. Reading and Literature at the Secondary Level. (2) II.
Mr. Loban
A survey of the literature read by adolescents, together with an examination of their reading problems and interests; an analysis of reading as employed in subject-matter areas other than English; an evaluation of relevant research with application to the classroom.

181. Adult Education. (3) I and II.
Mr. London
The functions and possibilities of adult education in our society. The resources available to those who do educational work with adults in public schools and other community agencies. The role of the public schools in facilitating cooperation among these agencies.

*182. Problems of Adulthood. (3) II.  
The examination of certain general psychological and sociological problems of adults. This course will be primarily concerned with physical growth, mental abilities, interests, attitudes, adjustments, and scope of activities in adulthood and old age.

*186. Laws Relating to Schools and to Children. (2) I.  
Mr. Morphet  
School laws and those aspects of labor and welfare laws applicable to school children.

199. Special Study for Advanced Undergraduates. (1-5) I and II.  
The Staff (Mr. Brownell in charge)

**GRADUATE COURSES**

As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation will consist normally of the completion of at least 12 units of upper division work basic to the subject of the graduate course.

The admission of undergraduates to graduate courses is limited to seniors who have an average grade of at least B in the basic courses; the study-list limits in such cases are the limits imposed by the rules of the Graduate Division.

200A. Social Foundations of Education. (3) I and II.  
A study of the interrelations of the school and society, of the complexity of the culture in which education functions, and of the political and social relations of the school to contemporary American society.

200B. Psychological Foundations of Education. (3) I.  
Mr. Brownell  
(Formerly numbered 210A.)  
Prerequisite: 8 units in educational psychology and/or psychology.  
A systematic course designed to organize and to integrate the field of educational psychology at an advanced level.

200C. Foundations of Curriculum Development. (3) II.  
Mr. Parker  
A basic course in the general concepts, principles, and practices of curriculum development, and the construction and evaluation of specific curricula.

200D. Public School Organization and Administration. (3) I and II.  
Mr. Reller  
Enrollment restricted to nonmajors in administration.  
The principles and practices of educational administration with respect to the teacher and the administrative personnel, state and local administrative organization, finance and business procedures, public relations.

201A–201B. History of Education. Seminar. (2–2) Yr.  
Mr. Mosier  
The theory and practice of historical inquiry as applied to research in the history of education.  
Admission on consultation with the instructor.

203. Problems in the History of Education. (2) I and II.  
Mr. Mosier  
Admission on consultation with the instructor.  
An analytic and critical consideration of the literature in the history of education relating to selected issues in educational theory and practice.

206A–206B. Philosophy of Education. Seminar. (2–2) Yr.  
Mr. Lilge  
Admission on consultation with the instructor.

209. Philosophical Issues in Contemporary Education. (2) II. Mr. Lilge
Admission on consultation with the instructor. For graduate nonspecialists and majors in the history and philosophy of education.
A critical analysis of educational issues and their relation to major philosophical positions. Readings principally from significant current publications.

210. The Learning Process. (2) II. Mr. Tyler
Prerequisite: consent of the instructor. Doctoral candidates in educational psychology may not register for this course.
Limited to human learning and directed particularly to problems of school learning in the areas of skills, concept formation, problem solving, and aesthetic appreciation.

211B. Children's Thinking. (2) II. Mr. Russell
Prerequisite: consent of the instructor.
A study of children's learning and thinking from the developmental point of view, with particular reference to the influence of the home and the school; the role of perceptual and emotional factors in children's thinking; the development of children's concepts, problem-solving abilities, and creative thinking.

212. Analysis of Difficulties in Reading and Language Arts. (2) II. Mr. Holmes
Clinical procedures in the study of pupils who are failing in reading, spelling, and oral and written composition; various types and causes of failures; use of educational and psychological tests and informal analyses; corrective methods.

213. Individual Intelligence Tests in Guidance. (2) I. Mr. Jensen
Prerequisite: courses 100A, or former course 110, 111, 114 or their equivalent.
A critical analysis of the history and techniques of individual intelligence testing. While the theory of individual intelligence testing is emphasized, some supervised practice in administering, scoring, and interpreting both the 1937 Revised Stanford-Binet and the Wechsler-Bellevue scales is a regular requirement of the course.

214A. Advanced Statistics with Application to Methods of Educational Investigation. (2) I. Mr. Stellwagen
Prerequisite: a course in elementary statistics and consent of the instructor.
For students conducting investigations involving statistical analysis, or expecting to teach tests and measurements and statistical methods in colleges.

214B. Factor Analysis. (2) II. Mr. Stellwagen
Prerequisite: Education 114, 214A.
The theory and application of factor analysis to educational and psychological data.

215. Advanced Educational Psychology.
Prerequisite: consent of the instructor.
A systematic and critical appraisal of the scientific literature of the field.

215A. Principles and Theories of Psychological Measurement. (4) I. Mr. Carter
Primarily for doctoral candidates in educational psychology.
The development and application of methods of measuring human behavior, including intelligence, interests, attitudes, adjustments, etc.

215B. Psychology of Learning. (4) I. Mr. Jensen
Primary for doctoral candidates in educational psychology.
Learning and learning theory.
215C. Human Development: Individual Differences. (4) I. Mr. Tyler
Primarily for doctoral candidates in educational psychology.
The facts, principles, and generalizations concerning the nature of,
and the factors related to, individual differences in human growth and
development.

215D. Human Development: Factors in Personal and Social Development. (4) II.
Mr. Roden
Primarily for doctoral candidates in educational psychology.
A survey of recent research in the field of child development, with
special reference to the literature on early childhood experiences, peer
relationships, cultural influences, determinants of self-concepts.

217A. Experimental Education. (2) I.
Mr. Holmes
Admission on consultation with the instructor.
Laboratory experiments, with special reference to the more elaborate tech­
niques applied to the various school subjects. The course includes voice re­
cording, photographing eye movements in reading and spelling, analysis of
rhythm in reading, arithmetic, and writing, and studies of the motor re­
sponses accompanying appreciation. Each member of the class will participate
in all experiments.

217B. Experimental Education. (2) II.
Mr. Holmes
Prerequisite: course 217A.
Students will be expected to complete an advanced laboratory project.

218A. The Psychological Bases of the Curriculum in Elementary Schools.
(2) II.
Mr. Russell
(Formerly numbered 118.)
Psychological problems in the use of materials and methods in the ele­
mentary school program. Part of the students' work will be a special study
of psychological research in a selected area.

218B–218C. Investigations in the Curriculum of the Language Arts. (2–2)
Yr.
(Formerly numbered 218A–218B.)
Prerequisite: consent of the instructor.
A study of available and needed research in selected areas of the language
arts. Some emphasis will be given to topics such as communication in modern
life, child development in language abilities, language and thought, inter­
relationships of language and personality and curricular problems in the
language arts. Students will work intensively in one area of special interest.

218D. Investigations in the Curriculum of Arithmetic. (2) II.
(Formerly numbered 219.)
Mr. Brownell
Prerequisite: consent of the instructor.
A critical analysis of selected research reports relating to the teaching and
learning of arithmetic, with comprehensive reading and evaluation of re­
search on problems of special interest to individual students.

*226. Curriculum Construction. (2) II.
Mr. Parker

*227. Problems in Curriculum Development Practicum. (2) I.
Mr. Parker
Prerequisite: two courses in elementary and/or secondary curriculum,
teaching experience, graduate standing, and consent of the instructor. De­
signated especially for teachers, principals, and superintendents who wish to
make specific plans and develop materials for specific curriculum problems
in their schools.

**229. In-Service Programs for School Personnel.** (2) I. Mr. Parker
Prerequisite: school experience. Designed for principals, directors, super­visors, superintendents, and for teachers with interest or responsibility for in-service education.
Current practices, problems, principles, and procedures in in-service education programs for public school personnel, with emphasis upon evaluation.

**231. Administration of Elementary Education Practicum.** (2) I.
Prerequisite: consent of the instructor.

**233A-233B. Supervision of Elementary Education Practicum.** (2-2) Yr.
Prerequisite: consent of the instructor.

**235. The Elementary School Curriculum.** (2) II.
Prerequisite: consent of the instructor.

**236A-236B. Evaluation of Elementary Education.** (2-2) Yr.
236A. II; 236B. I. Mr. Michaelis,
Prerequisite: consent of the instructor.
Critical analysis of theories and principles of evaluation applied to elementary education; review of pertinent research studies in evaluation dealing with all aspects of elementary education.

**237. Trends in Elementary Education.** (2) I. Mr. Michaelis
Prerequisite: graduate standing and completion of at least 12 units in education.
A survey of current practices descriptive of the emerging elementary school in the United States, with special attention to their implications for the student's own professional needs.

**241A-241B. Introduction to Educational Administration.** (4-4) Yr.
Mr. Morphet, Mr. Swanson
Prerequisite: consent of the instructor. Required for the master's degree in educational administration and for various administrative credentials.
A comprehensive introduction to the principles, practices, and literature of educational administration.

**242. Advanced Study in the Theory and Practice of Educational Administra­tion.**
Prerequisite: course 241A-241B and consent of the instructor.
Designed to provide opportunity for advanced study in the theory and practice of educational administration at elementary, secondary, and adult education levels. Opportunity will be provided for exhaustive study of the basic related disciplines and problems in the respective areas.

**242A. Local, State, and Federal Organization; Education and Government; Education Law.** (2-4) II.
Mr. Reller

**242B. Administration of Educational Programs and Services; Pupil Personnel Services.** (2-4) I.
Mr. Swanson

**242C. Administrative Behavior and Organization; Personnel Adminis­tration.** (2-4) I and II.

**242D. Finance and Business Administration.** (2-4) II. Mr. Morphet

**242E. School-Community Relations and Schoolhousing.** (2-4) I.
Mr. Reller

* Not to be given. 1960-1961.
261. Student Personnel and Counseling Psychology. Mr. Stewart
Prerequisite: courses 213 or 100A, or former course 110, 111 and 114.
Primarily for students working for graduate degrees in the field or for credentials in pupil personnel and counseling or child welfare and attendance work.
A systematic course designed to organize and integrate the field of student personnel and counseling psychology at an advanced level.

261A. Principles and Theories of Guidance. (2) I. Mr. L. H. Stewart
The development and scope of guidance work as a profession; critical analysis of basic philosophies, ethics, and professional responsibilities.

261B. Environmental Factors in Counselor Adjustment. (2) I. 
Theories of environmental interaction in personal adjustment and the counseling process. Also includes labor market dynamics, occupational surveys and studies, investigation of training opportunities. Sources and interpretation of data.

261C. Group Guidance. (2) II.
A critical analysis of the literature on group dynamics and social psychology applicable to group procedures in counseling and personnel work. Theory, function, and operation of group guidance activities in an educational setting.

261D. Individual Appraisal in Counseling. (2) II. Mr. Stewart
Prerequisite: courses 114, 119, and consent of the instructor.
Theory and practice of psychological evaluation of counselees. Major emphasis upon aptitude, interest, and attitude tests; validity; reliability; and normative data.

266A-*266B. Advanced Counseling Theory. (2-2) Yr. 
Prerequisite: course 261 and consent of the instructor.
Counseling theory, schools of counseling, intensive investigation of counseling techniques, diagnostic procedures and treatment, evaluation of counseling.

272A. Secondary School Curriculum: Basic Principles. (2) I. Mr. Edwards
Prerequisite: course 100A or former courses 110, 111, 170, or their equivalent, graduate standing, and consent of the instructor.
For advanced students who wish to make a thorough study of the basic principles of curriculum development, with special reference to the secondary school.

272B. Secondary School Curriculum: Techniques of Curriculum Making. (2) II. Mr. Edwards
Prerequisite: course 272A, graduate standing, and consent of the instructor.

273. Supervision in Secondary Schools. (2) I and II. Mr. Edwards
Prerequisite: course 130 or 170, teaching experience, and consent of the instructor.
The organization, function, and techniques of supervision, with special reference to secondary schools.

275. Secondary Education: Survey. (2) II. Mr. Lund
Survey and critical review of secondary education literature, including research studies, yearbooks, reports, and other documents. Admission on consultation with the instructor.

279. The Junior College. (2-4) I and II. Mr. Medsker
The nature and role of the junior college in American education, including a consideration of purposes, curriculum, principles of learning, development and utilization of instructional materials, and student personnel services.
Credential candidates without teaching experience will register for 4 units of credit. Students not seeking the junior college credential may enroll for either 2 or 4 units.

*281A–281B. Adult Education Seminar. (2–2) Yr. Mr. London
(Formerly numbered 281.)
Prerequisite: course 181 or experience in adult education.
Discussion of current problems and literature in adult education, with opportunity for members of the course to work on a solution of one of these problems or of a problem which confronts them in their work.

285. Higher Education in the United States. (3) I. Mr. McConnell
Prerequisite: consent of the instructor.
Analysis of trends and problems in higher education, with emphasis on functions and educational programs of the several types and levels of institutions; admission and counseling of students; instructional problems and the administration, control, and financing of public and private colleges and universities.

288. Seminar in Higher Education. Mr. McConnell, Mr. Stone
Prerequisite: course 285 or consent of the instructor.
Intensive study of selected problems in higher education.

288A. The Student in Higher Education. (2) II.

288B. The Curriculum of Higher Education. (2) II.

288C. The Administration of Higher Education. (2) I.

*292. Research Techniques. Seminar. (2) I.
Research problems in education; historical and scientific methods; design of investigations; bibliographical techniques, statistical methods, survey methods, and laboratory techniques; methods of reporting results.

293. Surveys and Field Studies. (2) I and II. Mr. Ross, Mr. Swanson
The theory, techniques, procedures, and results of surveys and field studies.

294. Seminar. (2–4) I and II.
Prerequisite: consent of the instructor.
Required of all master's and doctor's candidates in connection with seminar papers and dissertations.

* A. Adult Education.
B. Educational Administration. I. Mr. Reller, Mr. Swanson
C. Educational Curriculum. I. Mr. Parker
D. Educational Psychology. I. Mr. Carter
E. Educational Sociology. II. Mr. Trow
F. Elementary Education. I. Mr. Michaelis, Mr. Russell
G. Higher Education. I. Mr. Stone
H. History of Education.
I. Philosophy of Education.
J. Secondary Education. I. Mr. Lund
K. Student Personnel and Counseling Psychology. I. Mr. L. H. Stewart

298. Directed Research Seminar. (2-4) I and II.
   The Staff (Mr. Brownell in charge)
   Admission only with consent of the instructor in charge. Open only to candidates for the Ph.D. and Ed.D. degrees who have passed the departmental qualifying examinations and who present an approved plan of research, and in special cases, to students who present evidence of qualifications and approved plans for carrying on a particular type of research.

313. School Psychologist Internship. (4) II.
   Mr. L. H. Stewart, Mr. Jensen
   Prerequisite: course 213 and consent of the instructor.
   Four to eight hours per week will be spent in supervised field work in which interns will make case reports and will participate in case conferences and staff meetings concerned with diagnosis and prognosis and the formulation of remedial procedures.

325. Field Work in Student Personnel and Counseling Psychology. (2) I and II.
   Mrs. Kirk
   Prerequisite: consent of the instructor.
   Supervised practice in selected aspects of student personnel services and counseling psychology at elementary, secondary, or college level, and in other agencies. The nature of the assignment will vary with the background and needs of students.

340. Directed Field Study and Internship in Educational Administration. (2-4) I and II.
   Mr. Morphet, Mr. Ross
   Prerequisite: courses 241A-241B and 293, and consent of the instructor.

Supervised Teaching

Students must reserve a three-hour period daily. Applications for admission to these courses must have been made in 103 Haviland Hall, not later than April 4, 1960, for the fall semester, 1960; not later than November 7, 1960, for the spring semester 1961; and not later than April 3, 1961, for the fall semester, 1961. Enrollment is limited to available facilities.

   Mr. Stone, Mr. Schevill, and Supervisory Staff
   The University of California will accept only those candidates who meet the requirements set up by the State Department of Education in health, including specifically sight and hearing.
   Education 320A, 320C, 320E, 323, and 324 are scheduled as extra-session courses, to begin with the opening of the public schools and to end with the closing of the semester in the public schools. Thus, teaching assignments in the fall semester, 1960, will begin on or about September 8 and end January 29. For the spring semester, 1961, they will begin on or about February 1 and end June 10. Students should make arrangements accordingly.
   A limited number of block assignments in junior or senior high schools may be made available for highly qualified students who wish to enroll only in supervised teaching and methods courses in one semester and to spend virtually all of their time during the school week in teaching and allied assignments in the public schools. These block assignments should not be regarded as a means of advancing the date for the completion of credential requirements. Applications will be accepted only from superior students who have completed all prerequisites and who desire intensive professional experience. Students should consult Mr. Schevill.

320A. Secondary Supervised Teaching. (3) I and II.
   Mr. Stone, Mr. Schevill, and Supervisory Staff
   Lectures, conferences, observations, and supervised teaching. Prerequisite: course 100A or former courses 110, 111, 170, 320B. Course 320E (major field)
must be taken concurrently with course 320A. In order to enroll in Education 320A, students should meet the grade-point requirements listed on page 122 and must have been admitted to the Graduate Division.

Note that this is an extra-session course, beginning and ending with the semester in the public schools (see above).

320B. Introduction to Teaching in Secondary Schools. (2) I and II.
   Mr. Applegate, Mr. Brown, Mr. Nelson
Prerequisite: course 100A. Ordinarily course 320B should be taken concurrently with course 100B.
Introduction to the curriculum of the secondary school in subject fields. It will include directed experience as teacher aides and laboratory work on utilization of instructional resources, including audio-visual materials. Students must reserve time for 15 hours of experience as teacher-aides in public school classrooms. Pre-enrollment is required.

320C. Supervised Teaching. (3) I and II.
   Mr. Stone, Mr. Schevill, and Supervisory Staff
Conferences, observation, and supervised teaching. Prerequisite: course 100A or former courses 110, 111, 170, 320A, 320B. Students must reserve a three-hour period daily.
Note that this is an extra-session course, beginning and ending with the semester in the public schools (see page 128).

320E. Methods of Teaching. (2) I and II.
   Mr. Stone, Mr. Schevill, and Supervisory Staff
Lectures, conferences, and laboratory.
Note that this is an extra-session course, beginning and ending with the semester in the public schools (see page 128).
All students enrolled in 320A or 324 must carry concurrently one of the following sections:

- Sec. 2. Life Science and Physical Science.
- Sec. 3. Mathematics.
- Sec. 4. English.
- Sec. 5. Foreign Languages.
- Sec. 6. Social Studies.
- Sec. 7. Social Studies.
- Sec. 8. Physical Education for Men.
- Sec. 9. Physical Education for Women.
- Sec. 10. Art.
- Sec. 11. Homemaking.
- Sec. 12. Music.
- Sec. 13. Business Education.
- Sec. 16. Junior College.
- Sec. 17. Special Education.

Admission on approval by the instructor. Hours to be arranged.

School Library Administration (Librarianship 206). (2) II. Mrs. Durham
This course is required of all applicants for the librarianship credential or for the general secondary credential with major in librarianship.

323. Practicum in Supervised Teaching. (2–4) I and II.
   Mr. Schevill
Prerequisite: a course in supervised teaching or experience as a teacher, and consent of the instructor. Candidates who are graduates of other institutions must submit transcripts of record at the time of application.

Note that this is an extra-session course, beginning and ending with the semester in the public schools (see page 128).

An opportunity to obtain more extended and varied experience under supervision.

324. Junior College Supervised Teaching. (4) I and II. Mr. Schevill
Conferences, observation, and supervised teaching. Prerequisite: course 279. Course 320E, Sec. 16, must be taken concurrently.
Students should reserve a four-hour time block daily and should note that this is an extra-session course, beginning and ending with the semester in the public schools (see page 128).

330. Elementary Supervised Teaching, Professional Methods. I and II.
Mr. Dumas, and Supervisory Staff
The University of California will accept for teacher education only those candidates who meet the requirements set up by the State Department of Education in health, including specifically sight and hearing.
Students must have not less than a grade-point average of 2.5 in the work of the upper division in order to enroll in courses 330A and 330C. Graduate standing is prerequisite to course 330 C.
For students enrolled in Education 330C this is an extra-session course, beginning and ending with the semester in the public schools (see page 128).

330A. Introduction to Elementary Teaching. (2) I and II.
Mr. Dumas, and Supervisory Staff
Lectures, conferences, laboratory, and field work.
Observations and participation in public school work. Students must reserve at least one two-hour period for field work each week.

330C. Elementary Supervised Teaching. (8) I and II.
Mr. Dumas, and Supervisory Staff
Conferences, observation, and supervised teaching. Prerequisite: courses 100A, 100B, or former course 110, 130A, 130B, 130C, 130D, 330A or equivalents; Decorative Art 6A; Music 10; History 189A or 189B; Physical Education 26, Section on Elementary School Skills.
Note that this is an extra-session course, beginning and ending with the semester in the public schools (see page 128).

330E. Methods of Teaching in Elementary School or Junior High School.
(2) I and II. Mr. Dumas, and Supervisory Staff
Restricted to candidates for the general junior high school credential or for the general elementary school credential. Must be taken concurrently with course 330C.

Special Education

*149. Administration, Organization, and Procedures in Special Education.
(2) I.

*326. Supervised Teaching in Special Education. (4) II.
Prerequisite: course 149, which may be taken concurrently if circumstances require. Course 320E, Sec. 17, must be taken concurrently with 326. Open only to candidates for a credential in special education and only after consultation with the instructor in charge of the course.

*370. Speech Defects and Disorders with Corrective Techniques. (2) II.
Prerequisite: course 100A or former course 110.
Designed to give students, teachers, and administrators a broader understanding of the causes and treatment of speech defects and disorders. Includes classification of speech defects and disorders, theories of functional

and organic disorders of voice and speech; the causes and treatment of stuttering and articulatory defects, and methods used in the speech correction classes in the public school in California.

*379. Educational Treatment of Cerebral Palsied Children. (2) II. Admission only on consultation with the instructor.

COURSES IN OTHER DEPARTMENTS ACCEPTED AS ELECTIVES FOR TEACHING CREDENTIALS IN EDUCATION

English 300. Problems in Teaching English Literature and Composition in Secondary Schools. (2) I and II.
Librarianship 206. School Library Administration. (2) II.
Music 328A. Methods of Teaching Vocal Techniques. (2) I.
Music 328B. Methods of Teaching Vocal Techniques. (2) II.
Music 329A. Methods of Teaching Stringed Instruments. (1) I and II.
Music 329B. Methods of Teaching Brass Instruments. (1) I.
Music 329C. Methods of Teaching Woodwind Instruments. (1) II.
Music 329D. Methods of Teaching Percussion Instruments. (1) I.
Music 329E. Ensemble: Literature for School Orchestra and Band. (1) II.
Music 330. Choral Repertory. (1) II.

ENGINEERING

(Office, 315 Engineering Building)
Morrough P. O'Brien, B.S., D.Sc.(hon.), Professor of Engineering, Emeritus.
Don O. Horning, M.E., Lecturer in Engineering.

CIVIL ENGINEERING

(Department Office, 109 Engineering Building)
Howard D. Eberhart, M.S., Professor of Civil Engineering (Chairman of the Department).

Hydraulic and Sanitary Engineering

(Division Office, 107 Engineering Building)
Hans Albert Einstein, D.S.T., Professor of Hydraulic Engineering.
Joe W. Johnson, M.S., Professor of Hydraulic Engineering and Director, Hydraulic Laboratories.
Percy H. McGauhey, M.S., Professor of Sanitary Engineering (Chairman of the Division), and Director of the Sanitary Engineering Research Laboratory.
Bernard D. Tebbens, Sc.D., Professor of Industrial Hygiene Engineering.
Sidney T. Harding, B.S., Professor of Irrigation, Emeritus.
Charles G. Hyde, B.S., LL.D., Professor of Sanitary Engineering, Emeritus.
Wilfred F. Langelier, M.S., D.Eng.(hon.), Professor of Sanitary Engineering, Emeritus.
Erman A. Pearson, Sc.D., Professor of Sanitary Engineering.
Warren J. Kaufman, Sc.D., Associate Professor of Sanitary Engineering.
Gerald T. Orlob, M.S., Associate Professor of Civil Engineering.
William J. Oswald, Ph.D., Associate Professor of Sanitary Engineering.
Jerome F. Thomas, Ph.D., Associate Professor of Sanitary Engineering.
David K. Todd, Ph.D., Associate Professor of Civil Engineering.
Robert L. Wiegel, M.S., Associate Professor of Civil Engineering.
Jaime Amorocho, M.S., Acting Assistant Professor of Civil Engineering.
James A. Harder, Ph.D., Assistant Professor of Civil Engineering.

Peter C. Klingeman, M.S., Associate in Hydraulic Engineering.

Frank M. Stead, M.S., Lecturer in Civil Engineering.

**Structural Engineering and Structural Mechanics**

(Division Office, 202 Engineering Materials Laboratory)

Frank Baron, M.S., D.Sc., Professor of Civil Engineering.
Boris Bresler, M.S., Professor of Civil Engineering.
Ray W. Clough, Jr., Sc.D., Professor of Civil Engineering (Vice-Chairman of the Division).
Howard D. Eberhart, M.S., Professor of Civil Engineering.
Joe W. Kelly, B.S., Professor of Civil Engineering.
Tung-Yen Lin, M.S., Professor of Civil Engineering (Chairman of the Division) and Director of the Structural Engineering Laboratory.
Egor P. Popov, Ph.D., Professor of Civil Engineering.
Jerome M. Raphael, S.M., Professor of Civil Engineering.
George E. Troxell, B.S., Professor of Civil Engineering.
Raymond E. Davis, C.E., M.S., D.Eng.(hon.), Professor of Civil Engineering, Emeritus, and Director of Engineering Materials Laboratory, Emeritus.
Bruce Jameyson, B.S., Professor of Civil Engineering, Emeritus.
Vitelmo Bertero, Sc.D., Associate Professor of Civil Engineering.
Hugh D. McNiven, Ph.D., Associate Professor of Civil Engineering.
Joseph Penzien, Sc.D., Associate Professor of Civil Engineering.
David Pirtz, M.S., Associate Professor of Civil Engineering.
Karl S. Pister, Ph.D., Associate Professor of Civil Engineering.
Milos Polivka, M.S., Associate Professor of Civil Engineering.
Charles F. Scheffey, M.S., Associate Professor of Civil Engineering.
Alexander C. Scordelis, M.S., Associate Professor of Civil Engineering.
Jack G. Bouwkamp, C.I., Assistant Professor of Civil Engineering.
Richard A. Parmelee, M.S., Associate in Civil Engineering.
Maynard O. Serbousek, M.S., Associate in Civil Engineering.
Robert L. Taylor, M.S., Associate in Civil Engineering.

Alexander Klein, M.S., Lecturer in Civil Engineering.

**Transportation Engineering**

(Division Office, 107 Engineering Building)

Harmer E. Davis, M.S., Professor of Civil Engineering and Director of the Institute of Transportation and Traffic Engineering.
Dan M. Finch, B.S., Professor of Transportation Engineering.
Robert Horonjeff, B.S., Professor of Transportation Engineering.
*Paul F. Keim, M.Sc., Professor of Civil Engineering.
*W. Norman Kennedy, B.S., Professor of Transportation Engineering (Chairman of the Division), Assistant Director of the Institute of Transportation and Traffic Engineering.
Ralph A. Moyer, M.S., C.E., Sc.D.(hon.), Professor of Transportation Engineering.
Harry Bolton Seed, Ph.D., Professor of Civil Engineering.
Francis S. Foote, E.M., Professor of Railroad Engineering, Emeritus.
Francis H. Moffitt, M.C.E., Associate Professor of Civil Engineering.
James K. Mitchell, Sc.D., Assistant Professor of Civil Engineering.

1 In residence fall semester only, 1960-1961.
2 In residence spring semester only, 1960-1961.
Engineering

Carl L. Monismith, M.S., Assistant Professor of Civil Engineering.
Robert L. Alexander, M.S., Associate in Civil Engineering.
Wolfgang S. Homburger, M.S., Associate in Transportation Engineering.
James H. Kell, M.S.C.E., Associate in Transportation Engineering.

Walter E. Gillfillan, M.Eng., Lecturer in Transportation Engineering.
Wayne H. Snowden, B.S., Lecturer in Transportation Engineering.
Richard M. Zettel, M.A., Lecturer in Transportation Engineering.

ELECTRICAL ENGINEERING

(Department Office, 231 Cory Hall)

Diogenes J. Angelakos, Ph. D., Professor of Electrical Engineering.
Leonard J. Black, Ph.D., Professor of Electrical Engineering.
Charles F. Dalziel, E.E., Professor of Electrical Engineering.
Arthur M. Hopkin, Ph.D., Professor of Electrical Engineering.
Harry D. Huskey, Ph.D., Professor of Electrical Engineering and Mathematics.
Paul L. Morton, Ph.D., Professor of Electrical Engineering.
Burtis L. Robertson, Ph.D., Professor of Electrical Engineering.
Victor H. Rumsey, B.A., Professor of Electrical Engineering.
Robert M. Saunders, M.S., Professor of Electrical Engineering (Chairman of the Department).
Herbert J. Scott, E.E., Professor of Electrical Engineering.
Samuel Silver, Ph.D., Professor of Engineering Science and Director, Space Sciences Laboratory.
Otto J. M. Smith, Ph.D., Professor of Electrical Engineering.
John R. Whinnery, Ph.D., Professor of Electrical Engineering.
Lotfi A. Zadeh, Ph.D., Professor of Electrical Engineering.
Lester E. Reukema, Ph.D., Professor of Electrical Engineering, Emeritus.
Charles K. Birdsall, Ph.D., Associate Professor of Electrical Engineering.
*Henry C. Bourne, Jr., Sc.D., Associate Professor of Electrical Engineering.
Georg Bruun, M.Sc., Acting Associate Professor of Electrical Engineering.
Charles A. Desoer, Sc.D., Associate Professor of Electrical Engineering.
Albert C. English, Ph.D., Associate Professor of Electrical Engineering.
Eliahu I. Jury, Sc.D., Associate Professor of Electrical Engineering.
Ernest S. Kuh, Ph.D., Associate Professor of Electrical Engineering.
Donald O. Pederson, Ph.D., Associate Professor of Electrical Engineering and Director, Electronics Research Laboratory.
Jerome R. Singer, Ph.D., Associate Professor of Electrical Engineering.
David H. Sloan, Ph.D., Associate Professor of Electrical Engineering.
Charles Süßkind, Ph.D., Associate Professor of Electrical Engineering.
Shyh Wang, Ph.D., Associate Professor of Electrical Engineering.
John R. Woodyard, Ph.D., Associate Professor of Electrical Engineering.
Thomas E. Everhart, M.Sc., Assistant Professor of Electrical Engineering.
Arthur Gill, Ph.D., Assistant Professor of Electrical Engineering.
*Allan J. Lichtenberg, M.S., Acting Assistant Professor of Electrical Engineering.

Aram J. Thomason, Ph.D., Assistant Professor of Electrical Engineering and Statistics.
Alvin W. Trivelpiece, Ph.D., Assistant Professor of Electrical Engineering.
William J. Welch, Ph.D., Acting Assistant Professor of Electrical Engineering.

1 In residence fall semester only, 1960–1961.
2 In residence spring semester only, 1960–1961.
Michael Athanassiades, B.S., Associate in Electrical Engineering.
Jack W. Carlyle, M.S., Associate in Electrical Engineering.
John H. Eaton, B.S., Associate in Electrical Engineering.
Victor Galindo, B.E.E., Associate in Electrical Engineering.
Someshwar Gupta, M.A., Associate in Electrical Engineering.
Lawrence Hasdorf, B.S., Associate in Electrical Engineering.
Lester O. Hill, M.S., Associate in Electrical Engineering.
Morimi Iwama, M.S., Associate in Electrical Engineering.
David Lynn, M.S., Associate in Electrical Engineering.
Guenther K. Machol, M.S., Associate in Electrical Engineering.
Bernard G. Maxum, M.S., Associate in Electrical Engineering.
Sanjit K. Mitra, M.S., Associate in Electrical Engineering.
Syed A. Nasar, M.S., Associate in Electrical Engineering.
David E. Norton, B.S., Associate in Electrical Engineering.
M. Anantha Pai, M.S., Associate in Electrical Engineering.
Elijah Polak, M.S., Associate in Electrical Engineering.
Martin A. Pollack, M.E.E., Associate in Electrical Engineering.
Paul T. Schoeneman, B.Eng., Associate in Electrical Engineering.
Henry J. Scudder, III, M.E.E., Associate in Electrical Engineering.
Kashi R. Swaminathan, B.S., Diploma, Associate in Electrical Engineering.
Harold E. Thiel, M.S., Associate in Electrical Engineering.
Leslie K. Wanlass, M.S., Associate in Electrical Engineering.
Willard H. Wattenburg, M.S., Associate in Electrical Engineering.
Jack Wing, M.S., Associate in Electrical Engineering.
PeigFeng Wu, M.S., Associate in Electrical Engineering.

Richard B. Hurley, M.S., Lecturer in Electrical Engineering.

INDUSTRIAL ENGINEERING
(Department Office, 200B Building T-4)
George B. Dantzig, Ph.D., Professor of Engineering Science.
E. Paul DeGarmo, M.S., Professor of Industrial Engineering.
Raymond C. Grassi, M.S., Professor of Industrial Engineering.
Thomas H. Hazlett, M.S., Professor of Industrial Engineering.
Ronald W. Shephard, Ph.D., Professor of Engineering Science (Chairman of the Department of Industrial Engineering).
Erich G. Thomsen, Ph.D., Professor of Metal Processing.
James S. Campbell, Jr., M.M.E., Associate Professor of Industrial Engineering.
Louis E. Davis, M.S., Associate Professor of Industrial Engineering.
Edward C. Keachie, Ph.D., Associate Professor of Industrial Engineering.
James T. Lapsley, Jr., M.S., Associate Professor of Industrial Engineering.
George P. Redman, M.S., Associate in Industrial Engineering.

MECHANICAL ENGINEERING
(Department Office, 320 Engineering Building)
Aeronautical Sciences
(Division Office, 212 Mechanics Building)
Edmund V. Laitone, M.A., Professor of Aeronautical Sciences.
George J. Maslach, B.S., Professor of Aeronautical Engineering (Chairman of the Division).

† In residence fall semester only, 1960–1961.
Engineering

*Antoni K. Oppenheim, Ph.D., Professor of Aeronautical Sciences.
Samuel A. Schaal, Ph.D., Professor of Engineering Science (Chairman of the Department of Mechanical Engineering).
Ernest S. Starkman, M.S., Professor of Aeronautical Engineering.
Gilles M. Corcos, Ph.D., Associate Professor of Aeronautical Sciences.
Warren H. Giedt, Ph.D., Associate Professor of Aeronautical Sciences.
Frederick S. Sherman, Ph.D., Associate Professor of Aeronautical Sciences.
†Lawrence Talbot, Ph.D., Associate Professor of Aeronautical Sciences.

Franklin C. Hurlbut, Ph.D., Lecturer in Aeronautical Sciences.

Heat-Power Systems
(Division Office, 215 Engineering Building)
†Israel I. Cornet, Ph.D., Professor of Mechanical Engineering.
*Robert V. Dunkle, M.S., Professor of Mechanical Engineering.
Everett D. Howe, M.S., Professor of Mechanical Engineering and Director, Sea Water Conversion Laboratory.
†Francis W. Hutchinson, M.S., M.E., Professor of Mechanical Engineering.
Harold W. Iverson, M.S., Professor of Mechanical Engineering.
Harold A. Johnson, M.S., Professor of Mechanical Engineering.
Ralph A. Seban, Ph.D., Professor of Mechanical Engineering (Chairman of the Division).
Yasundo Takahashi, Ph.D., Professor of Mechanical Engineering.
Carl J. Vogt, M.S., Professor of Mechanical Engineering.
*Leonard Farbar, M.S., Associate Professor of Mechanical Engineering.
Alan D. K. Laird, Ph.D., Associate Professor of Mechanical Engineering.
Paul B. Stewart, Ph.D., Associate Professor of Mechanical Engineering.
Ralph A. Seban, Ph.D., Professor of Mechanical Engineering (Chairman of the Division).

Mechanics and Design
(Division Office, 124 Building T-7)
Clyne J. Garland, M.S., Professor of Mechanical Engineering.
*Werner Goldsmith, Ph.D., Professor of Engineering Mechanics.
Alexander S. Levens, M.S., C.E., Professor of Mechanical Engineering.
P. Paul Lieber, Ph.D., Professor of Engineering Science.
James L. Meriam, Ph.D., Professor of Engineering Mechanics (Chairman of the Division).
P. Paul Lieber, Ph.D., Professor of Engineering Science.
*Reinhardt W. Rosenberg, M.S., Professor of Engineering Mechanics.
Walter W. Soroka, Sc.D., Professor of Mechanical Engineering.
Cyril P. Atkinson, M.S., M.E., Associate Professor of Engineering Mechanics.
G. Wayne Brown, M.S., Associate Professor of Mechanical Engineering.
Don M. Cunningham, M.S., Associate Professor of Mechanics and Design.
Joseph Frisch, M.S., Associate Professor of Mechanical Engineering.
Chieh S. Hsu, Ph.D., Associate Professor of Mechanics and Design.
George Leitmann, Ph.D., Associate Professor of Engineering Science.
Charles W. Radcliffe, M.E., Associate Professor of Mechanical Engineering.
William S. Rouvelol, M.S., Associate Professor of Mechanical Engineering.

‡ In residence spring semester only, 1960–1961.
Robert F. Steidel, Jr., D.Eng., Associate Professor of Mechanical Engineering.
Frank E. Hauser, Ph.D., Assistant Professor of Mechanical Engineering.
Leo Dabaghian, M.S., Associate in Mechanical Engineering.
Peter T. Lyman, M.S., Associate in Mechanical Engineering.
Arthur M. Nakata, B.S., Associate in Mechanical Engineering.
George P. Wilson, M.S., Associate in Mechanical Engineering.

George E. Davis, M.A., Lecturer in Engineering Graphics.

MINERAL TECHNOLOGY
(Department Office, 210 Hearst Memorial Mining Building)
Anders J. Carlson, Ph.D., Professor of Petroleum Engineering.
John E. Dorn, Ph.D., Professor of Materials Science.
Irving Fatt, Ph.D., Professor of Petroleum Engineering.
Herbert E. Hawkes, Ph.D., Professor of Mineral Exploration.
Ralph R. Hultgren, Ph.D., Professor of Metallurgy.
*Earl R. Parker, Met.E., Professor of Metallurgy and Director, Institute of Engineering Research.
Joseph A. Pask, Ph.D., Professor of Ceramic Engineering (Chairman of the Department).
John A. Putnam, Ph.D., Professor of Petroleum Engineering.
*S. Frederick Ravitz, Ph.D., Professor of Metallurgy.
*S. Alan W. Searcy, Ph.D., Professor of Materials Science.
Lysle E. Shaffer, E.M., Professor of Mining.
Parker D. Trask, Ph.D., Professor of Geological Engineering.
Edward H. Wisser, B.S., Professor of Mineral Exploration.
Paul A. Witherspoon, Ph.D., Professor of Petroleum Engineering (Vice-Chairman of the Department).
Lester C. Uren, B.S., Professor of Petroleum Engineering, Emeritus.
Douglas W. Fuerstenau, Sc.D., Associate Professor of Metallurgy.
Wilbur H. Somerton, Pet.E., Associate Professor of Petroleum Engineering.
Stanley H. Ward, Ph.D., Associate Professor of Mineral Exploration.
Jack Washburn, Ph.D., Associate Professor of Metallurgy.
Richard M. Fulrath, M.S., D.Eng., Assistant Professor of Ceramic Engineering.

Granville S. Borden, LL.B., Lecturer in Mineral Technology.
Philip R. Bradley, B.S., Lecturer in Mining.
George M. Gordon, Jr., M.S., Lecturer in Materials Science.
Lawrence Himmel, Ph.D., Lecturer in Mining.
Kenneth K. Kelley, Ph.D., Lecturer in Metallurgy.
Robert B. Langston, M.S., Lecturer in Materials Science.
John F. McGarry, M.S., Lecturer in Process Engineering.
Gareth Thomas, Ph.D., Lecturer in Mineral Technology.

NAVAL ARCHITECTURE
(Department Office, 224 T-3)
Henry A. Schade, Dr.Ing., Professor of Naval Architecture (Chairman of the Department).
*John V. Wehausen, Ph.D., Professor of Engineering Science.

1 In residence fall semester only, 1960–1961.
2 In residence spring semester only, 1960–1961.
Engineering

J. Randolph Paulling, Jr., S.M., Nav.Arch., Assistant Professor of Engineering.

Egil Abrahamsen, C.E., Lecturer in Naval Architecture.
Tamatsu Nagai, Ph.D., Lecturer in Naval Architecture.
Osvald J. Sibul, M.S., Lecturer in Naval Architecture.

NUCLEAR ENGINEERING

(Department Office, 219 T-4 Engineering Building)

Thomas H. Pigford, D.Sc., Professor of Nuclear Engineering (Chairman of the Department).
Lawrence M. Grossman, Ph.D., Professor of Nuclear Engineering.
Paul L. Chambré, Ph.D., Associate Professor of Engineering Science and of Mathematics.
Virgil E. Schrock, M.S., M.E., Associate Professor of Nuclear Engineering.

Joel Bengston, Ph.D., Lecturer in Nuclear Engineering.
James E. Carothers, Ph.D., Lecturer in Nuclear Engineering.
Richard M. Fulrath, M.S., D.Eng., Assistant Professor of Ceramic Engineering.
Albert J. Kirschbaum, Ph.D., Lecturer in Nuclear Engineering.
Frederick J. Shon, B.S., Lecturer in Nuclear Engineering.
Richard N. Stuart, Ph.D., Lecturer in Nuclear Engineering.

Inspection trips may be a part of the academic program of any course given by the departments of the College of Engineering. Lower division courses in the College of Engineering which are of general interest to students in various curricula are listed under Engineering.

ENGINEERING

LOWER DIVISION COURSES

In addition to the prerequisites noted, engineering students must complete the Lower Division Engineering Examination.

10. Engineering Measurements. (3) I and II.

The Staff (Mr. Moffitt in charge)

Prerequisite: Mathematics 3A and 3B. Mathematics 3B may be taken concurrently.
Theory and practice of engineering measurements; laboratory exercises and demonstrations using engineering systems; analysis of errors; adjustment and evaluation of measurements; applications to surveying; measurements in various fields of engineering.

11. Engineering Surveys. (3) I and II.

Mr. Moffitt (in charge), Mr. Monismith

Two lectures and three laboratory hours per week.
Prerequisite: course 10 or 21.
Control surveys, topographic surveys using transit-stadia and plane table-alidade, horizontal and vertical curves, earthwork, practical astronomy, introduction to photogrammetry.

18A-18B. Strength of Materials. (3-3) Yr. Beginning each semester.

Mr. Lin (in charge), Mr. Kelly, Mr. McNiven, Mr. Polivka

18A: 2 hours of lecture and 3 hours of computation per week.
18B: 3 hours of lecture per week.
Prerequisite: Mathematics 3B; Physics 2A and 3A or 4A; course 21, which may be taken concurrently with course 18A. For students in architecture.
Elementary analytic mechanics; application of statics and theory of elasticity to elements of structural design.

21. Plane Surveying. (3) I and II. The Staff (Mr. Moffitt in charge)
Prerequisite: trigonometry. Not open to students in engineering.
Principles and practice of surveying, including use of tape, transit, level, alidade; calculation of traverse, areas, volumes, curves; stadia and plane table mapping.

22. Engineering Drawing. (2) I and II. The Staff (Mr. Levens in charge)
One lecture and five laboratory hours per week. Prerequisite: course 23.
Freehand pictorials; theory of orthogonal projection; single and multiple auxiliaries; dimensioning; freehand and mechanical working drawings; graphic computations; plotting experimental data and determination of elementary empirical equations.

23. Descriptive Geometry. (2) I and II. The Staff (Mr. Levens in charge)
One lecture and five laboratory hours per week. Prerequisite: Mathematics 3A (may be taken concurrently); plane geometry, trigonometry, and mechanical drawing.
The fundamental principles of descriptive geometry and their application to the solution of three-dimensional problems arising in the various branches of engineering.

25. Engineering Graphics. (4) I and II. The Staff (Mr. Levens in charge)
Two lectures and six laboratory hours per week. Prerequisite: plane geometry, trigonometry, mechanical drawing; Mathematics 3A (taken concurrently).
The fundamental principles of orthogonal projection and their application to the solution of three-dimensional problems arising in the various branches of engineering; freehand pictorials; dimensioning; freehand and instrumental working drawings; graphic computations; plotting experimental data and determination of elementary empirical equations.

26. Introduction to Engineering Graphics. (2) I.
The Staff (Mr. Levens in charge)
One lecture and five laboratory hours per week. Prerequisite: 1 unit of high school mechanical drawing; Mathematics 3A (may be taken concurrently). Course is limited to students majoring in chemical engineering.
Fundamentals of orthogonal projection; freehand technical sketching—orthographic and pictorial; design drawings—freehand details and instrumental assemblies; graphical mathematics—functional scales, empirical relations, concurrency and alignment nomograms.

35. Statics. (3) I and II. The Staff (Mr. Steidel in charge)
Prerequisite: Physics 4A; Mathematics 4A and 4B (Mathematics 4B may be taken concurrently) or Mathematics 14A and 14B (Mathematics 14B may be taken concurrently); course 25 or 26, strongly recommended.
Force systems and equilibrium conditions, with emphasis on engineering problems covering structures, machines, distributed forces, and friction. Includes graphical and algebraic solutions and an introduction to the method of virtual work.

45. Properties of Materials. (3) I and II.
Mr. Ravitz (in charge), Mr. Bouwkamp, Mr. Cottrell, Mr. Dorn, Mr. English, Mr. Fuerstenau, Mr. Hauser, Mr. Hazlett, Mr. Hultgren, Mr. Parker, Mr. Pirtz, Mr. Polivka, Mr. Searcy, Mr. Wang
Two one and one-quarter hour lectures and one three-hour laboratory period every other week. Prerequisite: Chemistry 1B and Physics 4B (may be taken concurrently). Enrollment in the fall semester is open only to sophomores. An introductory course on the properties of engineering materials. Applications of basic principles to the selection and use of engineering materials.

**Upper Division Courses**

The basic prerequisite for all upper division courses is satisfaction of the lower division requirements in an engineering program of study and completion of the Upper Division Engineering Examination. Additional prerequisites are indicated.

**100. Materials and Methods Used in Manufacturing.** (3) I and II.

Mr. Campbell, Mr. Grassi, Mr. Lapsley

Prerequisite: junior standing in business administration. Not open to students in engineering.

Study of the common materials (metals and nonmetals), processes, and equipment used in modern manufacturing.

**101. Manufacturing Processes.** (3) I and II.

Mr. Thomsen (in charge), Mr. Campbell, Mr. L. E. Davis, Mr. Grassi, Mr. Hazlett, Mr. Keachie, Mr. Lapsley, Mr. Redman

Prerequisite: junior standing; courses 25 and 45 or the equivalent.

Casting processes; hot and cold working; machining; measuring and gauging; welding and joining; grinding and surface finishing; general-purpose and production-type machine tools; tooling; jigs and fixtures; relation of design to production.

**102. Dynamics.** (3) I and II.

The Staff (Mr. Steidel in charge)

Prerequisite: course 35, Mathematics 4A-4B, Physics 4A.

Kinematics and kinetics of a particle and of rigid bodies as applied to engineering problems. Force, energy, and momentum methods of solution. Introduction to mechanical vibrations.

**103. Elementary Fluid Mechanics.** (3) I and II.

The Staff (Mr. J. W. Johnson in charge)

Prerequisite: course 102, which may be taken concurrently.

The principles of mechanics applied to the statics and to the flow of incompressible and compressible fluids.

**113. Introduction to the Professional Aspects of Engineering.** (2) I and II.

The Staff (Mr. Robertson in charge)

Prerequisite: senior standing in engineering. To be taken during the year of intended graduation.

Development of an understanding of the professional responsibilities of the engineer; practice in the elements of effective speaking and in the preparation of technical and nontechnical papers; study and discussion of selected topics of value to the engineer beginning his career.

**120. Principles of Engineering Investment and Economy.** (3) I and II.

Mr. DeGarmo (in charge), Mr. Grassi, Mr. Hazlett, Mr. Keachie, Mr. Lapsley

Prerequisite: Mechanical Engineering 105A, or Physics 112, or Chemistry 110B; Electrical Engineering 100A, 101, or 109A, or Physics 110A; Civil Engineering 130 or 132.

Derivation of formulas used in the theory of investment; economy studies applied to original and alternative investments in engineering enterprise; replacement problems; relation of personnel and quality control factors to engineering economy; economy studies of governmental projects.
140. **Elementary Illumination.** (2) I and II.  
Mr. Finch  
Prerequisite: consent of the instructor; Physics 4C; Electrical Engineering 100A, 101, or 109A (may be taken concurrently).  
Light: its utilitarian and engineering aspects; light, vision, and radiant energy; photometric concepts; illumination instruments and measurements; lighting calculations and design; color specification; lectures and demonstrations.

140L. **Elementary Illumination Laboratory.** (1) I and II.  
Mr. Finch  
Prerequisite: course 140 (may be taken concurrently).  
Laboratory experiments in the fundamental concepts and quantities used in illumination: intensity, brightness, illumination, flux, reflection, transmission, light distribution from luminaires, visibility, color, measuring instruments, measuring techniques.

142. **Lighting Design.** (2) II.  
Mr. Finch  
Prerequisite: course 140 (may be taken concurrently).  

166. **Metallurgy of Welding.** (3) II.  
Mr. Hazlett  
Prerequisite: course 45.  
Metallurgical problems associated with welding. The influence of welding technique on the metallurgical structures and properties of welds. A study of the origin and effect of weld defects.

173. **Noise Control.** (3) II.  
Mr. Soroka  
Prerequisite: course 102 and course 103 or Mechanical Engineering 109.  

**Graduate Courses**

As a condition for enrollment in a graduate course, the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation will consist normally of the completion of at least 12 units of upper division courses basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed. The admission of undergraduates to graduate courses is limited to seniors who have an average scholarship of not lower than B in the basic courses.

230. **Engineering Analysis.** (3) I and II.  
Mr. Schaaf (in charge), Mr. Laitone, Mr. McNiven  
Prerequisite: graduate standing in engineering or Mathematics 14B.  
Methods of theoretical analysis of typical engineering systems. Practice in setting up and solving engineering problems in heat transfer, fluid mechanics, electrical network, mechanical vibrations, and elasticity.

241. **Radiation Sources: Ultraviolet, Visible, Infrared.** (3) I.  
Mr. Finch  
Two lectures and one three-hour laboratory period per week. Prerequisite: course 140 and Physics 130.  
Sources of ultraviolet, visible, infrared and thermal radiation considered from atomic and molecular excitation viewpoint. Luminescence, fluorescence,
phosphorescence, and electroluminescence, as light-producing phenomena. Infrared and solar radiation calculations. Photoconductivity and photoelectric effects. Laboratory experiments on the characteristics of light sources including fluorescence, gaseous discharge, incandescent and electroluminescent sources.

298. Group Studies or Seminars. (1–5) I and II. Mr. O'Brien
Advanced study in the general area of the history of technology. Specific topics are determined by the interests of qualified graduate students in engineering.

Courses characteristic of the various curricula offered by the College of Engineering are described under the several departments of the college, as follows:

CIVIL ENGINEERING

UPPER DIVISION COURSES

The basic prerequisite for all upper division courses is satisfaction of the lower division requirements in an engineering program of study and completion of the Upper Division Engineering Examination. Additional prerequisites are indicated.

101. Elementary Photogrammetry. (3) I. Mr. Moffitt
Prerequisite: Engineering 11, or consent of the instructor.
Geometry of single vertical photograph; stereoscopy and parallax measurement; principles of radial line plot; mosaics; oblique photographs. Laboratory includes flight planning, stereoscopic studies, topographic compilation by stereo-plotting, radial line plot, tilt determination, and orientation in multiplex.

102. Route Surveying. (3) I. Mr. Monismith
Prerequisite: Engineering 11.
Simple, compound, and transition curves, reconnaissance, preliminary and location surveys; calculations of earthwork and other quantities; field work.

105. Higher Surveying and Geodesy. (2) II. Mr. Moffitt
To be offered in even-numbered years.
Prerequisite: Engineering 11.
Methods of geodetic surveying; adjustment of observations; geodetic positions; map projections.

107. Airphoto Analysis and Interpretation. (3) II. Mr. Moffitt
To be offered in odd-numbered years.
Prerequisite: senior standing in engineering or geology.
Principles of aerial photography and photogrammetry; the use of air-photos in identifying land forms, in locating transportation facilities, and in the interpretation of soil and drainage conditions for engineering works.

110. Engineering Materials Laboratory. (2) I and II.
The Staff (Mr. Pirtz in charge)
Prerequisite: Engineering 45; course 130 (may be taken concurrently).
Principles and methods of testing engineering materials. Physical tests of concrete, steel, and wood; proportioning and properties of concrete mixtures.
111. Materials Testing Laboratory. (1) I and II.  
Prerequisite: for engineering students, course 130 (may be taken concurrently). For students in agricultural, mechanical, mining, geological, and petroleum engineering. Not open for credit to students who take course 112.  
The Staff (Mr. Pirtz in charge)  
Principles and methods of testing engineering materials. Physical tests of concrete, steel and wood.

112. Materials Testing Laboratory. (1) I and II.  
Prerequisite: Engineering 18B. For students in the Department of Architecture. Not open for credit to students who take course 111.  
The Staff (Mr. Kelly in charge)  
Principles and methods of testing engineering materials. Mechanical tests of concrete, steel, aluminum, and wood.

114. Soil Properties and Their Engineering Applications. (1) I and II.  
Prerequisite: course 121 (may be taken concurrently). Mr. Seed  
Selected experiments on physical and mechanical properties of soils and their application in design problems.

118. Asphalts and Asphaltic Mixtures. (1) I and II. Mr. Monismith  
Prerequisite: senior standing in civil engineering.  
Laboratory tests on asphalts and aggregates to determine suitability for use in paving mixtures. Design of asphaltic mixtures, including proportioning and preparation of specimens for tests to determine stability.

121. Soil and Foundation Engineering. (3) I and II. Mr. H. E. Davis (in charge), Mr. Seed  
Prerequisite: course 130; course 135 (may be taken concurrently).  
Lectures, discussions, and problems on physical and mechanical properties of soils; the supporting capacity of soils; lateral earth pressures on structures; piles and pile foundations; consideration in the design of substructures; cofferdams and caissons; construction problems in foundation engineering.

122. Soil Mechanics and Foundation Design. (2) I and II. Mr. Seed  
Prerequisite: course 121.  
Principles of foundation design; ultimate bearing capacity of soils; theory of consolidation and its application in predicting the settlement of structures; allowable bearing pressures; methods of minimizing settlements; effect of settlement on structures; stability of slopes; foundations on compacted fills.

125. Elements of Framed Structures. (2) I and II. Mr. Lin, Mr. McNiven, Mr. Bertero  
Prerequisite: Engineering 18A–18B. For students in architecture.  
Analytical and graphical stress analysis for framed structures.

126. Reinforced Concrete Design. (3) I and II. Mr. Baron, Mr. Scordelis  
Prerequisite: senior standing and course 125, which may be taken concurrently.  
For students in architecture.  
Design of reinforced concrete buildings, including foundations and retaining walls.

127. Framed Structures. (3) I and II. Mr. Scordelis, Mr. Bertero  
Prerequisite: senior standing and courses 125, 126 (the latter may be taken concurrently). For students in architecture.  
Stress computations and design of structures in wood, steel, and reinforced concrete, particularly of buildings.
130. Mechanics of Materials. (3) I and II.  
Prerequisite: Engineering 35.  
Elastic and ultimate resistance of materials; stress and deformation analysis for bars, shafts, and beams; combined stresses; columns; elements of design for wood and metal members.

131. Structural Analysis. (3) I and II.  
Prerequisite: course 130.  
Analysis of determinate structures, including beams, frames, and roof and bridge trusses, by algebraic and graphical methods. Introduction to indeterminate structural analysis.

132. Elements of Mechanics of Materials. (2) I and II.  
Prerequisite: Engineering 35. Open only to students in electrical engineering and to nonengineering majors.  
Elastic and ultimate resistance of materials; stress and deformation analysis for bars, shafts, and beams; combined stresses; columns; vibration; energy methods.

133. Steel and Timber Design. (3) I and II.  
Prerequisite: course 130.  
Design of steel and timber structural components; structural connections, tension and compression members, and beams.

134. Elements of Mechanics of Materials. (2) I and II.  
Prerequisite: course 130.  
The Staff (Mr. Pister in charge)  
Elastic and ultimate resistance of materials; stress and deformation analysis for bars, shafts, and beams; combined stresses; columns; vibration; energy methods.

135. Reinforced Concrete Design. (3) I and II.  
Prerequisite: course 130.  
Mr. Lin, Mr. Baron, Mr. Scordelis  
The analysis and design of reinforced concrete structures.

136. Analysis and Design of Bridges. (3) I and II.  
Prerequisite: courses 131, 133, 135.  
Mr. Scheffey  
Analysis and design of girder, truss, rigid frame, and continuous bridges, with special emphasis on highway bridges. Introduction to moment distribution and its application to analysis of bridges.

137. Analysis and Design of Buildings. (3) I and II.  
Prerequisite: courses 131, 133, 135.  
Mr. Baron  
Analysis and design of building structures under the action of vertical dead and live loads, and of wind and earthquake forces. Building code and structural requirements in connection with the use of timber, steel frame, reinforced concrete, and brick.

138. Analysis of Airplane Structures. (3) I and II.  
Prerequisite: course 131 (formerly 107A) or Mechanical Engineering 112.  
Mr. Penzien  
Solution of typical stress analysis problems; load requirements; thin web beams; monocoque construction; plate stringer combinations; beam columns; space frames.

140. Water Supply Engineering. (3) I and II.  
Prerequisite: Engineering 103.  
Mr. Pearson, Mr. Kaufman, Mr. Orlob  

141. Sewerage Engineering. (3) I and II.  
Mr. Orlob, Mr. Kaufman, Mr. Oswald, Mr. Pearson  
Prerequisite: Engineering 103.  
Hydraulic review of sewerage works; functional design of sanitary and
storm sewer systems. Chemical and biological characteristics of sewage, and methods and objectives of treatment. Analysis of unit operations and processes, functional design of treatment units. Stream pollution analysis. Solid waste disposal.

142. Sanitary Engineering Design. (2) II. Mr. Orlob
Prerequisite: courses 140 and 141.
Functional engineering design for water purification and for distribution and treatment of wastes; includes disposal or reclamation, facilities for aeration, flocculation, sedimentation, filtration, disinfection, aerobic and anaerobic decomposition, pumping, collection, and conveyance.

144. Principles of Sanitary Engineering. (3) II. Mr. Oswald
Prerequisite: upper division standing in public health, science, or engineering.
An engineering approach to problems of municipal and rural water supply, sewerage, and waste collection and disposal.

145. Chemistry and Biology of Water Purification and Sewage Treatment. (2) I. Mr. Thomas
Prerequisite: Chemistry 1A–1B.
The chemical and biological character of water and sewage; theory of water purification and sewage disposal processes.

146. Sanitary Chemistry Laboratory. (3) I and II. Mr. Thomas
Prerequisite: Chemistry 1A–1B.
Chemical analysis of water and sewage and the laboratory control of purification and sewage treatment processes.

147. Sanitary Engineering Chemistry. (3) II. Mr. Thomas
Prerequisite: Chemistry 1A–1B.
Lectures, demonstrations, and problems concerning the applications of organic chemistry and biological chemistry to water purification, sewage treatment, agricultural and industrial wastes disposal, and sanitation of the industrial environment.

149. Municipal Engineering Services. (2) II. Mr. Kennedy, Mr. McGauhey
Prerequisite: enrollment in a course in city and regional planning, or upper division or graduate standing in fields other than civil engineering, and consent of the instructor.
Study of engineering services from the point of view of planning, development, financing, and organization, with emphasis on the importance of engineering design as related to the comprehensive, long-range planning of urban communities.

159. Water Institutions and Economics. (2) II. Mr. Todd, Mr. Orlob
Prerequisite: senior standing.
Water rights, water users’ organizations, economics of water resources development, and public policies and laws relating to the use and conservation of water resources.

160. Hydrology. (2) I. Mr. Todd, Mr. Orlob
Prerequisite: course 140 (may be taken concurrently), Engineering 103.
Study of precipitation, evapotranspiration, stream flow and flood flow, and factors influencing the processes; ground-water flow and development; flood routing and forecasting; snow and snowmelt; and hydrometeorology.
161. Hydraulic Laboratory. (2) I and II.
Prerequisite: Engineering 103. The Staff (Mr. Einstein in charge)
An introductory laboratory course which includes experiments on weirs, pipes and channels, spillways, hydraulic jump, model laws, turbines, pumps, and other hydraulic phenomena. Program largely optional.

166. Advanced Hydraulics. (3) I.
Prerequisite: Engineering 103.
Nonuniform steady flow in open channels; open channel surges; flow in porous materials; hydraulic models and analogies; model laws.

167. Hydraulic Engineering Design. (3) II. Mr. Orlob, Mr. Amorocho (Formerly course 157.)
Prerequisite: Engineering 103, courses 161 and 140.
Principles of design of hydraulic structures including low dams, spillways, headworks, transitions, outlets, siphons, chutes, and energy dissipators. Applications of engineering economics to design. Consideration of seepage and uplift, flow nets, wells and drums, pumping and power generation, and other selected topics.

168. Design of Open Channel Flow Systems. (2) II. (Formerly course 158.) Mr. Harder, Mr. Amorocho
Prerequisite: course 166; course 167 (may be taken concurrently).
The over-all hydraulic design of open channel systems with emphasis on the selection of suitable structures and the economic evaluation of alternate plans. Will include occasional field inspection trips.

170. Highway Engineering. (3) I and II. Mr. Moyer, Mr. Stubbs
Prerequisite: Engineering 11, and Engineering 45; junior standing in engineering.
Highway planning, finance, location, design, economics, drainage, construction, and maintenance of highways, streets, and pavements.

171. Introduction to Traffic Engineering. (3) II. Mr. Kennedy, Mr. Kell
Prerequisite: senior standing in engineering and course 170, which may be taken concurrently.
Street and highway traffic problems; principles of design of thoroughfares on the basis of operational characteristics; traffic regulation and control.

179. Traffic Engineering for Police. (2) II. Mr. Kennedy, Mr. Homburger
Prerequisite: upper division standing and one course in statistics or consent of the instructor. For majors in police administration and public administration.
Engineering studies of traffic volumes, speeds, parking and accidents, and analysis of data in applying traffic signs, signals, and markings, and other traffic regulations. Driver behavior and limitations. Characteristics of vehicle operations.

180. Concrete Construction. (2) I. Mr. Kelly
(Formerly Structural Engineering 280.) Lectures and seminars. Consideration of broad aspects of concrete construction; technical requirements; selection of materials; control of quality; practices in the construction of dams, highways, airfields, canals, bridges, buildings, hydraulic structures.

181. Engineering Construction. (3) I and II. Mr. Stubbs
Prerequisite: senior standing in engineering.
A study of the construction industry: its development, components, eco-
Economic importance; fundamental principles that underlie construction practices, methods and equipment, their application and limitations; economic factors involved in planning, organizing, and operating a construction force.

190. Engineering Reports. (2) II. Mr. Kelly
Prerequisite: junior standing in civil engineering.
Application of written and oral expression to the preparation of technical reports and articles.

191. Engineering Relations: Contracts and Specifications. (2) I and II.
(Formerly numbered 116.) The Staff (Mr. Horonjeff in charge)
Prerequisite: senior standing in civil engineering.
Professional duties and privileges; principles of business law; preparation of contracts and contract documents, including specifications and drawings.

198. Directed Group Study for Advanced Undergraduates. (1-5) I and II.
The Staff (Mr. Eberhart in charge)
Prerequisite: senior standing in engineering.
Group study of a selected topic or topics in civil engineering.

199. Individual Study and Research for Advanced Undergraduates.
(1-5) I and II.
The Staff (Mr. Eberhart in charge)
Enrollment limited to senior students in engineering whose scholastic records show a scholarship average of grade B or higher or whose records indicate a capacity for independent study.
Individual study and/or investigation of a subject in civil engineering in which the student has a special interest.

GRADUATE COURSES

As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation will consist normally of the completion of at least 12 units of upper division courses basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed. The admission of undergraduates to graduate courses is limited to seniors who have an average scholarship of not lower than B in the basic courses.

Note: The graduate programs of study which are administered through the Department of Civil Engineering comprise major programs under the superintendence of the three operational divisions of the department (Hydraulic-Sanitary, Structural Engineering and Structural Mechanics, and Transportation), together with programs in certain areas of specialization which are administered by the department such as Soil Mechanics and Photogrammetry. Courses relating to the latter programs are listed under Civil Engineering—General.

Hydraulic and Sanitary Engineering
and
Water Resources Engineering

203. Ground Water Hydrology. (3) I. Mr. Todd
(Formerly Hydraulic-Sanitary 203).
Prerequisite: course 160.
Elements of ground-water occurrence, flow, quality, conservation, and basin development. Water-well construction, development and hydraulics. Legal considerations.
204. **Surface Water Hydrology.** (3) II.  
(Formerly Hydraulic-Sanitary 204.)  
Prerequisite: course 160.  
Determination of design floods, hydrometeorological analysis, unitgraphs, channel and reservoir routing, flood control methods, river and flood forecasting, snowmelt runoff analysis, and artificial precipitation.

205. **River-Harbor Hydraulics.** (3) I.  
Mr. Einstein, Mr. J. W. Johnson  
(Formerly Hydraulic-Sanitary 205.)  
Prerequisite: Engineering 103; course 166 desirable (may be taken concurrently).  
Turbulence in open channel flow; nonsteady channel flow; tidal flow, surface wave systems; wave forces; design of hydraulic structures.

206. **Sediment Transport.** (3) II.  
Mr. Einstein  
(Formerly Hydraulic-Sanitary 206.)  
Lectures and laboratory. Prerequisite: course 166.  
Definition and description of sediment, its different types of motion. Mathematical relationships between sediment motion and flow. Design and management of rivers and reservoirs with respect to sediment load.

207. **Advanced Hydraulic Design.** (2) I.  
Mr. Amorocho, Mr. Harder, Mr. Orlob  
(Formerly Hydraulic-Sanitary 221.)  
Prerequisite: course 156 and either course 167 (formerly course 157) or course 168 (formerly course 158).  
Design of diversion works, distribution systems, special hydraulic structures.

208. **Advanced Hydraulic-Structures Laboratory.** (2) II.  
Mr. J. W. Johnson  
(Formerly Hydraulic-Sanitary 220.)  
Prerequisite: course 166 or 205.  
Advanced problems, including experimental investigations of hydraulic model laws; experimental hydraulic structures, river and harbor models; studies of flood waves, oscillatory waves, beach erosion and protection, sediment transportation, energy dissipation.

211A–211B. **Water and Sewage Treatment: Theory and Design.** (3–3) Yr.  
The Staff (Mr. McGauhey in charge)  
(Formerly Hydraulic-Sanitary 250A–250B.)  
Prerequisite: course 140, 141, and 146, which may be taken concurrently.  
Theory and design of elements of systems for water supply, water purification, sewage treatment and disposal.

213. **Advanced Sanitary Chemistry.** (2) I.  
Mr. Thomas  
(Formerly Hydraulic-Sanitary 260.)  
Prerequisite: course 146.  
Theory and application of advanced chemical instrumentation to the analysis of water and waste, domestic and industrial, including atmospheric pollutants. Particular consideration is given to the application of spectrophotometric, chromatographic, electrometric, and radiochemical equipment and techniques.

215. **Advanced Sanitary Engineering Laboratory.** (2) II.  
Mr. Pearson  
(Formerly Hydraulic-Sanitary 251.)  
Lectures and laboratory. Prerequisite: course 145 or 211A.  
Studies on the following unit processes of water and sewage treatment: rapid sand filtration, sedimentation, break-point chlorination, chemical treatment of industrial wastes, sludge digestion, sludge gas analysis, sludge conditioning and filtration, plant efficiency studies and special topics.
216. Industrial and Agricultural Waste Treatment. (2) II.  Mr. Pearson  
(Formerly Hydraulic-Sanitary 261.)  
Prerequisite: course 211A or consent of the instructor.  
Studies of the wastes from industrial and agricultural processes that may be detrimental to watercourses, water supplies, sewerage systems, or the atmosphere; principles and methods of disposal and treatment of important wastes and municipal refuse.

218. Atmospheric Pollution. (3) I.  Mr. Tebbens  
(Formerly Hydraulic-Sanitary 270.)  
Prerequisite: course 146.  
Study of air pollution by gases, fumes, vapors and dusts; nature of polluting materials, and relation of atmospheric conditions to their dispersal; methods of air analysis, standards of and control of pollution, and administrative problems.

Structural Engineering and Structural Mechanics

220. Statically Indeterminate Structures. (3) I.  Mr. Scordelis  
Prerequisite: graduate standing.  
Discussion of the classical theorems of structural theory including the theorems of Clapeyron, Betti, Castigliano, Maxwell, Mohr, Muller-Breslau, and the principle of virtual work. Analysis of statically indeterminate structures by superposition, elastic center, column analogy, conjugate structure, least work, slope deflection and moment distribution.

221. Experimental Structural and Stress Analysis. (3) I.  Mr. Clough, Mr. Bertero  
Lectures and laboratory in the principal experimental methods used for structural and stress analysis, including similitude and loaded models, elastic line models, mechanical and electrical strain gauging, stress coat analysis, analogy methods, and photoelasticity.

230A–230B. Advanced Mechanics of Materials. (3–3) Yr.  Mr. Popov  
(Formerly Structural Engineering 230A–230B.)  
Course 230A is not prerequisite to 230B.  
Failure theories; inelastic bending; limit design; thick-walled cylinders; torsion of noncircular elements; design for fluctuating and sustained loads; application of theory of elasticity to some complex states of stress; curved bars; elastic stability; plates; beams on elastic foundations.

231. Dynamics of Structures. (3) II.  Mr. Clough  
(Formerly Structural Engineering 231.)  
Prerequisite: course 137, and Engineering 102.  
Analysis of stresses and deflections in structures due to the application of dynamic loads. Approximate and “exact” methods for determining the response of buildings, bridges, frames to earthquake accelerations, wind gusts, moving loads, and bomb blasts.

232. Theory of Plates. (3) II.  Mr. Pister and Mr. McNiven  
Prerequisite: course 230B or Mechanical Engineering 285A, or consent of the instructor.  
Analysis of bending, buckling, and vibration of plates, slabs and membranes; linear and nonlinear behavior, refined theories; variational principles and approximate methods; method of singularities; applications to anisotropic and nonhomogeneous plates; thermal stress problems; high frequency vibration and wave-propagation in plates.
233. Theory of Thin Shells. (3) I. Mr. Popov
Prerequisite: course 230B, or consent of instructor.
General theory of thin shells; cylindrical shells, shells having the form of a surface of revolution, hyperbolic paraboloids and other shells of double curvature; approximate methods of analysis; anisotropic and non-homogeneous shells; buckling and vibration; limit analysis.

234. Advanced Reinforced Concrete. (3) I. Mr. Lin, Mr. Bresler
Study of shrinkage and plastic flow, elastic and ultimate design of beams, columns, footings, and slabs, unsymmetrical bending, eccentric loads, deflections, torsion, prismatic and cylindrical shells, prestressed concrete simple and continuous beams, and circular tanks.

235. Analysis and Design of Masonry Dams. (3) II. Mr. Raphael
(Formerly Structural Engineering 235.)
Prerequisite: course 140.
Lecture and design course. Selection of location and type; stability analysis, stress analysis of gravity, arch, multiple-arch, dome, and slab-buttress dams; problems imposed by construction conditions and use of mass concrete.

236. Advanced Bridge Design. (3) II. Mr. Scheffey
(Formerly Structural Engineering 236.)
Prerequisite: course 136.
Design and analysis of advanced bridge structures; bridge approaches; bridge substructures; bridge layouts; bridge economics; bridge specifications; special design problems.

237. Mechanics of Solids. (3) I. Mr. Pister
Prerequisite: course 230A or Mechanical Engineering 285A, Engineering 230 or equivalent background in mathematics, or consent of the instructor.
Elements of tensor analysis and differential geometry; analysis of strain; strain and stress tensors; mechanical equations of state; invariant formulation of the equations of the mechanics of deformable solids; selected topics in elastic and visco-elastic media.

238. Applied Elasticity. (3) II. Mr. McNiven, Mr. Pister
Prerequisite: course 237 or consent of the instructor.
Applications of the theory of elasticity in structural mechanics and related fields.

Transportation Engineering

250. Analysis of Transportation Systems. (6) I. The Staff (Mr. Kennedy in charge)
(Formerly Transportation Engineering 201 and 210.) Prerequisite: course 170, Engineering 120, Statistics 130E.
Analysis of the function, influence, characteristics, and operation of transportation facilities and systems; comprehensive advanced study of transportation problems influencing planning and design, as affected by public policy, finance, and organization and management.

251. Advanced Highway Design. (3) II. Mr. Moyer
(Formerly Transportation Engineering 202.)
An advanced study of the location and design of various types and classes of highways. Emphasis is placed on advanced theory and practice in the design of alignment; highway cross sections, intersections, interchanges, multilane expressways and arterial highways in urban areas.
255. Traffic Engineering: Operations. (3) II. Mr. Kennedy
(Formerly Transportation Engineering 211.)
Theory and practical application of street and highway traffic engineering restrictions and uniform traffic control devices. Parking control and public transit planning. Traffic engineering administration.

255L. Traffic Engineering Laboratory. (1) II. Mr. Kennedy
(Formerly Transportation Engineering 210L.) Prerequisite: course 250 (may be taken concurrently.) Field and laboratory practice in making traffic engineering investigations and analysis of data. Vehicle performance.

260. Airport Engineering. (3) II. Mr. Horonjeff
(Formerly Transportation Engineering 270.) Prerequisite: graduate standing in engineering, except when special provision is made for students in certain programs of study.
Survey of the functions of government agencies in airport planning and the financing of public airports; evaluation of community airport requirements; factors covering the selection of airport sites; air traffic control and its effect on airport design; airport design requirements with respect to runways, taxiways, terminal area, drainage, and lighting.

265. Highway and Airport Pavements. (3) I. Mr. Horonjeff
(Formerly Transportation Engineering 220.)
An advanced study of the theories, principles, and practices in the design, construction, and maintenance of highway and airport pavement, including soil stabilization, design of rigid and flexible pavements, accelerated traffic and loading tests, and the design of asphaltic mixtures.

General Courses

270. Advanced Soil Mechanics. (2) II. Mr. Seed
(Formerly course 208.)
Prerequisite: course 121 and 122 or equivalent.
Advanced theories of soil mechanics including, among others, considerations of pore-water pressures in earth masses, shear strength of cohesive soil, applicability of the various methods of slope stability analysis to practical problems, the analysis of pile foundations and the design of bulkheads.

270L. Advanced Soil Mechanics Laboratory. (1) II. Mr. Seed
Prerequisite: course 270, may be taken concurrently.
A series of group discussions and individual experimental studies dealing with the more advanced aspects of soil properties and their applications in design. Subjects studied include consolidation, strength of soils in triaxial compression with measurement of pore-water pressures, vane shear tests, pile loading tests and pavement design procedures.

271. Seepage and Earth Dams. (2) II. Mr. Seed
(Formerly course 209.)
The principles governing the flow of water through soils and their application in the design of earth dams.

273. Applications of Physico-Chemical Principles in Soil Engineering. (3) I. Mr. Mitchell
Prerequisite: courses 121 and 122.
Colloidal phenomena in soils, clay mineralogy, determination of soil composition, the relationships between soil composition and behavior, soil formation, sediments, soil structure and its significance in determining soil properties and in engineering problems, the improvement of soil properties with additives.
298. Group Studies, Seminars, or Group Research. (1–5) I and II.

The Staff (Mr. Eberhart in charge)

Advanced study in various subjects related to civil engineering, through special seminars on topics to be selected each year, informal group studies of special problems, group participation in comprehensive design problems, or group research on complex problems for analysis and experimentation. The general areas in which studies may be undertaken include: engineering materials; structural mechanics and structural engineering; soil mechanics and foundation engineering; hydrology, fluid mechanics and hydraulic engineering; engineering biology and biochemistry and sanitary engineering; photogrammetric and geodetic engineering; engineering management and construction; transportation and traffic engineering. Examples of topics which have been studied in recent years include theory of thin shells; bending and buckling of thin plates; advanced structural theory; matrix and digital computer analysis of structures; design of thin sheet structures; beams on elastic foundation; topics in elasticity theory using complex variables; sanitary engineering project design; supplementary control surveys for photogrammetry; water resources, quality and pollution; air sanitation; urban transportation planning, highway finance, air transport policy and analysis.

The studies specifically undertaken in any particular session depend upon the availability of staff and the interests of qualified students. Announcements are made prior to each semester of topics concerning which seminars will be organized.

299. Individual Study or Research. (1–5) I and II.

The Staff (Mr. Eberhart in charge)

Investigation of selected advanced civil engineering subjects.

Graduate Seminars. (No credit) I and II.

Meetings of the staff and graduate students for discussion of current developments and research in various fields of civil engineering and irrigation. Seminars scheduled in each of the following groups: hydraulics, irrigation, and sanitary engineering, and structures (including materials and soil mechanics).

ELECTRICAL ENGINEERING

Upper Division Courses

The basic prerequisite for all upper division courses is satisfaction of lower division requirements in an engineering program of study and completion of the Upper Division Engineering Examination. Additional prerequisites are indicated.

100A–100B. Electrical Circuits and Machinery. (4–4) Yr. Beginning each semester.

The Staff (Mr. Robertson in charge)

Prerequisite: Mathematics 14A or 4A–4B; Physics 4B. Not for students in electrical engineering.

Voltage generation; circuit constants; electrical instruments; single-phase and polyphase circuit analysis; single-phase transformers; electrical machinery (synchronous, induction, direct-current, and single-phase machines) discussed primarily from the physics of performance; electronic tubes and their associated circuits; practical engineering problems; associated laboratory experiments.

101A. Electrical Circuits and Applications. (3) I and II.

Prerequisite: Mathematics 4A–4B, Physics 4B.

Theory and applications of electronics and electrical circuits. Single-
Engineering: Electrical

phase and polyphase circuits and machines, electromechanical energy conversion. Vacuum-tube and semiconductor characteristics; amplifiers and control circuits. Designed for students in civil and mining engineering. Students may not receive credit for both 101A and 101B.

101B. Electrical Circuits and Applications. (3) I and II.
Mr. Studer (in charge), Mr. Sloan
Prerequisite: Mathematics 4A–4B, Physics 4B.
Theory and applications of electronics and electrical circuits. Polyphase and transient currents. Vacuum-tube and semiconductor circuits and instruments. Electronic measuring devices, transducers, digital displays, telemetering. Designed for students in chemical engineering and in mineral technology except mining engineering. Students may not receive credit for both 101A and 101B.

102. Electrical Engineering Laboratory. (1) I and II.
One three-hour period per week to be arranged. Sections limited to fifteen students. Prerequisite: course 101 (should be taken concurrently if possible). Experiments designed to illustrate electrical theory and afford practice in the operation of electrical equipment. Designed to accompany, and supplement course 101.

103A–103B. Nuclear Accelerators. (2–2) Yr.
Mr. Woodyard
Prerequisite: course 100B or 106 or 109B or Physics 110B or 121 (may be taken concurrently). Course 103A is normally prerequisite to 103B. Qualified students may enroll in 103B without 103A with consent of instructor.
Theory, design, and applications of modern electronuclear machines such as d-c accelerators, betatrons, r-f linear accelerators, cyclotrons, synchrotrons, and strong-focusing machines; recent developments; ion sources and vacuum systems, lectures and demonstrations supplemented by visits to nearby nuclear laboratories.

106. Basic Electronics. (4) II.
Mr. Woodyard
Prerequisite: course 100A or 101 or Physics 110A or 121. Not for students majoring in electrical engineering.
Motion of charges in electromagnetic fields; electron energy levels in solids; semiconductors; electron emission; vacuum tubes and transistors; equivalent circuits; rectifiers and amplifiers; nonlinear circuits and distortion.

The Staff (Mr. Morton in charge)
Four lectures, one three-hour design problem session, and two three-hour laboratory periods per week. Prerequisite: Mathematics 14B, Physics 4B.
Electric circuits and circuit analysis; analytical, graphical, and experimental studies of circuits carrying direct, alternating, and transient currents. Magnetic circuits and materials, with applications to inductors and transformers. Electronic and electromagnetic effects and devices.

111A–111B. Electrical Machinery. (3–3) Yr.
111A: I and II. Mr. Robertson, Mr. Bergen, Mr. Iwama
111B: II.
Prerequisite: course 109B, Mechanical Engineering 100.
111A. The fundamental theory of the exploitation of nonlinear and linear ferromagnetic materials to produce power modulation, amplification, and energy conversion in static and rotating devices.
111B. The study of the dynamic and steady-state characteristics of rotating electromechanical devices including the direct-current machine, the
induction machine, the synchronous machine, the Amplidyne, and other specialized machines.

112A-112B. Energy Conversion in Electrical Systems. (5–4) Yr.

Prerequisite: course 119 (may be taken concurrently) and Mechanical Engineering 100.

Dynamic and steady-state specifications for electrical systems and the satisfaction thereof; analysis of nonlinear systems containing stationary power modulators and electromechanical energy converters.

114A-114B. Energy Transmission. (4–4) Yr.

Prerequisite: course 109A-109B.

A study of distributed-constant transmission lines with emphasis on energy transmission. A study of transient and steady-state behavior of energy transmission and generation systems, including steady-state and transient stability, system protection, and reactive power requirements.


Beginning each semester.

Prerequisite: course 106 or 109B.

116A. Simple communication systems; frequency analysis of idealized channels; tuned and coupled circuits; r-f amplifiers; power amplifiers; feedback and oscillations; amplitude and angular modulation.

116B. Microwave amplifiers; radiation and propagation; noise and generalized modulation systems; system calculations; introduction to information theory.


117A: I and II. Mr. Angelakos, Mr. Scott, Mr. Susskind, Mr. Whinnery
117B: II.

Prerequisite: course 109B or 106.

The mathematics of vector fields, static electric and magnetic fields. Maxwell’s equations. Applications to problems in wave propagation, skin effect, waveguides and cavity resonators, electromagnetic radiation, and ultra-high-frequency techniques.

119. Linear Systems Analysis. (3) I and II.

Prerequisite: course 109A-109B.

Mr. Jury, Mr. Bergen, Mr. Gill

Linear electrical, electromechanical and mechanical systems. System behavior from equilibrium equations, classical methods, and LaPlace transform techniques. Analysis of communication and control systems in time and frequency domains by the application of complex variable theory and pole-zero concepts. Signal flow analysis.

123. Communication Circuits. (3) I and II.

Prerequisite: course 119.

Mr. Pederson, Mr. Kuh

The properties of lumped element communication circuits and their network functions; the development of synthesis methods and techniques for filters, filter amplifiers, equalizers, etc.; the analysis of communication transmission lines and the design of transmission line filters and matching networks.

125. Principles of Electronic Circuits. (3) I and II.

Prerequisite: course 109B, not open to those taking course 116A.

Mr. Pederson, Mr. Bruun

Transistor and vacuum-tube equivalent circuits, analysis and design of linear low-pass, band-pass and feedback amplifiers; power amplifiers; the utilization of nonlinear operation for modulation, demodulation and harmonic
and relaxation oscillators; discrete state circuit (e.g., multivibrator) operation and analysis.

126. Physical Electronics. (4) I. Mr. Woodyard
Three lectures and one three-hour laboratory period per week. Prerequisite: course 106 or 109B, or Physics 110B or 121.
Basic principles and theory underlying scientific and industrial applications of electronics. Wave properties of the electron, relativistic electron ballistics, kinetic theory of gases, conduction in vacuum and gases, electronic and nuclear magnetic resonance, X rays, electromagnetic heating, electron microscopes, vacuum systems.

127. Elemental Control. (1) I. Mr. Hopkin (in charge), Mr. O. J. M. Smith
One three-hour laboratory period per week. Prerequisite: course 119 (to be taken concurrently). Credit will not be given for both 127 and 112A.
Analysis, testing, construction and operation of open-loop control systems and system components. Control system dynamics, motor controllers, transducers, output members, relays, switching circuits and networks.

128. Feedback Control. (4) I and II. Mr. Smith
Three lectures and one three-hour laboratory period per week. Prerequisite: courses 111A (may be taken concurrently) or 100B; 119; Mechanical Engineering 100 or Engineering 102; course 127 or 112A recommended.
The principles of analysis, synthesis, construction, and operation of closed-loop control systems, including steady-state and transient theory, stability criteria, and performance design factors. Illustrations from various engineering fields, with emphasis on electromechanical systems.

130. Electrical Engineering Materials. (2) I. Mr. English
Prerequisite: Physics 121.
The properties of solid-state materials of particular importance in electrical engineering devices leading from an atomic and structural foundation to the parameters of interest in applications. Ferromagnetic materials, conducting materials (metals, semiconductors, insulators) and dielectric and ferroelectric materials.

132A–132B. Electrical Communications Laboratory. (2-2) I and II.
132A: I and II. Mr. Everhart, Mr. Scott, Mr. Birdsell
132B: II.
Prerequisite: 132A: course 116A (may be taken concurrently). 132B: courses 132A, 117A or 119; 116B and 117B or 123 to be taken concurrently.
Experiments illustrating the fundamental principles involved in the operation of communication circuits and electronic devices. Particular consideration is given to the special methods of measurement, and special techniques, which must be employed at high frequencies.

133A. Power Modulator Laboratory. (2) I and II.
The Staff (Mr. Iwama in charge)
Prerequisite: course 111A (may be taken concurrently with 133A).
Selected experiments on magnetic amplifiers and rotating electric machinery, designed to illustrate the theory and recent developments in power modulators.

133B. Advanced Electrical Machinery Laboratory. (2) II.
The Staff (Mr. Dalziel in charge)
Prerequisite: courses 133A, 111B (may be taken concurrently).
Advanced experiments on a-c and d-c machinery.
151A–151B. Switching and Computing Circuits. (3–3) Yr.
   Mr. Singer, Mr. Morton
   Two lectures and one three-hour laboratory period per week. Prerequisite: course 106 or 109B.
   The functional and electrical design of switching circuits. Techniques and circuit components for digital information. Applications in high-speed digital computers and in industrial control.

152. Digital Computers. (3) II. Mr. Huskey
   Prerequisite: course 151A.
   System design with emphasis on data processing systems. Logical properties of computer components. Logical design features of automatic calculators, digital differential analyzers, and large-scale digital systems.

198. Directed Group Studies for Advanced Undergraduates. (1–5) I and II.
   The Staff (Mr. Saunders in charge)
   Prerequisite: course 109B; additional requirements may be specified by the instructor in each group.
   Group study of selected topics in electrical engineering, usually related to new developments.

199. Individual Study and Research for Advanced Undergraduates. (1–5) I and II.
   The Staff (Mr. Saunders in charge)
   Prerequisite: course 109B. Enrollment limited to senior students in engineering whose scholastic records show a scholarship average of B or higher or whose records indicate a capacity for independent study. Enrollment is subject to additional requirements imposed by the instructor concerned.
   Individual study and/or research on a problem chosen by the student and carried out under guidance of an instructor.

Graduate Courses

As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation will consist normally of the completion of at least 12 units of upper division courses basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed. The admission of undergraduates to graduate courses is limited to seniors who have an average scholarship of not lower than B in the basic courses.

205. Electron Optics and Beam Dynamics. (3) I. Mr. Süsskind
   Prerequisite: courses 116A, 117A or Physics 110A; Mathematics 122 recommended.
   Principles of the motion of electrons and streams of electrons; their production and control; application to theory of vacuum tubes such as velocity-modulated and cross-field tubes, cathode-ray and storage tubes, electron microscopes, and other electron-beam devices.

206. Theory of High Frequency Tubes. (3) II. Mr. Whinnery, Mr. Birdsall
   Prerequisite: course 117A–117B or Physics 110A–110B; course 205 recommended.
   A study of the interchange of energy between electromagnetic fields and various electron streams operating under transit-time conditions, with applications to the theory of space-charge-controlled tubes, velocity-modulation tubes, magnetrons, and traveling wave tubes.

210A–210B. Applied Electromagnetic Theory. (3–3) Yr. Mr. Rumsey
   Prerequisite: course 117A–117B or Physics 110A–110B.
211. Electrical Machinery. (3) I.  
Mr. Saunders  
Generalized analysis of machines used for energy control and conversion. Application of the methods of analysis to systems containing electrical machinery.

212. Nonlinear Magnetic Circuits. (3) II.  
Mr. Bourne  
Generalized approach to circuits containing magnetic cores with nonlinear, multivalued characteristics; methods for the dynamic representation of nonlinear system components; saturable reactor and magnetic amplifier theory; magnetic amplifier circuitry; practical applications of advanced magnetics in open-loop and feedback control systems.

216. Microwave Antennas. (3) II.  
Mr. Angelakos  
Prerequisite: course 117A–117B.  
Application of Maxwell's equations to transmission, propagation, and reception of radio waves.

217. Microwave Networks. (3) I.  
Mr. Trivelpiece  
Prerequisite: course 117A–117B or Physics 110A–110B.  
Study of the application of network theory, including the general theorems, the methods of analysis, and the measurement techniques, to microwave guides, cavity resonators, coupling systems and networks of these components.

220. Electro-Acoustics. (3) II.  
Mr. Black  
(Formerly numbered 220A–220B.)  
Prerequisite: recommended, course 117A–117B or 123.  
Analysis of vibrating systems; principles and apparatus involved in the production, propagation, measurement, and reception of sound.

222. Operational Analysis of Systems. (3) I and II.  
Mr. Zadeh  
Prerequisite: course 119 and Mathematics 185 (may be taken concurrently).  
Application of operational methods of circuit analysis, including Laplace transform and its extension, the Z-transform, to systems having lumped and distributed parameters, and to sampled systems.

223. Linear Network Theory. (3) I.  
Mr. Kuh  
Prerequisite: course 123 and Mathematics 185 (may be taken concurrently).  
The generalized analysis of linear networks; topological derivation of network functions; energy relations in passive networks and fundamental properties of physically realizable driving point and transfer functions; two-element kind canonic forms and equivalent networks; characterization and properties of passive N-port.

224. Network Synthesis. (3) II.  
Mr. Kuh  
Prerequisite: course 123 and Mathematics 185.  
General synthesis methods of driving point impedance and transfer functions; approximation methods in the frequency and time domains.

227. Linear Feedback Control Systems. (3) I.  
Mr. Jury  
Prerequisite: course 128, Mathematics 185, and course 222 (may be taken concurrently).  
Design of linear feedback control systems, considering stability, power requirements and response speed. Relations between Laplace transform, time domain, frequency response and root loci methods. Optimization with restrictions, statistical analysis, synthesis, and system specifications. Realizability. Comparison or performance criteria.
228. Sampled-Data Control Systems. (3) II.  
Prerequisite: course 222.  
Analysis, synthesis, and critical study of sampled-data control systems.  
General application of the Z-transform method to sampled-data problems.  
Study of digital computers in feedback control problems.  
Mr. Bergen

229. Nonlinear Feedback Control Systems. (3) II.  
Prerequisite: course 128.  
Analysis and design of nonlinear feedback control systems: systems with unavoidable nonlinearities; systems with nonlinearities deliberately introduced to improve performance. Phase space and frequency response methods.  
Nonlinear transformations and decision functions. Carrier systems.  
Mr. Hopkin

230. Solid-State Electronics. (3) II.  
Prerequisite: course 130 and Physics 121.  
A study of relations between the electrical, magnetic and radiation properties of solid-state electronic devices and the basic science of the solid state.  
Typical subjects include semiconductors (rectifiers, transistors, photodevices), phosphors (electroluminescence), electron emission, with emphasis on recent research.  
Mr. English

240. Nonlinear Active Circuits. (3) I.  
Prerequisite: course 119.  
Thermionic and semiconductor electronics; active device electrical description and equivalent circuits; piecewise linear analysis techniques and determination of optimum or limiting performance, application to electron tube and transistor switching, sweep and relaxation circuits; nonlinear amplifier and oscillator analysis.  
Mr. Pederson

241. Linear Active Circuits. (3) II.  
Prerequisite: course 123.  
Application and extension of passive network theory to the analysis and synthesis of linear active circuits; potential instability; fundamental limitations and optimum performance of cascaded and feedback amplifiers; active circuit noise and minimal noise circuits; application to electron tube and transistor circuits.  
Mr. Pederson

Prerequisite: course 151A–151B.  
Design of digital systems, including over-all planning, combination of functional elements, design of electric circuitry, and planning of tests and check procedures. Analysis and synthesis of switching networks, using adaptations of symbolic logic. Design examples, tests, and demonstrations.  
Mr. Morton

(2–2) Yr.  
Prerequisite: course 152A–152B.  
Study of types available, order codes, and checking procedures. Preparation and use of subroutine libraries. Logical design of computers.  
Mr. Huskey

260. Stochastic Processes in Electrical Engineering. (3) II.  
Prerequisite: course 119 or 116A; Statistics 134 or 202A.  
Continuous random processes; spectral analysis; theory of optimum linear systems and nonlinear processes with random inputs; statistical detection of signals. Applications in noise and control theory. Special topics.  
Mr. Thomasian
263. Discrete-State Systems and Automata. (2) II. Mr. Zadeh, Mr. Gill
A systematic development of the concepts and techniques relating to the
analysis and synthesis of discrete-state systems. Input-output relationships.
Moore's theory. Finite-memory systems. Turing machines. Reliability and
redundancy. Computability. Learning, adaptivity and self-organization.

265. Information Theory. (3) I. Mr. Thomasian
Prerequisite: Statistics 134 or 202A.
A systematic development of the concepts and facts of information theory.
The information rate of a source; coding for reliable transmission over dis­crete and continuous channels with noise; channel capacity; error correcting
codes; connections with modulation systems.

298. Group Studies, Seminars, or Group Research. (1–5) I and II.
The Staff (Mr. Saunders in charge)
Prerequisite: specific preparation as determined by the instructor in each
Advanced group study in electrical engineering; topics vary from year to
year. May consist of organized lectures or seminar discussions, devoted chiefly
to the research area in which the group is working. Sections planned for 1960–
1961 are: (a) Antennas and Radiation (I and II, Rumsey); (b) High-
Frequency Tubes (I and II, Whinnery); (c) Direct Synthesis of Control
Systems (I and II, Smith); (d) Seminar on System and Communication
Theories (I and II, Bergen, Desoer, Gill, Thomasian, Zadeh); (e) Solid-State
Devices (I and II, Wang); (f) Digital Control Systems Theory (I and II,
Jury); (g) Masers and Related Phenomena (I and II, Singer).

299. Individual Study or Research. (1–5) I and II.
The Staff (Mr. Saunders in charge)
Investigation of advanced electrical engineering problems.

INDUSTRIAL ENGINEERING

Upper Division Courses

The basic prerequisite for all upper division courses is satisfaction of lower
division requirements in an engineering program of study and completion of
the Upper Division Engineering Examination. Additional prerequisites are
indicated.

141. Introduction to Industrial Engineering. (1) I.
Mr. DeGarmo (in charge), Mr. L. E. Davis, Mr. Grassi
Prerequisite: junior standing. Open only to those registered in industrial
engineering.
Introduction to the historical development of industrial engineering;
literature in the field; relationship of the field to other phases of industry;
important contributors to the field; current problems, professional organi­zations.

142. Methods and Standards. (4) II. Mr. L. E. Davis, Mr. Redman
Three lectures and one three-hour laboratory period per week. Prerequisite:
Engineering 101, course 141, Statistics 130E (may be taken concurrently).
Not open to students who have completed course 143.
Principles of process, methods and work flow analysis and design, job
design, human engineering, equipment layout, work simplification, produc­tivity improvement programs; principles of work measurement, performance
standards, incentives and rewards, administration of methods and standards
programs.
143. Motion and Time Study. (3) I. Mr. L. E. Davis, Mr. Redman
Prerequisite: Engineering 100 or 101, or consent of the instructor; Business Administration 140 (may be taken concurrently); Statistics 130E recommended. Not open to students who have completed course 142.
Principles of motion economy; study of hand motions and their simplification through the use of process charts, micromotion analysis, and workplace design; equipment layout; theory and practice of time study, rating of worker performance, and standard data theory.

146. Wage and Incentive Systems. (3) I and II. Mr. Keachie
Prerequisite: course 142 or 143; Business Administration 140 (may be taken concurrently).
Design and administration of wage and incentive systems; job analysis and evaluation; employee rating; validation; motivation and morale; incentives for indirect, supervisory and professional groups; effects of technology, government, and labor unions; relationships to other industrial engineering and business activities.

148. Planning and Layout of Manufacturing Facilities. (2) II. Mr. Grassi (in charge), Mr. Lapsley, Mr. Keachie
One lecture and one three-hour laboratory period per week. Prerequisite: courses 151, 142, Business Administration 140, Engineering 120 (may be taken concurrently).
Principles involved in the design and operation of production facilities; product analysis, plant location, plant services, equipment selection, plant design, personnel factors.

149. Industrial Engineering Project. (1) II. Mr. Grassi, Mr. L. E. Davis, Mr. Keachie, Mr. Redman
Prerequisite: courses 142, 151, 148 (may be taken concurrently).
In-plant projects dealing with various phases of industrial engineering; individual projects selected by the students; written and oral reports and discussions of the results.

151. Manufacturing, Planning, and Control. (5) I. Mr. Lapsley (in charge), Mr. Grassi, Mr. Thomsen
Three lectures and six hours of laboratory per week. Prerequisite: course 142, Engineering 101, Mechanical Engineering 106A.
Consideration of the design and operation of manufacturing facilities; process selection; operation and capacity determination; production planning, scheduling, and control; design of manufacturing adjuncts of gages, jigs and fixtures, press dies, and tooling of production-type machines.

152. Principles of Metal Casting. (3) II. Mr. Campbell
Two lectures and one three-hour laboratory period per week. Prerequisite: Engineering 45, 101, or the equivalent.
Casting of metals; methods of providing molds and patterns; gating; solidification; finishing and inspection of castings; sources and elimination of defects; melting; design limitations.

161. Industrial Systems Analysis and Operations Research. (3) I and II. Mr. Shephard, Mr. Dantzig
Prerequisite: Statistics 130E, Mathematics 14A-14B or the consent of the instructor.
Introduction to the methods of analysis for the efficient allocation and control of resources in the design and operation of production systems—with illustrative examples of application of the methods.
198. Directed Group Studies for Undergraduates. (1-5) I and II.  
The Staff (Mr. Shepherd in charge)  
Prerequisite: upper division standing in engineering.  
Group studies of selected topics which vary from year to year.

199. Individual Study and Research for Advanced Undergraduates. (1-5)  
I and II.  
The Staff (Mr. Shepherd in charge)  
Enrollment limited to senior students in engineering whose scholastic records show a scholarship average of grade B or higher or whose records indicate a capacity for independent study. Enrollment is subject to approval of the instructor concerned.  
Individual study and/or research in a problem chosen by the student and carried out under guidance of an instructor.

GRADUATE COURSES

As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation will consist normally of the completion of at least 12 units of upper division courses basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed. The admission of undergraduates to graduate courses is limited to seniors who have an average scholarship of not lower than B in the basic courses.

243. Advanced Motion and Time Study. (3) I.  
Prerequisite: courses 142 or 143, 146, Statistics 130E.  
Mr. L. E. Davis  
A continuation on an advanced level of the subject matter presented in courses 142 and 143; presentation of complex problems of production measurements and methods development; introduction to research techniques in development of fundamental data.

245. Advanced Metal Cutting. (3) II.  
Prerequisite: course 151 or the equivalent.  
Mr. Thomsen  
Theoretical aspects of metal cutting. Chip formation; selection and use of cutting tools; machinability and tool life; heat transfer problems and selection of cutting fluids. Tooling of screw machines. Relation of dimensional control to interchangeable manufacturing.

261. Advanced Topics in Industrial Systems Analysis and Operations Research. (3) I.  
Prerequisite: course 161, Statistics 130E.  
Mr. Shephard, Mr. Dantzig  
Advanced study of problems relating to decision processes; nonlinear and dynamic programming, replacement theory, organization theory and group dynamics, cost and production functions and digital computer simulation, analysis of complex industrial systems.

290. Industrial Engineering Seminar. (3) II.  
Prerequisite: graduate standing in industrial engineering.  
Mr. DeGarmo, Mr. Grassi  
A study of past and current factors which contribute to policy-level problems and decisions in industrial engineering practice; case studies of problems arising from industrial engineering practice; current issues.

298. Group Studies, Seminars, or Group Research. (1-5) I and II.  
The Staff (Mr. Shepherd in charge)  
Advanced group studies in various fields of industrial engineering on topics which vary from year to year.

299. Individual Study or Research. (1-5) I and II.  
The Staff (Mr. Shepherd in charge)  
Individual investigation of advanced industrial engineering problems.
MECHANICAL ENGINEERING

UPPER DIVISION COURSES

The basic prerequisite for all upper division courses is satisfaction of lower division requirements in an engineering program of study and completion of the Upper Division Engineering Examination. Additional prerequisites are indicated.

100. Introduction to Dynamics. (2) I and II. Mr. Cunningham
Prerequisite: Mathematics 14A–14B, Physics 4A, Engineering 35; open only to students in electrical engineering.
Introductory treatment of kinematics and kinetics of a particle and of rigid bodies as applied to engineering problems. Force, energy, and momentum methods of solution.

105A. Thermodynamics. (3) I and II.
The Staff (Mr. H. A. Johnson in charge)
Prerequisite: course 100 or Engineering 102, which may be taken concurrently; Chemistry 1B or 8, Physics 4C; Mathematics 4B.
Energy transformations, reversibility, availability; thermal properties of gases and vapors. Theoretical cycles and practical engine forms, mechanisms and performance.

105B. Thermodynamics. (3) I and II.
Prerequisite: course 105A. Mr. H. A. Johnson (in charge), Mr. Laird

106A. Machine Design. (3) II. The Staff (Mr. Rouverol in charge)
Two lectures and one 3-hour laboratory period per week. Prerequisite: Engineering 25 (or 22 and 23), 102, and Civil Engineering 130. Not open to mechanical engineering students.
Application of the principles of mechanics, kinematics, physical properties of materials, and manufacturing processes to the design of machine parts.

107. Mechanical Laboratory. (2) I and II.
The Staff (Mr. Laird in charge)
Prerequisite: course 105A and either 105B and Engineering 103, or course 109. For chemical engineering students, Chemical Engineering 144 and 146A.
Measurement and appraisal of the performance of mechanical engineering systems.

109. Introduction to Heat Transfer and Fluid Mechanics. (3) I and II.
Mr. Giedt (in charge), Mr. Corcos, Mr. Howe
Prerequisite: course 105A. No credit allowed if either Engineering 103 or course 105B is taken.
The principles of conduction, convection and radiation heat transfer and one-dimensional flow of incompressible and compressible fluids.

110. Mechanism and Dynamics of Machinery. (3) I and II.
Prerequisite: Engineering 102. The Staff (Mr. Frisch in charge)
Three lecture hours per week (two 1½-hour periods). Advanced kinematic analysis and synthesis of typical elements of mechanism. Velocity and acceleration analysis of linkages, gearing, and cams. Inertia forces and balancing problems in machinery.
111. Nomography. (3) I and II. 
Prerequisite: Mathematics 14A–14B.
Theory and design of concurrency and alignment nomograms. Nomographic solutions to equations of three or more variables. Representation and analysis of experimental data using nomographic techniques.

112. Machine Design. (3) I and II. The Staff (Mr. Rouverol in charge)
Prerequisite: Engineering 102, Civil Engineering 130.
Two lectures and one three-hour laboratory per week. Application of principles of engineering mechanics to the design of a complete machine to meet prescribed functional requirements. Design of components for static and dynamic loads. Relation of design to materials and manufacturing processes.

*115. Reversed Thermodynamic Cycles and Refrigeration. (3) I.
Prerequisite: course 105B. Not open to students who have taken course 117, no longer offered.
Theory and practice of refrigeration, illustrated by study trips to actual plants.

*116. Industrial Air Conditioning Methods Economics. (3) II.
Prerequisite: course 105B. Not open to students who have taken course 117, no longer offered.
Theory and practice of air conditioning, illustrated by study trips to actual plants.

118. Power Production. (3) II. 
Prerequisite: course 105B, Electrical Engineering 100B.
Systems for the conversion of chemical, thermal, and radiant energy into mechanical or electrical energy, and for the alteration and storage of these forms of energy. Steam power plants, internal combustion engines, thermoelectric converters, fuel cells, nuclear reactors, and so forth, will be considered as parts of the spectrum of devices useful under particular optimizing conditions.

123A–123B. Internal Combustion Engines. (3–3) Yr. 
Prerequisite: course 105B, Engineering 103, 102. Recommended: Mathematics 14B.
Application of the principles of engineering mechanics and thermodynamics to internal combustion engines.

124. Mechanical Engineering Systems. (3) II.
Prerequisite: course 112 and 131A. The Staff (Mr. Vogt in charge)
Synthesis of the several fields of mechanical engineering, with applications in the design of systems such as those for power, propulsion, refrigeration, environmental control, and fluid transmission.

131A–131B. Mechanical Engineering Laboratory. (3–3) Yr.
131A. I and II; 131B. II. The Staff (Mr. Thal-Larsen in charge)
Prerequisite: course 105B, Engineering 103, Electrical Engineering 100B.
Experimental investigation and analysis of the transient and steady-state behavior of mechanical engineering systems and of their thermal and dynamic processes.

151. **Heat Transfer.** (3) I and II.  
Mr. H. A. Johnson, Mr. Tien  
**Prerequisite:** course 105B and Engineering 103. Recommended: Mathematics 14B.  
The study of the basic principles of heat transfer and their application to the design of industrial equipment. Steady-state and transient problems of conduction by analytical and graphical methods. Free and forced convection. Transfer of radiant energy.

152. **Industrial Mass Transfer.** (3) II.  
Mr. Stewart  
**Prerequisite:** course 105B or 151, Engineering 103 or Chemical Engineering 146A.  
Mass transfer processes both with and without simultaneous heat transfer applied to process equipment, involving evaporation, evaporative cooling, humidification, dehumidification, and gas absorption.

154. **Thermodynamics.** (3) I and II.  
Mr. Stewart  
**Prerequisite:** course 105B or Chemical Engineering 143 and Engineering 103. Recommended: Mathematics 14B.  
Engineering applications of the first and second laws of thermodynamics. Thermodynamics of the pure component and of mixtures and solutions in flow systems, separation processes, combustion reactions, and phase equilibria.

161. **Applied Fluid Mechanics.** (3) I and II.  
Mr. Laird, Mr. Iversen  
**Prerequisite:** Engineering 103.  
The theory of viscous and turbulent flow with related phenomena; hydraulic machinery (including pumps, fans, compressors, turbines, and hydraulic couplings), similarity criteria and model laws.

163. **Flow Problems of the Process Industries.** (3) II.  
Mr. Farbar  
**Prerequisite:** course 105A and Engineering 103. For chemical engineering students, Chemical Engineering 146A–146B.  
Flow properties of mixtures and suspensions, plastic flow, multiphase flow, materials handling, mixing and pumping equipment.

164. **Automatic Control.** (3) I and II.  
Mr. Takahashi, Mr. Thal-Larsen  
**Prerequisite:** Engineering 103 or course 109, course 105B or Physics 112 or Chemical Engineering 143, Mathematics 14B.  
Transient and steady-state behavior of systems. Dynamics of control loops in the time, the frequency, and the Laplace domains. Application of graphical and topological techniques. Illustrative problems may be taken from the fields of mechanical, process, nuclear, aeronautical and electrical engineering.

165. **Automatic Controls Laboratory.** (1) I and II.  
Mr. Takahashi, Mr. Thal-Larsen  
**Prerequisite:** course 164 or Electrical Engineering 128.  
Experiments with feedback control systems such as might be encountered in mechanical, chemical, mining and metallurgical engineering. Dynamics of level, temperature, pressure and other control systems. Studies of control-loop components. Investigations of various control schemes.

170. **Mechanical Vibrations.** (3) I and II.  
Mr. Garland  
**Prerequisite:** Engineering 102 and Mathematics 14A–14B or equivalent.  
Introduction to the theory of mechanical vibrations with application to vibration isolation, critical speeds, and machinery.

171. Design of Mechanical Equipment. (3) I.  
Mr. Radcliffe  
Two lectures and one three-hour laboratory period per week. Prerequisite: course 110 and 112.  
Application of engineering principles to the design of complete machines. Analysis of curved beams, centrifugal stresses, thermal stresses, and other selected topics. Theoretical and empirical methods. Economic aspects in material selection and processing.

172. Fundamentals of Experimental Stress Analysis. (3) I and II.  
The Staff (Mr. Cunningham in charge)  
Two lectures and one three-hour laboratory period per week. Prerequisite: Civil Engineering 130 and Engineering 102.  
Experimental methods for the determination of strains in structure and machine members. Laboratory experiments making use of various types of strain gauges, associated recording and indicating instruments, brittle lacquers, photoelasticity and model analysis. Discussion of deviations from elementary theory of strength of materials.

175. Advanced Mechanics. (3) I and II.  
Mr. Meriam  
Prerequisite: Engineering 102, Mathematics 14A–14B. Recommended for students planning graduate study.  
Advanced methods applied to problems of force and motion. Fundamental laws and principles of mechanics. Vector algebra and calculus; energy methods in statics and dynamics; dynamics of mass systems; variable mass; Euler's equations; gyroscopic motion; selected topics.

180. Elements of Analog Computers. (3) I and II.  
Mr. Atkinson  
Two lectures and one three-hour laboratory period per week. Prerequisite: Engineering 102 or the equivalent; Electrical Engineering 100A, or 101; students majoring in mathematics, physics or chemistry with equivalent background may be admitted at the discretion of the instructor.  
Introduction to analog computers, emphasizing basic elements used in their construction and operation. Representation of fundamental mathematical processes by mechanical, electro-mechanical, electrical, and electronic devices. Integrators, differentiators, multipliers, adders, etc. Use of analog laboratory equipment.

*181. Selection of Process Equipment and Materials of Fabrication. (3) I.  
Mr. Cornet  
Prerequisite: Civil Engineering 130 (formerly Civil Engineering 108A); Engineering 45, 103, and course 105A or Chemical Engineering 146A.  
Principles of corrosion. The selection of equipment and its design specification. For chemical and petroleum process industry. Consideration of process operating requirements, such as pressure, temperature, corrosion.

198. Group Studies for Advanced Undergraduates. (1–5) I and II.  
The Staff (Mr. Garland in charge)  
Prerequisite: upper division standing in engineering, plus particular courses to be specified by the instructor for each group.  
Group studies of selected topics which vary from year to year. The program for 1960–1961 may include: Acoustics, Mr. Soroka; Analog Computing Methods, Mr. Atkinson; Design of Mechanical Equipment, Mr. Rouverol; Dynamics, Mr. Goldsmith; Applied Kinematics, Mr. Radcliffe; Engineering Graphics, Mr. Levens; Engineering Plastics, Mr. Frisch; Principles of Solar Energy, Mr. Howe; Introduction to Elasticity, Mr. Hsu.

199. Individual Study and Research for Advanced Undergraduates. (1–5) I and II.
The Staff (Mr. Meriam for Mechanics and Design; Mr. Vogt for Heat-Power Systems)

Enrollment limited to senior students in engineering whose scholastic records show a scholarship average of B or higher or whose records indicate a capacity for independent study. Enrollment is subject to additional requirements imposed by the instructor concerned.

Individual study and/or research on a problem chosen by the student and carried out under guidance of an instructor.

GRADUATE COURSES

As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation will consist normally of the completion of at least 12 units of upper division courses basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed. The admission of undergraduates to graduate courses is limited to seniors who have an average scholarship of not lower than B in the basic courses.

Graduate standing is required for admission to these courses. In addition, graduate students must have completed at least Mathematics 14A–14B before undertaking any of the following courses, except as noted.

264. Advanced Automatic Control. (3) I. Mr. Takahashi
Prerequisite: course 164 or Electrical Engineering 128; Mathematics 185 or Engineering 230 recommended.
Analysis and synthesis of linear, nonlinear, and sampled-data control systems. Study of statistical, matrix, and dynamic programming methods of solving control problems. Examples will be chosen from the fields of mechanical and chemical operations.

265. Heat Conduction. (2) I. Mr. Seban
Prerequisite: course 151 and Engineering 230 (may be taken concurrently).
Study of steady-state, transient, and periodic problems of heat conduction, using both mathematical and numerical methods of solutions. Introduction to problems of thermal stress.

266. Heat Convection. (3) II. Mr. Seban
Prerequisite: course 151, Aeronautical Sciences 162, and Engineering 230.
Mathematical analysis of convection problems, including boundary layer theory and heat transfer during laminar and turbulent flow. Discussion of allied topics such as boiling, condensation, and mass transfer.

267. Thermal Radiation. (2) I. Mr. H. A. Johnson
Prerequisite: course 151 (may be taken concurrently).
The transfer of radiant energy, gaseous radiation, geometrical and spectral characteristics of systems involving thermal radiation.

268. Advanced Problems of Thermodynamics. (3) II. Mr. Tien
Prerequisite: course 154.
An introduction to the statistical thermodynamics of the pure component and of mixtures. The thermodynamics of irreversible phenomena.

271. Theory of Pumping Machinery. (3) II. Mr. Iversen
Recommended: course 161 or Aeronautical Sciences 162.
The design and performance of all types of pumping machinery.
280. Application of Analogs to Engineering Problems. (3) II
Mr. Atkinson
Two lectures and one three-hour laboratory period per week. Prerequisite: graduate standing in engineering, physics, or mathematics.

283A–283B. Oscillations in Nonlinear Systems. (3–3) Yr. Mr. Hsu
Prerequisite: course 170 or Electrical Engineering 109B.

284A–284B. Mechanical Vibrations. (3–3) Yr. Mr. Soroka
Prerequisite: course 170 recommended.

285A. Theory of Elasticity 1. (3) I. Mr. Naghdi
Prerequisite: Mathematics 119 (or equivalent) and Mathematics 122 (or equivalent); the latter may be taken concurrently.
Fundamentals of the theory of elasticity (in three dimensions), various types of boundary-value problems, and general theorems. Application to torsion, flexure and two-dimensional problems of plane strain, plane stress, and generalized plane stress.

285B. Theory of Elasticity 2. (3) II. Mr. Naghdi
Prerequisite: course 285A.
Continuation of Theory of Elasticity 1. Minimum principles and variational theorems. Muskhelishvili's method and application of conformal mapping to two-dimensional elastostatic and elastokinetic problems. Three-dimensional problems of elasticity and related special theorems.

*285C. Theory of Elasticity 3. (3) II. Mr. Naghdi
Prerequisite: course 285A.

*286A. Theory of Plasticity 1. (3) I. Mr. Naghdi
Prerequisite: course 285A.
Fundamentals of plasticity, the concept of yield and the associated constitutive equations in the theory of elastic-plastic solids including those for the perfectly plastic, and the elastic, perfectly plastic solids. Application to torsion and plane problems of plasticity.

*286B. Theory of Plasticity 2. (3) II. Mr. Naghdi
Prerequisite: course 286A.
Continuation of Theory of Plasticity 1. Further considerations of the constitutive equations and the associated concepts. Variational theorems, the piecewise linear loading functions and related minimum principles. The

linear and nonlinear theories of viscoelasticity and viscoplasticity with application.

*287A. Advanced Engineering Dynamics. (3) I. Mr. Goldsmith
Prerequisite: Engineering 102 or Physics 105B; Mathematics 14A–14B; graduate standing in engineering, mathematics, or physics. Course 284A–284B recommended.

287B. Impact. (3) II. Mr. Goldsmith
Prerequisite: course 287A. Course 284A–284B recommended.

289A. Foundations of the Theory of Continuous Media 1. (3) I. Mr. Naghdi
Prerequisite: a course in elasticity (Mechanical Engineering 285A) or a course in fluid mechanics (Aeronautical Sciences 162) and Mathematics 220A (may be taken concurrently).
The foundations of the theory of continuous media. An introduction to tensor calculus; kinematics of deformation for initial and current coordinate systems; various measures of deformation and strain rates. The concept of the stress tensor in both initial and current coordinate systems and the Kirchoff double vector. The consequences of the laws of conservation of mass, momentum, energy, and Clausius inequality.

289B. Foundations of the Theory of Continuous Media 2. (3) II. Mr. Naghdi
Prerequisite: course 289A.
Continuation of course 289A. Classical thermodynamics and thermodynamic potential for a continuous medium. Irreversible thermodynamics, Onsager’s principle and variational principles for nonequilibrium systems. Constitutive equations for various media and application.

298. Group Studies, Seminars, or Group Research. (1–5) I and II.
The Staff (Mr. Garland in charge)
Advanced study in various fields of mechanical engineering on topics which may vary from year to year.
The program for 1960–1961 may include: Acoustics, Mr. Soroka; Applications of Variational Principles to Engineering Problems, Mr. Rosenberg; Exterior Ballistics of Rockets, Mr. Leitmann; Mechanical Invention, Mr. Rouverol; Wave Propagation in Solids, Mr. Goldsmith; Analytical Dynamics and Relativity, Mr. Lieber; Hydrodynamic Stability, Mr. Lieber; Sea Water Conversion, Mr. Howe; Advanced Kinematics, Mr. Radcliffe.

299. Individual Study or Research. (1–5) I and II.
The Staff (Mr. Meriam, in charge Mechanics and Design; Mr. Vogt, in charge Heat-Power Systems)
Investigation of advanced mechanical engineering problems.

Aeronautical Sciences

UPPER DIVISION COURSES

The basic prerequisite for all upper division courses is satisfaction of lower division requirements in an engineering program of study and completion of

the Upper Division Engineering Examination. Additional prerequisites are indicated.

121. Engineering Aerodynamics. (3) II. Mr. Laitone
Prerequisite: Engineering 103.
Wing characteristics, performance determination, loading conditions, static and dynamic stability and control of airplanes.

122. Propulsion. (3) I and II. Mr. Sherman, Mr. Starkman
Prerequisite: Mechanical Engineering 105A-105B, Engineering 103, and senior standing.
Analysis of propulsion systems and machinery with emphasis on the aerodynamics, thermodynamics and mechanics of systems applicable to jet propulsion of aircraft and missiles.

162. Elementary Hydrodynamics. (3) I and II. Mr. Corcos, Mr. Schaaf
Prerequisite: Engineering 103, Mathematics 14B.
Stream function, potential function, and conformal transformation with applications to engineering problems.

**Graduate Courses**

As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation will consist normally of the completion at least 12 units of upper division courses basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed. The admission of undergraduates to graduate courses is limited to seniors who have an average scholarship of not lower than B in the basic courses.

*223. Dynamics of Reactive Fluids. (3) II. Mr. Oppenheim
Studies of processes involving mutual interaction between fluid dynamic, chemieokinetic, heat- and mass-transfer phenomena.

270. Wing Theory. (3) II. Mr. Laitone
Prerequisite: course 162, Engineering 230.
Airfoil and deeply submerged hydrofoil theory. The lift, drag and moment of wings and hydrodynamic control surfaces.

276. Mechanics of Real Fluids. (3) II. Mr. Schaaf, Mr. Sherman
Prerequisite: Engineering 230. Recommended: Mechanical Engineering 161 and course 162.
Theory of viscous and turbulent flow with applications to fundamental flow problems.

277. Compressible Fluids. (3) I. Mr. Talbot
Prerequisite: Engineering 230. Recommended: Mechanical Engineering 162 or Mathematics 270.
Fundamentals of subsonic and supersonic flow, shock waves, different theoretical methods, laboratory equipment, and procedures for supersonic investigations.

298. Group Studies, Seminars, or Group Research. (1-5) I and II.
The Staff (Mr. Schaaf in charge)
Advanced study in various fields of aeronautical sciences on topics which may vary from year to year.

* Not to be given, 1960-1961.
298A. Experimental Methods in Aerodynamics. (1-5) I. Mr. Maslach
Design of aerodynamic experiments based on theoretical calculations, the principles of physical measurements and the limitations of contemporary measurement techniques including consideration of error sources and their influence on the planning of investigations.

298B. Advanced Fluid Dynamics. (3) I. Mr. Sherman
An extension in depth and scope of the material of courses 276 and 277 and offering a discussion of advanced problems in classical fluid mechanics.

298C. Advanced Propulsion Systems. (1-5) I. Mr. Starkman
The application of thermodynamics, fluid mechanics, and chemical kinetics to instability, nonequilibrium, dissociation, abnormal heat transfer, and ionization calculations in propulsion systems.

298D. Magnetohydrodynamics. (1-5) II. Mr. Talbot
An introduction to the fundamental laws and concepts, and the standard theoretical assumptions of continuum magnetohydrodynamics, including a discussion of wave propagation, shocks, and other topics to be selected by students.

298E. Rarefied Gas Dynamics. (1-5) II. Mr. Schaaf
Review of theoretical and experimental methods and results in slip, transition and free molecule flow, with applications to problems of ultra high altitude flight.

298F. Foundations of Fluid Dynamics. (3) II. Mr. Corecos
A critical review of the foundations of the various fields of fluid dynamics.

299. Individual Study or Research. (1-5) I and II.
The Staff (Mr. Schaaf in charge)
Investigation of advanced problems in aeronautical sciences.

MINERAL TECHNOLOGY

Ceramic Engineering†

Geological Engineering

UPPER DIVISION COURSES*

The basic prerequisite for all upper division courses is satisfaction of lower division requirements in an engineering program of study and the completion of the Upper Division Engineering Examination. Additional prerequisites are indicated.

120. Fundamentals of Geologic Engineering. (2) I. Mr. Trask
(Formerly numbered 100.)
Prerequisite: Geology 150 or the equivalent.
Application of geology to engineering, the influence of mineral composition, fabric, texture, stratification, weathering, porosity, permeability, water content, fracturing, strength, and other factors upon the design and construction of engineering structures.

121. Geological Evaluation of Construction and Foundation Problems in Civil, Mining, and Petroleum Engineering. (3) II. Mr. Trask
(Formerly numbered 101.)
Prerequisite: Geology 150 or the equivalent.
Geologic problems of concern to the civil engineer in designing and con-

* See also courses listed under Petroleum Engineering, Mining, Geology.
† For courses in ceramic engineering, see Materials Science, page 171.
Engineering: Mineral Technology

Structuring dams, tunnels, bridges, highways, airfields; to the mining engineer in locating shafts, tunnels and adits, mine development procedure, subsidence, water problems; to the petroleum engineer in drilling, procuring, drilling muds, landslides; frozen ground.

122. North American Mining Districts. (3) I. Mr. Wisser
(Formerly numbered 102.)
Prerequisite: Geology 150 or the equivalent.
Ore deposit distribution in western North America; relation to intrusives, structural features, geologic history of their surroundings. Analyzes districts to determine reasons for formation; emphasis on areas subject to intensive exploration by modern geological, geophysical, and engineering methods.

123. Exploration for Metalliferous Deposits. (3) II. Mr. Wisser
(Formerly numbered 103.)
Prerequisite: Geology 150 or the equivalent.

198. Directed Group Studies for Advanced Undergraduates. (1-5) I and II. The Staff (Mr. Trask in charge)
Prerequisite: upper division standing in engineering or consent of the instructor.
Group study of selected topics.

199. Individual Study for Advanced Undergraduates. (1-5) I and II. The Staff (Mr. Trask in charge)
Prerequisite: enrollment limited to senior students in engineering whose scholastic records show a scholarship average of grade B or higher or whose records indicate a capacity for independent study.

Graduate Courses

As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation will consist normally of the completion of at least 12 units of upper division courses basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed. The admission of undergraduates to graduate courses is limited to seniors who have an average scholarship of not lower than B in the basic courses.

202. Geological Engineering Case Histories. (2) I. Mr. Trask
Prerequisite: Geology 5 and 150 or equivalent.
An analysis of geological aspects of engineering construction problems by means of studies of case histories and review of current literature.

203. Advanced Mineral Exploration. (2) I. Mr. Hawkes, Mr. Wisser
Prerequisite: course 103, Mining 105, 106, Geology 106B, or their equivalent.
A study of mineral exploration case histories stressing the integrated use of geological, geophysical, and geochemical ore guides in the search for mineral deposits.
298. Group Studies, Seminars, or Group Research. (1–5) I and II.
The Staff (Mr. Trask in charge)
Group studies may be arranged in different fields of geological engineering such as foundation problems, mineral exploration, geochemistry, and geophysics.

299. Individual Study or Research. (1–5) I and II.
The Staff (Mr. Trask in charge)

Materials Science

Upper Division Courses

100. Industrial Ceramics and Metallurgy. (1) I.
(Formerly Ceramic Engineering 190.) Mr. Fulrath, Mr. Washburn
Prerequisite: Engineering 45.
Lectures, field trips, and reports on topics related to the ceramic and metallurgical industries.

101. Material and Energy Balances. (3) II. Mr. Ravitz
(Formerly Metallurgy 100.)
Prerequisite: Chemistry 110A.
Material and energy balances of metallurgical and ceramic processes; fuels; combustion and heat utilization; introduction to unit processes.

102. Phase Changes. (3) II. Mr. Searcy
(Formerly Ceramic Engineering 101.)
Prerequisite: Chemistry 110A.
Phase rule and concepts of phase diagrams. Phase transformation under equilibrium and nonequilibrium conditions. Application of phase diagrams to ceramic and metallurgical problems.

103. Structure and Properties of Crystals. (4) II. Mr. Dorn
(Formerly Engineering 160.)
Prerequisite: Chemistry 110A and Physics 121 (may be taken concurrently).
Relationships between atomic structure of the elements and crystal structure of elements and compounds; dependence of physical and chemical properties on structure and on crystal imperfections; laboratory measurement of solid state properties, with particular emphasis on X-ray diffraction techniques.

104. Metallurgical Thermodynamics. (3) I. Mr. Hultgren
(Formerly Metallurgy 101.)
Prerequisite: Chemistry 110B and senior standing.
The principles of thermodynamics with emphasis on their application to metallurgical and ceramic problems.

111. Physical Ceramics. (2) I. Mr. Pask, Mr. Fulrath
(Formerly Ceramic Engineering 102.)
Prerequisite: course 102 or consent of the instructor.
Introduction to ceramic engineering, with emphasis on chemical and physical properties of inorganic nonmetallic materials. The effect of chemical compositions and physical processing on properties. Emphasis on glasses and refractories.

111L. Physical Ceramics Laboratory. (1) I. Mr. Pask, Mr. Fulrath
(Formerly Ceramic Engineering 102L.)
Prerequisite: open only to students who have had or are enrolled in course 111.
The laboratory part of course 111.
112. Chemical Ceramics. (3) I. Mr. Fulrath, Mr. Searcy
(Formerly Ceramic Engineering 103.)
Prerequisite: course 102 or consent of the instructor.
Fundamentals of inorganic and physical chemistry applied to materials of ceramic interest: colloids, clays, glasses, oxides, and high melting materials.

113. Principles of Ceramic Engineering. (4) II. Mr. Pask, Mr. Fulrath
(Formerly Ceramic Engineering 105.)
Prerequisite: course 111.
Unit operation of ceramic engineering processes: nature and processing of ceramic materials, rheological properties of colloidal systems, slurries and plastic masses, formulation of compositions with specific textures, forming principles, drying and firing problems. Process analyses. Special problem included in laboratory work.

114. Seminar in Ceramic Engineering. (2) II. Mr. Searcy
Prerequisite: course 102.
Seminar discussions of recent articles in the scientific and technical literature pertaining to ceramics. Last quarter of semester devoted to individual problems involving engineering design and analysis. Section limited to fifteen students.

121. Physical Metallurgy. (2) I and II. Mr. Washburn
(Formerly Engineering 163.)
Prerequisite: Chemistry 1B, Physics 4B and 4C.
Relationships between microstructure, composition, heat and mechanical treatment, and physical properties of metals and alloys; the metallic state, phase diagrams and interpretation of microstructures from them; deformation of recrystallization of metals, metallography, and heat treatment of iron and steel.

121L. Physical Metallurgy Laboratory. (1) I and II. Mr. Washburn
(Formerly Engineering 163L.)
Prerequisite: open only to students who have had or are enrolled in course 121.
The laboratory part of course 121.

122. Advanced Physical Metallurgy. (3) II. Mr. Hultgren
(Formerly Metallurgy 103.)
Prerequisite: course 102 or consent of the instructor.
Application of principles of physics and chemistry to study of metals; elastic and plastic theory; theories of alloying; microstructure as affected by alloying and heat treatment; correlation between microstructure and mechanical and chemical behavior; kinetics of metallurgical reactions.

123. Mechanical Metallurgy. (3) II. Mr. Dorn
(Formerly Engineering 165.)
Prerequisite: courses 121 and 121L (or Engineering 45).
An analysis of the effects of structure on the mechanical properties of metals.

124. Plasticity and Metal Forming. (3) I. Mr. Dorn, Mr. Thomsen
(Formerly Engineering 164.)
Prerequisite: Civil Engineering 130.
The theory of plasticity and the plastic forming of metals.

132. Unit Processes for Mineral Industries. (3) I. Mr. Fuerstenau
(Formerly Metallurgy 102.)
Prerequisite: course 101.
Principles of the unit processes involved in the extraction of metals from
their ores; calcining, roasting, smelting, refining, leaching, electrolysis, and related processes; metallurgical calculations.

133. Mineral Dressing. (3) I.  Mr. Fuerstenau
(Formerly Metallurgy 104.)
Prerequisite: consent of the instructor. Chemistry 110A may be taken concurrently.
Systematic study of unit operations of mineral dressing, including crushing and grinding, sizing, gravity concentration, flotation, magnetic and electrostatic separation, thickening and filtration; economics of mineral dressing.

198. Directed Group Studies for Advanced Undergraduates. (1–5) I and II. The Staff (Mr. Pask and Mr. Washburn in charge)
(Formerly Ceramic Engineering 198 and Metallurgy 198.)
Prerequisite: courses 101 and 103.

199. Individual Studies or Research for Advanced Undergraduates. (1–5) I and II. The Staff (Mr. Pask and Mr. Washburn in charge)
(Formerly Ceramic Engineering 199 and Metallurgy 199.)
Enrollment limited to senior students in engineering, chemistry, geology, or physics whose scholastic records show a scholarship average of grade B or higher or whose records indicate a capacity for independent study.

GRADUATE COURSES

As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation will consist normally of the completion of at least 12 units of upper division courses basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed. The admission of undergraduates to graduate courses is limited to seniors who have a grade average of not lower than B in the basic courses.

†202. Metallurgy of the Less Common Metals. (2) II.  Mr. Ravitz
(Formerly Metallurgy 202.)

206A–206B. Materials for Nuclear Engineering. (2–2) I and II.
(Formerly Metallurgy 206A–206B.)  Mr. Fulrath
Prerequisite: Engineering 45 and Chemistry 110A–110B or the equivalent.
Basic considerations of engineering materials used primarily in nuclear reactor technology. The fundamentals of production, fabrication, irradiation damage of special materials and the specific problems related to the use of common engineering materials in reactor design.

*240. Metallurgical Thermodynamics. (3) II.  Mr. Kelley
(Formerly Metallurgy 240.)
Prerequisite: course 104 or Chemistry 114H.
Thermodynamic properties of metallurgical substances and their application to heat balances and reaction equilibria in extractive metallurgical processes.

250. Physics of Metals. (3) I.  Mr. Parker
(Formerly Metallurgy 250.)
A theoretical study of the metallic state, emphasizing those properties of technologic importance; chemical bonding forces, crystal structures of metals and alloys, compressibility, specific heat, magnetism, electrical and thermal conductivity, thermodynamics.

† To be given if a sufficient number of students enroll.
256. Reaction Kinetics. (3) I.  Mr. Dorn  
(Formerly Metallurgy 256.)  
Prerequisite: course 121, 121L, Chemistry 110A–110B.  
Introduction to the application of statistical mechanics to reaction kinetics in metallic systems. Special emphasis will be given to analytical treatment of recrystallization, phase transformations including decomposition of austenite and precipitation hardening, diffusion in metals, and the hardenability of steels.

258. Statistical Thermodynamics. (3) II.  Mr. Dorn  
To be offered in alternate years.  
Prerequisite: course 104 or equivalent.  
Boltzmann, Fermi-Dirac, and Bose-Einstein statistical mechanics with special emphasis on applications to metallurgy and ceramics.

260. Dislocation Theory. (3) I.  Mr. Washburn  
(Formerly Metallurgy 260.)  
Prerequisite: course 103 or equivalent.  
Application of the theory of dislocations to an understanding of properties. Current experimental and theoretical state of knowledge concerning crystal growth, yielding, strain hardening, solution hardening, recovery, recrystallization, creep, and fracture.

271. High Temperature Materials. (3) I.  Mr. Searcy, Mr. Pask  
(Formerly Ceramic Engineering 271.)  
Prerequisite: course 111.  
Relationships between structures, compositions and physical and chemical properties in high temperature materials. Kinetics of high temperature reactions.

273. Structure and Reactions in Inorganic Materials. (2) II.  Mr. Pask  
Prerequisite: Chemistry HOB, Physics 121.  
Theories on the structure, bonding and reactions in various classes of inorganic solids analyzed. Approximately one third of the semester is devoted to individual problems in bonding, structure, or reaction theory.

275. High Temperature Thermodynamics. (3) II.  Mr. Searcy  
To be offered in odd-numbered years.  
Prerequisite: course 104 or Chemistry 114H. Section limited to thirty students.  
Methods for measuring and for estimating thermodynamic data for high temperature materials are presented and evaluated. Thermodynamic data are applied to prediction of the behavior of materials in high temperature environments.

298. Group Studies, Seminars, or Group Research. (1-5) I and II.  
The Staff (Mr. Ravitz and Mr. Searcy in charge)  
(Formerly Ceramic Engineering 298 and Metallurgy 298.)

299. Individual Study or Research. (1-5) I and II.  
The Staff (Mr. Ravitz and Mr. Searcy in charge)  
(Formerly Ceramic Engineering 299 and Metallurgy 299.)
Engineering study of rocks from the standpoint of their mineral content, texture, fluid distribution, conductivity, and elastic behavior.

101. Economics of the Mineral Industry. (3) I. Mr. Shaffer
Prerequisite: senior standing in one of the mineral technology fields.

102. Mineral Engineering Applications of Fluid Mechanics. (3) I. Mr. Putnam
Prerequisite: Engineering 103, Petroleum Engineering 110, or Mechanical Engineering 105A or equivalent.
Extension of elementary fluid mechanics, thermodynamics and dynamics to flow problems encountered in transmission and pumping of fluids.

102L. Mineral Engineering Applications to Fluid Mechanics. (1) II. Mr. Putnam
Prerequisite: course 102.
Laboratory exercises in the application of fluid mechanics and thermodynamics to mineral engineering systems.

103. Elementary Mineral Economics. (2) II. Mr. Trask
(Formerly Engineering 161.)
Prerequisite: consent of the instructor; not open to majors in mineral engineering or materials science.
A survey of engineering aspects of mineral economics and water. Description of factors affecting supply and demand of mineral commodities, oil and coal, with respect to occurrence, recovery processing, transportation, marketing, cost. Special emphasis on ground water, irrigation, water supply.

Mining

Upper Division Courses

The basic prerequisite for all upper division courses is satisfaction of lower division requirements in an engineering program of study and completion of the Upper Division Engineering Examination. Additional prerequisites are indicated.

140. Introduction to Mining. (3) II. Mr. Hawkes
(Formerly course 100.)
Prerequisite: Geology 150 (may be taken concurrently).
The discovery, production, processing, and marketing of mineral raw materials other than petroleum.

143. Geological Factors in the Valuation and Operation of Mines. (3) II. Mr. Wisser
(Formerly course 103.)
Prerequisite: course 140 and Mineral Engineering 101.
Geological aspects of mine valuation. Size and metal content of ore deposits, based on geological reasoning, sampling, estimation of tonnage and average grade. Mining operations affected by geological factors; location of shafts, adits, mine levels. Selection of stoping methods.

144. Mine Economic Analysis and Reports. (3) II. Mr. Shaffer
(Formerly course 104.)
Prerequisite: course 140 and Mineral Engineering 101.
Two lectures and one laboratory period per week. Course 143 and Geological Engineering 123 may be taken concurrently.

‡ See also courses in geology and geological engineering.
Principles of engineering economic analysis applied to exploration, development, operation, and valuation of mineral deposits. Each analysis will be presented by the student as a formal report.

145. Geochemical Prospecting. (3) I. Mr. Hawkes
(Formerly course 105.)
Prerequisite: Chemistry 5, Geology 150 or the equivalent.
Introduction to the principles and practice of geochemical methods of prospecting for deposits of metallic and industrial minerals.

146. Geophysical Prospecting. (3) I. Mr. Ward
(Formerly course 106.)
Prerequisite: Geology 150 or the equivalent, Physics 4B.
Introduction to the applications of geophysics to exploration for deposits of metallic and industrial minerals and to problems in civil engineering.

198. Directed Group Studies for Advanced Undergraduates. (1–5) I and II.
The Staff (Mr. Shaffer in charge)
Prerequisite: upper division standing in engineering or consent of the instructor.
Group study of selected topics which vary from year to year.

199. Individual Study for Advanced Undergraduates. (1–5) I and II.
The Staff (Mr. Shaffer in charge)
Enrollment limited to senior students in engineering whose scholastic records show a scholarship average of grade B or higher or whose records indicate a capacity for independent study.

GRADUATE COURSES

As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation will consist normally of the completion of at least 12 units of upper division courses basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed. The admission of undergraduates to graduate courses is limited to seniors who have an average scholarship of not lower than B in the basic courses.

201A–201B. Investigations in Mining Practice. (2–3; 2–3) Yr.
The Staff (Mr. Shaffer in charge)
Program of work and credit to be arranged. Open to advanced students in geology and physics, as well as mining.
Instruction on the analysis, design, and development of mining systems. Applications of methods of modern physics and electronics to mining and mineral exploration.

202. Advanced Mineral Economic Analysis. (2) I. Mr. Shaffer
Economic analysis of mineral properties based on actual case histories.

203A–203B. Tectonic Analysis of Ore Districts. (2–2) Yr. Mr. Wisser
Prerequisite: consent of the instructor.
Principles of deformation in the earth’s crust; classification of ore districts according to type of deformation with which they are associated. Interrelation of mechanics of deformation with those of ore deposition. Application to search for new mining districts.

298. Group Studies, Seminars, or Group Research. (1–5) I and II.
The Staff (Mr. Shaffer in charge)
299. Individual Study or Research. (1-5) I and II.
The Staff (Mr. Shaffer in charge)

**Petroleum Engineering**

**Upper Division Courses**

The basic prerequisite for all upper division courses is satisfaction of lower division requirements in an engineering program of study and completion of the Upper Division Engineering Examination. Additional prerequisites are indicated.

**160. Thermal and Volumetric Behavior of Petroleum Reservoir Systems.** (3) II.
(Formerly course 110.)
Prerequisite: Chemistry 110A, Physics 4C, Mathematics 4B.
Principles of thermodynamics, heat transfer, combustion and volumetric behavior with applications to petroleum reservoir systems.

**160L. Petroleum Engineering Fundamentals Laboratory.** (1) II.
(Formerly course 110L.)
Mr. Witherspoon
Prerequisite: Mineral Engineering 100, Geology 5, and course 160 (may be taken concurrently).
Laboratory exercises on the measurement of properties of petroleum reservoir rocks and fluids.

**161. Petroleum Engineering—Development.** (3) I.
(Formerly course 111.)
Mr. Somerton
Prerequisite: Civil Engineering 111 and 130; Mineral Engineering 100; Mineral Engineering 102 and Geology 111A, both of which may be taken concurrently; or consent of instructor.
Analysis of principles and methods of oil field development including drilling mechanics, zonal evaluation, well completion and completion evaluation.

**161L. Petroleum Engineering—Development Laboratory.** (2) I.
(Formerly course 111L.)
Mr. Somerton
Prerequisite: course 161, which should be taken concurrently.
Laboratory experiments in petroleum engineering development including drilling mechanics, zonal evaluation and well completion evaluation.

**162. Petroleum Reservoir Mechanics.** (3) II.
(Formerly course 112.)
Mr. Fatt
Prerequisite: course 160, Chemistry 110A, Engineering 103, Mineral Engineering 100, Mathematics 14A-14B; or consent of instructor.
Principles of fluid mechanics applied to single phase and multiphase flow of fluid in porous rock.

**162L. Petroleum Reservoir Mechanics Laboratory.** (2) II.
(Formerly course 112L.)
Mr. Fatt
Prerequisite: course 162 (may be taken concurrently).
Laboratory exercises in the application of fluid mechanics to single and multiphase fluid flow through porous media.

**169. Petroleum Engineering—Short Course.** (3) I.
(Formerly Engineering 169.)
Mr. Somerton, Mr. Witherspoon
Prerequisite: consent of the instructor. Not open to petroleum engineering majors.
Condensed study of the technologic and economic problems of the petroleum producing industry. Special study sessions will be arranged for the following three groups of students: (1) engineering, (2) earth sciences, (3) business administration and economics.

198. Directed Group Studies for Advanced Undergraduates. (1-5) I and II.  
The Staff (Mr. Somerton in charge)  
Prerequisite: upper division standing in engineering or consent of the instructor.  
Group studies of selected topics which vary from year to year.

199. Individual Study or Research for Advanced Undergraduates. (1-5) I and II.  
The Staff (Mr. Fatt in charge)  
Enrollment limited to senior students in engineering whose scholastic records show a scholarship average of grade B or higher or whose records indicate a capacity for independent study.

GRADUATE COURSES

As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation will consist normally of the completion of at least 12 units of upper division courses basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed. The admission of undergraduates to graduate courses is limited to seniors who have an average scholarship of not lower than B in the basic courses.

205. Kinetic Theory of Fluids and Surfaces. (2) I.  
Mr. Fatt  
Prerequisite: course 110, or Mechanical Engineering 105A, or Chemistry 110A-110B.  
Study of gases and liquids of interest to mineral engineers from the standpoint of kinetic theory. Chemistry and physics of mineral surfaces and the interaction of these surfaces with fluids.

208. Advanced Reservoir Engineering. (3) II.  
Mr. Fatt  
Prerequisite: course 112 (formerly course 102), or Mechanical Engineering 105A and Engineering 103.  
Study of the detailed behavior of petroleum reservoirs using as a basis the thermodynamics and phase behavior of the fluids and the mechanics of multiphase flow through porous media.

213. Valuation of Oil- and Gas-Producing Properties. (2) II.  
Mr. Witherspoon  
Prerequisite: graduate standing or consent of the instructor.  
A study of the physical and economic factors underlying the appraisal of oil-producing properties. Estimation and evaluation of oil and gas reserves.

272. Flow in Porous Media. (3) II.  
(Formerly Mechanical Engineering 272.)  
Mr. Putnam  
Recommended: Aeronautical Sciences 162 or Mathematics 270.  
Applications of fluid mechanics and thermodynamics to flowing of single-phase and multiphase fluids in porous media, with application to reservoir problems.

298. Group Studies, Seminars, or Group Research. (1-5) I and II.  
The Staff (Mr. Fatt in charge)  
Advanced study in various fields of petroleum engineering on topics which may vary from year to year depending upon student interest. Topics suggested for 1960-1961 are: Advanced Fundamentals: Well Logging (Fatt,
Somerton); Hydrocarbon Phase Behavior (Fatt); Immiscible and Miscible Fluid Displacement (Fatt); Thermal Recovery Processes (Fatt); Surface and Colloidal Chemistry Petroleum Reservoirs (Witherspoon, Fatt); Physics of Reservoir Rocks (Somerton, Fatt); Rheology of Petroleum and Drilling Fluids (Witherspoon); Multiphase Fluid Flow (Fatt). Advanced Design and Professional Analysis: Natural Gas Technology (Witherspoon); Secondary Oil Recovery (Witherspoon); Drilling Mechanics (Somerton); Applications of Rheology (Fatt); Well Production Mechanics (Somerton); Use of Analog and Digital Computers (Somerton).

299. Individual Study or Research. (1–5) I and II. The Staff (Mr. Putnam in charge)

**Process Engineering**

**Upper Division Courses**

The basic prerequisite for all upper division courses is satisfaction of lower division requirements in an engineering program of study and completion of the Upper Division Engineering Examination. Additional prerequisites are indicated.

*100. Project Engineering of Process Plants. (3) II. Mr. McGarry*

Prerequisite: Electrical Engineering 101 (or equivalent), Engineering 103 and Mechanical Engineering 151, or Chemical Engineering 146A. Details of design and erection of process plants are covered, including plant location, flow diagrams, plot plans, scheduling, engineering design, procurement, contracts, vessels, heat exchangers, piping design, instrumentation, auxiliary equipment, structures, safety, and construction.

**NAVAL ARCHITECTURE**

**Upper Division Courses**

The basic prerequisite for all upper division courses is satisfaction of lower division requirements in an engineering program of study and completion of the Upper Division Engineering Examination. Additional prerequisites are indicated.

151. Statics of Naval Architecture. (3) I. Mr. Paulling

Prerequisite: Engineering 103, Civil Engineering 130, Engineering 102. Fundamentals of the geometry of the ship's form, including its presentation in the lines drawings; buoyancy and stability in both intact and damaged conditions; subdivision, freeboard, measurement rules and requirements; grounding and launching; strength and stiffness, including both general concepts of loading systems and determination of scantlings.

152. Dynamics of Naval Architecture. (3) I. Mr. Paulling

Prerequisite: Engineering 103 and course 151 which may be taken concurrently.


153. Marine Engineering. (3) II.  
(Formerly Mechanical Engineering 128.)  
Prerequisite: Mechanical Engineering 105B, Engineering 102. Recommended: course 151.  
The power requirements and the selection of power plants for various types of vessels and the necessary auxiliaries for steam and motor ships will be considered.

154. Applied Naval Architecture. (3) II.  
(Formerly Mechanical Engineering 126.)  
Prerequisite: courses 151, 152.  
A laboratory and drawing room course involving the preparation of a preliminary ship design, starting with a prescribed set of owner's requirements or military requirements. The work will include determination of optimum dimensions and coefficients of form; preparation of lines; estimated power requirements and dimensional propeller design; investigation of stability and floatability under damaged conditions; basic structural design, including development of midship section; basic arrangement studies and decisions.

198. Directed Group Studies for Advanced Undergraduates. (1-5) I and II.  
The Staff (Mr. Schade in charge)  
Prerequisite: requirements will be specified by the instructor.  
Group studies of selected topics which vary from year to year.

199. Individual Study and Research for Advanced Undergraduates. (1-5) I and II.  
The Staff (Mr. Schade in charge)  
Prerequisite: enrollment limited to students in engineering whose scholastic records show a scholarship average of Grade B or higher or whose records indicate a capacity for independent study. Enrollment is subject to additional requirements imposed by the instructor concerned.  
Individual study and/or research on a problem chosen by the student and carried out under guidance of an instructor.

GRADUATE COURSES

As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation will consist normally of the completion of at least 12 units of upper division courses basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed. The admission of undergraduates to graduate courses is limited to seniors who have an average scholarship of not lower than B in the basic courses.

(Formerly Mechanical Engineering 240A–240B.)  
Prerequisite: course 151.  
Design and performance of ship structures using rational methods. Predictions of force and moment systems applied to the structure; distributions of stresses, strains and displacements; and interpretation of large-scale experiments and performance data.

Prerequisite: Aeronautical Sciences 162, Mathematics 14A–14B, and course 151, 152, or permission of instructor.  
298. Group Studies, Seminars, or Group Research. (1–5) I and II.
The Staff (Mr. Schade in charge)
Advanced study in various fields of naval architecture on topics which may vary from year to year.

299. Individual Study or Research. (1–5) I and II.
The Staff (Mr. Schade in charge)
Investigation of selected advanced naval architecture subjects.

RELATED COURSE IN OTHER DEPARTMENTS
Mathematics 270. Technical Hydrodynamics. (3) I. Mr. Wehausen

NUCLEAR ENGINEERING
UPPER DIVISION COURSES

The basic prerequisite for all upper division courses is satisfaction of the lower division requirements in an engineering program of study and completion of the Upper Division Engineering Examination. Additional prerequisites are indicated.

165. Introduction to Nuclear Reactor Theory. (3) I and II.
Mr. Schrock, Mr. Grossman
Condensed course for non-nuclear engineering majors in engineering or science. Applied nuclear physics; diffusion and slowing down of neutrons; critical mass calculations for bare, reflected, homogeneous or heterogeneous reactors; kinetics and control; shielding; instrumentation and radiological measurements, thermal characteristics; reactor systems and safety.

166. Introduction to Nuclear Engineering Laboratory. (1) I and II.
Mr. Carothers, Mr. Kirschbaum
Prerequisite: course 165 (may be taken concurrently).
Experimental work in nuclear measurements and nuclear reactor performance; Geiger-Muller, Beta-proportional, scintillation counters; half lives; absorption and shielding; reactor operating and monitoring; calibration of foils; control rod calibration; effect of absorbers on reactivity; buckling and power calibration; etc.

198. Directed Group Studies for Advanced Undergraduates. (1–5) II.
The Staff
Prerequisite: senior standing in engineering or consent of instructor. Particular courses may be specified for each section.
Examples of topics that may be discussed are: Turbo Machinery, Closed Cycle Gas Turbine Systems, Energy Conversion, Power Cycles in Nuclear Reactor Systems, and Structural Problems in Nuclear Reactors.

GRADUATE COURSES

As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation will consist normally of the completion of at least 12 units of upper division courses basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed. The admission of undergraduates to graduate courses is limited to seniors who have an average scholarship of not lower than B in the basic courses.
250A-250B. Nuclear Reactor Theory. (3-2) Yr.
Beginning each semester.
Mr. Grossman, Mr. Pigford
Prerequisite: Engineering 230 (may be taken concurrently); Physics 124 or chemistry 123.
A study of the theory of nuclear reactors involving the principles of nuclear reactions in a sub-critical and critical assembly.

251A-251B. Nuclear Engineering Laboratory. (1-1) Yr.
Beginning each semester.
Mr. Carothers, Mr. Kirschbaum
Prerequisite: course 250A-250B (may be taken concurrently) and/or consent of instructor.
Studies center around experiments with a nuclear reactor and several subcritical assemblies. Theoretical concepts will be investigated and certain constants appearing in reactor theory will be determined and examined.

252. Nuclear Reactor Systems Design. (2) II. Mr. Schrock, Mr. Grossman
Prerequisite: course 250B, 260, and Metallurgy 206B, to be taken concurrently.
Original designs of a nuclear reactor and its system involving electric power or heat production will be developed. Analytical studies of neutronics, heat exchange, stress analysis, hazards, systems design, etc., will be made.

260. Nuclear Reactor Systems. (3) I and II. Mr. Grossman, Mr. Schrock
Prerequisite: course 250A, Engineering 230, Mechanical Engineering 151.
A study of the technology of nuclear reactors and systems. The disciplines of reactor physics and the engineering sciences of thermodynamics, heat transfer, fluid dynamics, and thermal stress analysis applied to nuclear reactors.

270. Neutron Transport Theory. (3) I and II.
Prerequisite: courses 250A-250B, Engineering 230.
Mr. Stuart
Theory of the statistical distribution in space, angle, and energy of neutrons in migration through bulk media. Discussion of physical assumptions and mathematical techniques for solving the integral equations for neutron distribution in problems relevant to reactor theory.

298. Group Studies, Seminars, or Group Research. (1-5) I and II.
The Staff (Mr. Pigford in charge)
Advanced group study in nuclear engineering; topics vary from year to year. May consist of organized lectures or seminar discussions, devoted chiefly to the research area in which the group is working. Sections planned for 1960-1961 include a seminar on current doctoral research topics (I and II) and a seminar course covering new topics such as thermoelectric and thermionic devices, thermonuclear research, and nuclear propulsion and power systems for space applications.

299. Individual Study or Research. (1-5) I and II.
The Staff (Mr. Pigford in charge)
Investigation of advanced nuclear engineering problems.

ENGLISH
(Department Office, 2125 Dwinelle Hall)
Travis M. Bogard, Ph.D., Professor of English.
†Myron F. Brightfield, Ph.D., Professor of English.
Bertrand H. Bronson, Ph.D., Professor of English.
James R. Caldwell, Ph.D., Professor of English.
‡ In residence spring semester only, 1960-1961.
James M. Cline, Ph.D., Professor of English.
*Bertrand Evans, Ph.D., Professor of English.
†James D. Hart, Ph.D., Professor of English.
Arthur E. Hutson, Ph.D., Professor of English.
*Charles W. Jones, Ph.D., Litt.D., Professor of English.
John E. Jordan, Ph.D., Professor of English.
*James J. Lynch, Ph.D., Professor of English.
Gordon McKenzie, Ph.D., Professor of English.
*Josephine Miles, Ph.D., Professor of English.
Samuel H. Monk, Ph.D., Mrs. William Beckman Professor of English Language and Literature for the spring semester.
Charles Muscatine, Ph.D., Professor of English.
Thomas F. Parkinson, Ph.D., Professor of English.
John H. Raleigh, Ph.D., Professor of English.
Mark Schorer, Ph.D., Professor of English.
Wayne Shumaker, Ph.D., Professor of English.
*Henry N. Smith, Ph.D., Professor of English.
Sir Charles P. Snow, Ph.D., Regents’ Professor of English for the fall semester.
*George R. Stewart, Ph.D., Professor of English.
Ernest Tuveson, Ph.D., Professor of English.
Ian P. Watt, M.A., Professor of English.
Arthur G. Brodeur, Ph.D., LL.D., Professor of English and Germanic Philology, Emeritus.
Willard E. Farnham, Ph.D., Professor of English, Emeritus.
Walter M. Hart, Ph.D., LL.D., Professor of English, Emeritus.
Benjamin H. Lehman, Ph.D., LL.D., Professor of English, Emeritus.
Jonas A. Barish, Ph.D., Associate Professor of English.
Howard E. Hugo, Ph.D., Associate Professor of English.
David W. Reed, Ph.D., Associate Professor of English.
John L. Traugott, Ph.D., Associate Professor of English.
Robert Bloom, M.A., Acting Assistant Professor of English.
Whitney F. Bolton, Ph.D., Assistant Professor of English.
Frederick C. Crews, Ph.D., Assistant Professor of English.
Thomas B. Flanagan, Ph.D., Assistant Professor of English.
Barbara Garlitz, Ph.D., Assistant Professor of English.
Martin Halpern, Ph.D., Assistant Professor of English.
Frank S. MacShane, D.Phil., Assistant Professor of English.
Robert L. McNulty, Ph.D., Assistant Professor of English.
Brendan P. O’Hehir, Ph.D., Assistant Professor of English.
Stephen K. Orgel, Ph.D., Assistant Professor of English.
John Paterson, Ph.D., Assistant Professor of English.
*Constantinos A. Patrides, D.Phil., Assistant Professor of English.
Norman C. Rabkin, Ph.D., Assistant Professor of English.
Ralph W. Rader, Ph.D., Assistant Professor of English.
Alain Renoir, Ph.D., Assistant Professor of English.
*Hugh M. Richmond, D.Phil., Assistant Professor of English.
Louis A. M. Simpson, Ph.D., Assistant Professor of English.
Robert E. Tracy, Ph.D., Assistant Professor of English.
Larzer Ziff, Ph.D., Assistant Professor of English.

‡ In residence spring semester only, 1960–1961.
Sheldon Sacks, M.A., Acting Instructor in English.
John D. Seelye, M.A., Acting Instructor in English.
Gardner D. Stout, Jr., M.A., Acting Instructor in English.

Jackson V. Burgess, M.A., Lecturer in English.
Seymour B. Chatman, Ph.D., Lecturer in English.
Leon M. J. Delaissé, Ph.D., Lecturer in English and Art.
Donald H. Ewing, M.A., Lecturer in English.
Dorothee Finkelstein, Ph.D., Lecturer in English.
John C. Gerber, Ph.D., Visiting Professor of English.
Thomson W. Gunn, M.A., Lecturer in English for the spring semester.
Benbow F. Ritchie, Ph.D., Associate Professor of Psychology.
Kingsley Widmer, Ph.D., Visiting Assistant Professor of English.

Students must have passed Subject A before taking any course in English.

Letters and Science List.—All undergraduate courses in this department are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Barish, Chairman: Mr. Bolton, Mr. Crews, Mr. Halpern, Mr. Rader, Mr. Renoir, Mr. Richmond (II), Mr. Sacks, Mr. Simpson, Mr. Traugott (I), Mr. Ziff.

The Major.—First Year—Required: course 1A–1B (3–3), Composition and Study of Literature. Second Year—Required: course 46A–46B (3–3) and 3 additional units to be elected from courses 25 (3), 30 (3), 41 (3), 44A–44B (3–3), 49 (3).

Twenty-four units of upper division work with specific requirements as follows: Third Year—Required: the Junior Course, English 100 (3): Methods and Materials of Literary Criticism. Fourth Year—Required: the Senior Course, English 151 (3).

The total program (lower and upper division) must include at least: 3 units in Chaucer or the Age of Chaucer; 3 units in Shakespeare; 3 units in Milton or the Age of Milton; 3 units in American Literature selected from English 30, 33A–33B, 130A, 130B, 130C; 3 units in a period or type course.

Attention is called to the requirements in foreign languages for higher degrees in English—a reading knowledge of French or German for the M.A.; of French, German, and Latin for the Ph.D. Undergraduates contemplating advanced study in English should prepare to satisfy these requirements as they proceed to the bachelor’s degree.

Teacher Training.—Consult Mr. Jordan; see also the Announcement of the School of Education.

Higher degrees.—Consult Mr. Bronson; see also the Announcement of the Graduate Division, Northern Section, and the Graduate Division Bulletin entitled Announcement in Modern Languages and Literatures.

LOWER DIVISION COURSES

FRESHMAN COURSE

1A–1B. First Year Reading and Composition. (3–3) Yr. Beginning each semester.
Mr. Barish, Mr. Bloom, Mr. Bolton, Mr. Burgess, Mr. Caldwell,
Mr. Chatman, Mr. Crews, Mr. Ewing, Mrs. Finkelstein, Mr.
Flanagan, Miss Garlitz, Mr. Gunn, Mr. Halpern, Mr. Hugo, Mr.
Hutson, Mr. Jones, Mr. MacShane, Mr. McKenzie, Mr. McNulty,

1 In residence fall semester only, 1960–1961.
English

Prerequisite for the English major. Course 1A is prerequisite to 1B.
Prerequisite: a passing grade in Subject A (examination or course). Credit for English 1A or 1B will not be given to any student who has not passed the Subject A examination or course.

1A. Training in writing and reading.
1B. An introduction to the study of literature, with further training in writing.

SOPHOMORE COURSES

25. Language. (3) I. Mr. Chatman
Designed for sophomores, but open to students in the upper division.
The origins and symbols of human speech; patterns, change, and growth in language; the interrelations of language, thought, and civilization. Emphasis on English, as written and spoken in England and in America.

30. Introduction to American Literature. (3) II. Mr. Crews

33A–33B. American Studies. (3–3) Yr. Mr. MacShane
Open to sophomores with the consent of the instructor. Limited to 15 students. Not open to students taking History 33A–33B or Political Science 33A–33B.
An honors course in the study of American culture. The class will study significant ideas and issues, drawing on material from history, literature, political science, philosophy, and other fields. The course will emphasize discussion and the writing of essays and will include occasional joint meetings with the staff and students of the two equivalent courses (History 33A–33B and Political Science 33A–33B).

40. Intermediate Exposition. (3) II. Mr. Tuveson
Prerequisite: course 1A–1B or Speech 1A–1B or the equivalent.
Writing in various expository forms.

41. Writing in Connection with the Reading of Important Books of the Nineteenth and Twentieth Centuries. (3) I. Mr. Parkinson
Prerequisite: course 1A–1B or Speech 1A–1B, or consent of the instructor.

44A–44B. Masterpieces of Literature. (3–3) Yr. Mr. Stewart, Mr. Watt
44A. I: Mr. Stewart; 44B. II: Mr. Watt.
44A is not prerequisite to 44B.
Lectures on great works of the world’s literature.

46A–46B. Survey of English Literature. (3–3) Yr.
Mr. Bloom, Mr. Chatman, Mr. Ewing, Mr. Flanagan, Miss Garlitz, Mr. Halpern, Mr. Hugo, Mr. McNulty, Mr. McKenzie, Mr. O Hehir, Mr. Orgel, Mr. Paterson, Mr. Rabkin, Mr. Rader, Mr. Raleigh, Mr. Reed, Mr. Seelye, Mr. Shumaker, Mr. Simpson, Mr. Stout, Mr. Tracy, Mr. Watt, Mr. Widmer, Mr. Ziff
Prerequisite: course 1A–1B.
Close study of typical works of major authors from Chaucer to T. S. Eliot, with consideration of the more important aspects of English literary history.

*49. Ten Great Books in the British Tradition. (3) II. Mr. Cline

UPPER DIVISION COURSES

Group I—Unrestricted Courses

(Open to all students in the upper division; enrollment not limited, except as noted)

A. COURSES IN COMPOSITION AND LANGUAGE

110. The English Language. (3) I and II. Mr. Chatman, Mr. Hutson

131. American English. (3) I. Mr. Reed

141. Modes of Writing (Exposition, Fiction, Verse, etc.). (3) II. Mr. Simpson
   Prerequisite: course 1A–1B or Speech 1A–1B, or consent of the instructor.
   Open to qualified sophomores with consent of the instructor.
   Writing in connection with readings in recent English literature and its continental backgrounds.

B. COURSES IN LITERATURE

114A. The English Drama to 1642. (3) II. Mr. Barish
   The history of English drama from the miracle plays to the closing of the theaters in 1642; special critical attention to Marlowe, Chapman, Jonson, and Webster; Shakespeare's practice as a playwright in relation to the work of his contemporaries.

114B. The English Drama from 1660 to 1850. (3) II. Mr. Lynch
   The drama of the Restoration period; various lines of development in the drama from the Restoration to about 1850, such as sentimental comedy, domestic tragedy, melodrama, and operatic farce; the impact of developments in the theater on the drama.

114C. British and American Drama from 1850 to the Present. (3) I. Mr. Bogard
   The history of dramatic literature in England, America, and Ireland, with emphasis on Shaw and O'Neill; continental influences and developments in the theater that have influenced the drama.

116. The English Bible as Literature. (3) I. Mr. Jordan

117A–117B. Shakespeare. (3–3) Yr. Mr. Barish, Mr. Bogard
   117B: I; 117A: II.
   Open both to students whose major is English and to others. 117A is not prerequisite to 117B. Lectures on the entire works of Shakespeare, including nondramatic poems.

117E. Shakespeare. (3) II. Mr. Richmond
   May not be taken by students whose major is English.
   Lectures on selected plays of Shakespeare.

119. The Age of Johnson. (3) II. Mr. Bronson

English

120A–120B. Medieval Literature. (3-3) Yr. Mr. Delaissé
120A is prerequisite to 120B but students may receive credit for 120A without taking 120B.

121. The Romantic Period. (3) II. Mr. Simpson
122. The Victorian Period. (3) I. Mr. McKenzie
123. Nineteenth-Century British Prose. (3) II. Mr. Jordan
125B. The Novel in Western Civilization. (3) II. Mr. Hugo
125C–125D. The English Novel. (3-3) Yr. Mr. Brightfield, Mr. Rader
125C is not prerequisite to 125D.
125E. The American Novel. (3) II. Mr. Ziff

*128. Regional Literature: California and the West. (3) II.

130A. American Literature before 1840. (3) I. Mr. Ziff
130B. American Literature. 1840–1885. (3) I. Mr. Gerber
130C. American Literature: 1885 to the Present. (3) II. Mr. Gerber

*132. The Transcendental Movement in American Literature. (3) II. Mr. Smith

*149. The English Lyric. (3) II. Miss Miles

The development of the English traditions of structure and style in lyric poetry.

152. Chaucer. (3) I. Mr. Muscatine

*153. Introduction to the Study of Poetry. (3) II.

155. The Age of Chaucer. (3) II. Mr. Renoir
158A–158B. The English Renaissance. (3-3) Yr. Mr. Cline, Mr. Shumaker
158A. Beginnings of the English Renaissance, and literature of the sixteenth century.
158B. Literature of the seventeenth century.
158B satisfies the Plan I English major requirement of a course on Milton or the Age of Milton.

160. British Literature from 1900 to the Present. (3) II. Mr. Schorer
161. Recent British and American Poetry. (3) I. Mr. Parkinson
166. The Age of Swift and Pope. (3) II. Mr. Monk

Group II—Restricted Courses

A. THE JUNIOR COURSE

(Sections limited to twenty students each)

Designed primarily for juniors whose major subject is English.

100. Methods and Materials of Literary Criticism. (3) I and II.
Mr. Bloom, Mr. Bogard, Mr. Bolton, Mr. Crews, Miss Garlitz, Mr. Halpern, Mr. Hugo, Mr. McKenzie, Mr. Paterson, Mr. Rabkin,

Mr. Raleigh, Mr. Sacks, Mr. Stout, Mr. Tracy, Mr. Traugott, Mr. Widmer

Explication and evaluation of literary texts and study of the various principles of literary judgment.

**B. THE SENIOR COURSE**

(Sections limited to twenty students each)

Prerequisite: course 100. Designed primarily for seniors whose major subject is English.

*151A. Arnold. (3) I. Mr. Caldwell

*151B. Byron. (3) I. Mr. Caldwell

151C. Conrad. (3) I. Mr. Watt

*151D. Dryden. (3) II. Mr. Traugott

*151E. Henry James. (3) I. Mr. Sacks

151F. Fielding. (3) II. Miss Garlitz

151H. Hawthorne. (3) I. Mr. McNulty, Mr. Orgel, Mr. Shumaker

151J. Milton. (3) I and II. Mr. McNulty, Mr. Shumaker; II: Mr. Orgel

151K. Contemporary Authors. (3) I. Mr. Flanagan, Mr. Paterson

151L. Chaucer. (3) I and II. Mr. Bronson, Mr. Cline, Mr. Caldwell

151M. Melville. (3) I. Mr. Raleigh

151P. Pope. (3) II. Mr. O Hehir

151R. Keats. (3) II.

151S. Shakespeare. (3) I and II. Mr. McNulty, Mr. Rabkin

*151Sp. Spenser. (3) I. Mr. McNulty

*151Sw. Swift. (3) II. Mr. Traugott

*151T. Thomas Hardy. (3) II.

151W. Whitman. (3) II. Mr. Parkinson

*151Wd. Wordsworth. (3) II. Mr. Jordan

**C. HONORS COURSES**

*H195. Honors Course. (3) I and II. The Staff (Mr. Barish in charge)

Prerequisite: candidacy for Honors in English, and (normally) the completion of a section of English 151.

Open only to candidates for Honors in English. In this course the English major student will complete the Bachelor's Thesis, begun in a section of English 151, required for candidacy for Honors in English.

*H197. Honors Course. (3) I and II. The Staff (Mr. Barish in charge)

Prerequisite: candidacy for Honors in English, and (normally) the completion of a section of English 151.

Open only to candidates for Honors in English as a substitute for English H195. In this course the English major student, meeting with students working in the same area, will complete the Bachelor's Thesis, begun in a section of English 151.

D. SPECIAL STUDIES

199. Special Study for Advanced Undergraduates. (1–3) I and II. The Staff (Mr. Barish in charge)

Reading and conference for individual honor students. Any student who completes 9 or more units of upper division English in the junior year with an average grade of not less than B may apply for admission to course 199. Such honor students undertake, in a chosen field, a program of reading and of conferences with the instructor. The subject matter should not coincide with that of any regular course and should be specific enough to permit the student to write a significant essay based upon his study. The number of units of credit is determined by the instructor. Not open to candidates for Honors in English (see courses H195 and H197).

E. ADVANCED COMPOSITION

(Open only to upper division students who have the consent of the instructor. With the consent of the instructor, courses numbered 106 may be repeated without duplication of credit.)

106A. Short Fiction. (3) II. Mr. Burgess
106B. Verse. (3) I. Mr. Simpson
*106D. Literary Criticism. (3) I. Mr. Watt
106E. Long Narrative. (3) II. Mr. Stewart

The student will work throughout the semester on a single project, either fiction (novel) or nonfiction (biography, history).

106H. Expository and Critical Writing. (3) II. Mr. Muscatine

106L. Advanced Composition. (3) I and II. Mr. Ziff, Mr. Gunn
Primarily for candidates for the Certificate of Completion of the teacher-training curriculum whose teaching major is English.

106M. Advanced Composition. (3) I and II. Mr. Burgess, Mr. Flanagan, Mr. Halpern
I: Mr. Burgess, Mr. Halpern; II: Mr. Flanagan
Specifically for candidates for the Certificate of Completion of the teacher-training curriculum whose teaching major is not English.

106P. Advanced Prose. (3) I and II. Mr. Ritchie, Mr. Crews
Prerequisite: consent of instructor.
Special section in advanced prose for teaching assistants, readers, and honor students in departments other than English.

TEACHERS’ COURSE

300. Problems in Teaching English Literature and Composition in Secondary Schools. (2) I and II. Mr. Gerber
This course, designed for seniors and graduate students undertaking an English teaching major or minor, should be completed before practice teaching. The course is accepted in partial satisfaction of the 22-unit requirement in education for the general secondary credential.

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

Students who have not passed the department's examination in French or in German will be admitted to a seminar only with consent of the instructor.

French 206A–206B and German 265 are especially recommended to candidates for higher degrees. Attention is directed to German 204.

The following courses are recommended for first-year graduate students: 200, 202, 208, 211A–211B, 213.


Since the courses listed as seminars are concerned with specific problems in the designated fields, the attention of graduate students desiring general surveys is directed to the following upper division courses: 119, 120, 121, 122, 123, 128, 130A, 130B, 130C, 155, 158A–158B, 160, and 166.

200. Techniques of Literary Scholarship. (3) I and II.
Mr. Brightfield, Mr. Caldwell, Mr. Jordan, Mr. Rader, Mr. Tuveson
I: Mr. Brightfield, Mr. Jordan, Mr. Tuveson; II: Mr. Caldwell, Mr. Rader.

202. The History of English Criticism. (3) II.
Mr. Monk

203M. Readings in Renaissance Literature. (3) II.
Mr. Orgel
Prerequisite: open to graduate students and (with consent of instructor) to advanced undergraduates.
Readings in the general area of English 158A.

203N. Readings in English Literature, 1660–1744. (3) I.
Mr. Traugott
Prerequisite: open to graduate students and (with consent of instructor) to advanced undergraduates.
Readings in the general area of English 166.

203P. Readings in American Literature of the Nineteenth and Twentieth Centuries. (3) II.
Mr. Tuveson
Prerequisite: open to graduate students and (with consent of instructor) to advanced undergraduates.
Readings in American literature of the nineteenth and twentieth centuries.

*204. Celtic Studies. (3) I and II.
Mr. Hutson
This course may be repeated for credit.

205A–205B. The Structure and History of the English Language.
(3–3) Yr.
Mr. Chatman, Mr. Reed, Mr. Sacks
205A. I and II: Mr. Chatman, Mr. Sacks; 205B. I: Mr. Reed.
205A. The structure of present-day English—pronunciation, grammar, vocabulary, dialects.
205B. The history of English structure from Old English to the present; sources of vocabulary, development of dialects, rise of standard English.

207. Linguistics and Literary Analysis. (3) II.
Mr. Reed
Prerequisite: course 205A–205B. Students whose interest is contemporary literature may take 207 concurrently with 205B.
A seminar to explore the application of linguistic knowledge and methods of analysis to literary works.

208. Problems in the Study of Literature. (3) I and II.
Mr. Parkinson, Mr. Traugott, Mr. Tuveson, Mr. Stewart
Textual analysis, discussion of scholarly approaches, based on secondary reading; problems in the presentation of materials.
Topics will vary from year to year.

210. Chaucer. (3) I.
Mr. Muscatine
Some knowledge of Chaucer and his language is presupposed.

English

211A. Introduction to Old English. (3) I and II. Rapid reading of Old English texts. Open to seniors with consent of the instructor. Mr. Bolton

211B. The Beowulf. (3) I and II. Mr. Hutson, Mr. Renoir

211G—211H. Old and Middle English. (3—3) Yr. Mr. Reed
211G: II. Especially designed for candidates for the Ph.D. degree. Development of the English language from its beginnings as illustrated in representative texts. Prerequisite for 211G: a reading knowledge of German.

*211J. Modern English. (3) II. Especially designed for candidates for the Ph.D. degree. Continuation of 211G—211H. Development of standard English to the present; the structure of present-day English.

212. Old English Poetic Forms and Techniques. (3) II. Mr. Renoir
Prerequisite: two semesters of Old English.

213. Readings in Middle English. (3) I and II. Mr. Bolton, Mr. Cline, Mr. Jones, Mr. Muscatine, Mr. Renoir
1: Mr. Bolton, Mr. Cline, Mr. Renoir; II: Mr. Jones, Mr. Muscatine. Rapid reading of selections in Middle English, and perhaps some entire poems, from the twelfth century to the fifteenth.

214. American Drama. (3) II. Mr. Bogard
Prerequisite: consent of instructor. Studies in American drama from the colonial period to the present.

217. Studies in Shakespeare. (3) I. Mr. Barish

218. Milton and His Contemporaries. (3) II. Mr. Shumaker

220A—220B. The Medieval Mind. (3—3) Yr. Mr. Delaisse
220A. Readings in Medieval Latin. I. Prerequisite: two years of high school Latin or the equivalent. An introduction to the central language and literature of the Middle Ages.
220B. Archaeology of the Manuscript: Its Importance for the History of Literature and Illumination. II. Prerequisite: course 120 or 220A or the equivalent. Bibliography and special problems. Accent upon medieval European literature without geographical or linguistic distinctions.

225A—225B. The Popular Ballad. (3—3) Yr. Mr. Bronson

*228. Regional Literature: California and the West. (3) II. Mr. Hart

230A—230B. American Literature. (3—3) Yr. Mr. Ziff, Mr. Hart
230A is not prerequisite to 230B.

*232. Anglo-American Literary Relations. (3) I. Mr. Tuveson
Literary culture of the American colonies and of the United States (to 1840) considered as an integral part of the British tradition.

*235. Mark Twain. (3) II. Mr. Smith

*245. Spenser. (3) II.

247. Theory of Poetry. (3) I. Miss Miles

251A–*251B. Romantic Poets. (3–3) Yr.  
Mr. Caldwell, Mr. Jordan  
251A: II. 251A is not prerequisite to 251B.

*254A–254B. Elizabethan Drama. (3–3) Yr.  
254A is not prerequisite to 254B.

257A. Literary Criticism, 1750–1850. (3) I.  
Mr. McKenzie

*257B. Methods and Assumptions of Recent Literary Critics. (3) II.  
Mr. Shumaker

*258. Johnson and His Contemporaries. (3) I.  
Mr. Bronson

260. Modern British Literature. (3) II.  
British literature from 1900 to the present.  
Mr. Watt

262. Nineteenth-Century Literature. (3) I.  
Mr. Raleigh

*264. John Donne and His Followers. (3) I.  
Mr. Bronson

266. Period from 1660 to 1744. (3) II.  
Mr. Tuveson

269. Theory of Fiction. (3) I.  
Mr. Schorer

298. Special Study. (3–6) I and II.  
The Staff (Mr. Bronson in charge)  
This course is normally reserved for students directly engaged upon the doctoral dissertation.  
The members of the department are variously engaged in particular research and stand ready to advise and direct properly qualified graduate students in their several fields. Some indication of fields of interest is herewith suggested:

1. Critical Theory (Brightfield, Caldwell, McKenzie, Miles, Schorer, Shumaker).
2. Prose Fiction (Brightfield, Paterson, Raleigh, Schorer).
3. Drama (Barish, Bogard, Evans).
4. Poetry (Caldwell, Miles, Parkinson, Simpson).
5. Linguistics (Hutson, Reed).
6. Early Germanic Literature (Renoir).
7. Celtic (Hutson).
8. The Ballad (Bronson).
9. Chaucer and the Middle Ages (Caldwell, Cline, Jones, Muscatine, Renoir, Shumaker).
10. Shakespeare, Spenser, Milton, Donne, Sixteenth and Seventeenth Centuries (Barish, Bogard, Cline, Evans, McNulty, Miles, Schumaker).
13. Twentieth Century (Hart, Parkinson, Schorer, Stewart).

299. Special Study. (1–3) I and II.  
The Staff (Mr. Bronson in charge)  
This course is primarily for students engaged in preliminary exploration of a restricted field, involving research and the writing of a report. It may not be substituted for available seminars.

**RELATED COURSES**

The Literature of the Renaissance in Western Europe (Comparative Literature *151A–151B).

The Symbolist Movement in European Literature (Comparative Literature 201A–201B).

ENTOMOLOGY AND PARASITOLOGY

(Department Office, 112 Agriculture Hall)

Roderick Craig, Ph.D., Professor of Entomology.
Richard L. Doutt, Ph.D., LL.B., Professor of Biological Control.
Julius H. Freitag, Ph.D., Professor of Entomology.
Deane P. Furman, Ph.D., Professor of Parasitology.
William M. Hoskins, Ph.D., Professor of Entomology.
Dilworth D. Jensen, Ph.D., Professor of Entomology.
E. Gorton Linsley, Ph.D., Professor of Entomology.
Abraham E. Michelbacher, Ph.D., Professor of Entomology.
Woodrow W. Middlekauff, Ph.D., Professor of Entomology.
Ray F. Smith, Ph.D., Professor of Entomology (Chairman of the Department).
Morris A. Stewart, Ph.D., LL.D., Professor of Parasitology.
Robert L. Usinger, Ph.D., Professor of Entomology.
Edward O. Essig, M.S., Professor of Entomology, Emeritus.
John W. MacSwain, Ph.D., Associate Professor of Entomology.
A. Earl Pritchard, Ph.D., Associate Professor of Entomology.
Rudolph L. Pipa, Ph.D., Assistant Professor of Entomology.
Ronald W. Stark, Ph.D., Assistant Professor of Entomology.

Merlin W. Allen, Ph.D., Professor of Plant Nematology, Davis.
William W. Allen, Ph.D., Lecturer in Entomology.
Richard M. Bohart, Ph.D., Professor of Entomology, Davis.
Norman W. Frazier, Ph.D., Lecturer in Entomology.
Harold T. Gordon, Ph.D., Lecturer in Entomology.
Carl B. Huffaker, Ph.D., Lecturer in Insect Ecology.
Paul D. Hurd, Jr., Ph.D., Lecturer in Entomology.
Harold F. Madsen, Ph.D., Lecturer in Entomology.
Mauro E. Martignoni, Ph.D., Lecturer in Insect Pathology.
Powers S. Messenger, Ph.D., Lecturer in Insect Ecology.
Robert L. Metcalf, Ph.D., Professor of Entomology, Riverside.
Eugene G. Munroe, Ph.D., Lecturer in Entomology.
Owain W. Richards, D.Sc. Visiting Professor of Entomology.
Edward A. Steinhaus, Ph.D., Professor of Insect Pathology.
Edward S. Sylvester, Ph.D., Lecturer in Entomology.
Jean P. Vité, D.F., Lecturer in Entomology.

Letters and Science List.—Courses 100, 106, 110, 112, 117, 119, 126, 127, 127L, 129, 131, 133 are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Adviser: Mr. MacSwain.
The Major.—See page 80 of the CIRCULAR OF INFORMATION.

LOWER DIVISION COURSE

49. Summer Field Course. (No credit)

Mr. MacSwain, Mr. Bohart, Mr. Hurd

Six weeks, daily, except Sunday. Prerequisite: one course in entomology or approval of the instructor.
The study and collection of insects in their natural habitats, with special emphasis on ecology, life histories, and field recognition.

† Appointment in the Miller Institute for Basic Research in Science, to December 31, 1960.
Upper Division Courses

100. General Entomology. (4) II. Mr. MacSwain
   Lectures and laboratory.
   An introduction to the classification, life histories, morphology, physiology, and ecology of insects.

106. Introduction to Structure and Function in Insects. (4) I. Mr. Pipa
   Lectures and laboratory. Prerequisite: course 100 or the equivalent.
   General principles of insect morphology with emphasis on the functional approach. Comparative anatomy of selected insect types.

110. Insect Physiology. (3) II. Mr. Craig
   Lectures and laboratory. Prerequisite: course 106; Chemistry 8 or the equivalent.
   Detailed consideration of nutrition, digestion, excretion, circulation, respiration, and the nervous and hormonal systems of insects.

112. Systematic Entomology. (4) II. Mr. Richards
   Lectures and laboratory. Prerequisite: course 100 or consent of the instructor.
   The classification of insects, taxonomic categories and procedure; bibliographical methods; nomenclature; museum practices.

114. Forest Entomology. (3) I. Mr. Stark
   Lectures and laboratory. Prerequisite: not open to entomology majors without special consent of the instructor.
   Interrelationships of insect populations, forest stands, and forest practices. Identification, life histories, ecology, and control of insects affecting western forests and forest products.

117. Helminthology. (4) I. Mr. Stewart, Mr. Furman
   Lectures and laboratory.
   Helminthic infections of man and domestic animals. Biology, host-parasite interrelationships, identification, prophylaxis, and therapeutics.

118. Plant Nematology. (4) II. Mr. M. W. Allen
   Lectures and laboratory.
   Identification, morphology, biology, and distribution of plant parasitic and associated nematodes. Symptomatology, pathology, and control of nematode infections in cultivated crops. Techniques employed in the manipulation and examination of soil and infected plants.

119. Acarology. (3) I. Mr. Pritchard
   Lectures and laboratory. Prerequisite: course 112 or consent of the instructor.
   The taxonomy, biology, and ecology of mites and ticks. Laboratory rearing techniques and slide preparation methods.

124. Economic Entomology. (4) I. Mr. Michelbacher, Mr. Middlekauff
   Lectures and laboratory.
   Life histories, habits, distribution, economics, and control of insects attacking agricultural crops and stored products.

125. Insect Vectors of Plant Diseases. (4) I.
   Mr. Freitag, Mr. Sylvester, Mr. Jensen, Mr. Frazier
   Lectures and laboratory. Prerequisite: Plant Pathology 120 or consent of the instructor.
   The role of insects in the transmission and causation of plant diseases.
Laboratory studies of disease symptoms, host ranges, methods of transmission, and properties of plant viruses.

126. Medical Entomology. (4) II. Mr. Stewart, Mr. Furman
   Lectures and laboratory.
   The role of insects and other arthropods in transmission and causation of diseases of humans and domestic animals.

127. Insect Ecology. (3) II. Mr. Smith, Mr. Huffaker, Mr. Messenger
   Prerequisite: upper division standing in one of the biological sciences.
   Principles of ecology, with examples from the insects; insect behavior; analysis of the insect environment; population dynamics.

127L Laboratory in Insect Ecology. (1) II.
   Mr. Huffaker, Mr. Messenger, Mr. Smith
   Prerequisite: courses 100, 127 (may be taken concurrently). Enrollment limited to ten students.
   Laboratory and field studies demonstrating principles of insect ecology. Emphasis on population dynamics and the analysis of the insect environment.

128. Chemistry of Insecticides and Fungicides. (4) I.
   Mr. Hoskins, Mr. Gordon
   Lectures and laboratory. Prerequisite: Chemistry 8 or consent of the instructor.
   Chemical composition and reactions of insecticides and fungicides, and their physiological effects on plant and animal tissues.

129. Biological Control of Insect and Weed Pests. (3) I.
   Mr. Doult
   Lectures and laboratory. Prerequisite: course 100 or consent of the instructor.
   Principles and methods of biological control; biology of entomophagous insects; critical discussion of important world projects.

130. Insects in Relation to Deciduous Fruit and Nut Crops. (3) II.
   Mr. Madsen, Mr. W. W. Allen
   Lectures and laboratory (field trip). Prerequisite: course 124.
   An advanced course on the biology, ecology, recognition and control of insects and related pests of major deciduous fruits and nuts in California. Emphasis on application methods and the principles of experimental field entomology.

131. Insect Pathology. (4) I.
   Mr. Steinhaus, Mr. Martignoni
   Lectures and laboratory. Prerequisite: course 100, and at least one course in mycology or bacteriology, or protozoology.
   General insect pathology and microbiology, including biological relationships between microorganisms and insects. Detailed study of bacterial, fungus, virus, and protozoan diseases of insects; noninfectious diseases; histopathology. Microbial agents and biological control.

133. Biology of Aquatic Insects. (4) II.
   Mr. Usinger
   Lectures and laboratory. Field trips for the study of stream and lake survey methods.
   General and applied limnology, with special reference to insects. Laboratory exercises on the life histories and identification of aquatic insects.

135. Insects in Relation to Flowering and Other Ornamental Plants. (2) I.
   Lecture and laboratory. Prerequisite: course 124.
   Mr. Pritchard
   The study of the importance, recognition, taxonomy, biology, ecology, and control of insects and related pests of flowering and other ornamental plants.

136. Insects in Relation to Vegetable and Field Crops. (3) II.
Mr. Michelbacher, Mr. Middlekauff
Lectures and one or more field trips. Prerequisite: course 124.
The major insects and related organisms attacking commercial vegetable
and field crops in California; their biology, ecology, distribution, diagnosis,
cultural, and chemical control.

198. Directed Group Studies for Advanced Undergraduates. (1–5) I and II.
The Staff (Mr. Smith in charge)
199. Special Study for Advanced Undergraduates. (1–5) I and II.
The Staff (Mr. Smith in charge)

**Graduate Courses**

(Concerning conditions for admission to graduate courses, see page 18)
200A–200B. Research in Entomology and Parasitology. (1–6; 1–6) Yr.
The Staff (Mr. Smith in charge)

201A–201B. Seminar in Economic Entomology. (1–1) Yr.
Mr. Middlekauff, Mr. Stark, Mr. Frazier, Mr. Pritchard

202A–202B. Seminar in Parasitology. (1–1) Yr. Mr. Stewart, Mr. Furman

203A–203B. Seminar in Insect Toxicology and Insect Physiology. (1–1) Yr.
Mr. Craig, Mr. Hoskins, Mr. Gordon

204A–204B. Seminar in Insect Pathology. (1–1) Yr.
Mr. Steinhaus, Mr. Martignoni

205A–205B. Seminar in Systematic Entomology. (1–1) Yr.
Mr. MacSwain, Mr. Usinger, Mr. Hurd, Mr. Munroe, Mr. Richards

207A–207B. Seminar in Insect Ecology. (1–1) Yr.
Mr. Smith, Mr. Huffaker, Mr. Messenger
Critical discussion of basic problems and recent literature.

210. Insect Biochemistry. (3) I.
Mr. Craig, Mr. Gordon, Mr. Hoskins
Lectures and laboratory. Prerequisite: courses 110, 128. Recommended:
courses 106, 112, 127; Biochemistry 102.
Interpretation of ecological specializations, including parasitism and
host specificity, on the basis of nutrition and enzyme mechanisms. In alternate years, emphasis is placed on the action of toxic chemicals, resistance
to insecticides, bioassay methods, and interpretation of experimental results.
May be taken twice for credit.

212. Principles of Systematic Entomology. (3) II.
Mr. Linsley, Mr. Usinger
Prerequisite: course 112 or consent of the instructor.
The theory and philosophy of systematic entomology with emphasis on
phylogeny, zoogeography, and nomenclature.

226. Advanced Medical Entomology. (2) I.
Mr. Stewart, Mr. Furman
Prerequisite: courses 117, 126; Bacteriology 101. Recommended: courses
106, 112, 127.
The genesis of arthropod-borne diseases.

Mr. Smith, Mr. Huffaker, Mr. Messenger
Prerequisite: course 127.
The principles of the distribution and abundance of animals with empha­s
on examples from the Arthropoda.
232. History of Entomology. (3) II. Mr. Jensen
Prerequisite: course 100 or consent of the instructor.
The historical development of influential ideas and principles in biology with special reference to entomology. Consideration is given to the effects of philosophy, religion, political and economic factors on the evolution of the scientific method.

250. Principles and Methods of Entomological Research. (3) I. Mr. Sylvester
A presentation of the techniques and purposes of the scientific method and experimentation in the field of entomology, with emphasis on problem selection and the accompanying collection, evaluation, and presentation of data.

Staff Seminar in Entomology. (No credit) Yr.
The Staff (Mr. Smith in charge)
Biweekly meetings for presentation of special topics by members of the staff or visiting specialists.

(GIVEN AT RIVERSIDE)

GRADUATE COURSES

200A–200B. Seminar in Entomology, Including Biological Control. (1–1) Yr. The Staff (Entomology, Mr. Metcalf in charge; Biological Control, Mr. Fleschner in charge)

201A–201B. Research in Entomology. (2–6; 2–6) Yr. Mr. Metcalf

205A–205B. Research in Biological Control. (2–6; 2–6) Yr. Mr. Fleschner

FOOD SCIENCE AND TECHNOLOGY

(Department Office, 108 Giannini Hall)

Maynard A. Joslyn, Ph.D., Professor of Food Science and Technology.
Gordon Mackinney, Ph.D., Professor of Food Science and Technology.
Harold S. Olcott, Ph.D., Professor of Marine Food Technology.
George F. Stewart, Ph.D., Professor of Food Science and Technology, Davis (Chairman of the Department).
William V. Cruess, Ph.D., Professor of Food Science and Technology, Emeritus.

Departmental Major Adviser: Mr. Mackinney.
Preparation for the Major.—See page 81 of the CIRCULAR OF INFORMATION.
The Major.—Course work leading to the degree of Bachelor of Science may be undertaken subject to the requirements of the College of Agriculture (see page 78 of the CIRCULAR OF INFORMATION).

FOOD TECHNOLOGY

UPPER DIVISION COURSES

*112. Principles and Practices of Food Processing. (3) I. Mr. Mackinney
Prerequisite: Chemistry 1A–1B and 8; Bacteriology 1 and 4; and a course in botany or zoology.
Principles and technological processes involved in the preparation, preservation, and examination of fruit and vegetable products.

113. Chemical and Biochemical Aspects of Food Processing. (3) II.
Prerequisite: Chemistry 1A–1B, 8; Bacteriology 1 and 4. Mr. Olcott
Relation of food processing and handling to acceptability, color changes, enzyme activity, deterioration, flavor, vitamin retention, and other factors.

*118. Enzyme Technology. (3) I.
Prerequisite: Biochemistry 102.
Control and utilization of enzymes in preparation and preservation of foods and food products.

120. The Natural Coloring Matters. (2) II. Mr. Mackinney
Lectures and laboratory. Prerequisite: 3 units of biochemistry or agricultural biochemistry, or upper division organic chemistry.
Chemistry of natural pigments and related compounds; spectrophotometric and chromatographic techniques; special emphasis on pigments in relation to foods.

199. Special Study for Advanced Undergraduates. (1–5) I and II.
Mr. Mackinney, Mr. Joslyn, Mr. Olcott

GRADUATE COURSES

*200A–200B. Seminar in Food Technology. (1–1) Yr.
Mr. Joslyn, Mr. Mackinney, Mr. Olcott

237A–237B. Research in Food Technology. (1–9; 1–9) Yr.
Mr. Joslyn, Mr. Mackinney, Mr. Olcott

FOREIGN LITERATURE IN TRANSLATION

The following courses offered in the departments of language and literature do not require a reading knowledge of any foreign language.

Classics
10A–10B. Ancient Greek and Roman Civilization.
34. Epic Poetry: Homer and Vergil.
35. Greek Tragedy.
36. Plato.
100A–100B. Greek and Latin Literature in Translation.
178. Mythology.

Comparative Literature *151A–151B. The Literature of the Renaissance in Western Europe

French
*142A–142B. French Literature of the Middle Ages.
*146A–146B. Readings in Contemporary French Literature.

German

Italian

Near Eastern Languages

Oriental Languages
*22. Indonesian Civilization.
104E. Studies in Ancient Chinese Literature: Interpretation.
*142C. Civilizations of Eastern Asia: China.
142K. Civilizations of Eastern Asia: Korea.
*163. Readings in Pacific Literature in English Translation.

Scandinavian
100A–100B–100C. History of Scandinavian Literature.
106. History of Scandinavian Drama up to 1900.
107. The Plays of Ibsen.
108. Strindberg and His Writings.
109. Scandinavian Drama of the Twentieth Century.
120A–120B. The Novel in Scandinavia.
125. Masterpieces of Old Norse Literature.

Slavic Languages and Literature
39. Great Writers of Russian Literature.
130. Introduction to Russian Literature.
*131. Russian Literature (1880–1917).
132. Russian Literature since 1917.
133A. Russian Novelists of the Nineteenth Century and Western European Literatures.
133C. Dostoevski.
133D. Tolstoy.
133E. Turgenev.
133F. Chekhov.
134. Russian Folklore.
*135. The Russian Drama.
140. Survey of Slavic Literatures.
153. Polish Literature of the Post-Romantic Period.
*154. Polish and Russian Romanticism.
*155. Mickiewicz.
160. Survey of Czech and Slovak Literature.
*161. Czech and Slovak Literature of the Nineteenth Century.
170. Survey of South Slavic Literatures.
*180A–180B. Survey of Russian Culture.
182. History of Polish Culture.

Spanish

FORESTRY
(Department Office, 243 Walter Mulford Hall)

Percy M. Barr, Ph.D., Sc.D., Professor of Forestry.
Harold H. Biswell, Ph.D., Professor of Forestry.
Robert A. Cockrell, Ph.D., Professor of Forestry.
Robert N. Colwell, Ph.D., Professor of Forestry.
Fred E. Dickinson, Ph.D., Professor of Forestry.

Dietrich Muelder, D.F., Professor of Forestry.
Henry J. Vaux, Ph.D., Professor of Forestry (Chairman of the Department).
John A. Zivnuska, Ph.D., Professor of Forestry.
Frederick S. Baker, F.E., Professor of Forestry, Emeritus.
Emanuel Fritz, M.E., M.F., Professor of Forestry, Emeritus.
Joseph Kittredge, Ph.D., Professor of Forestry.
Myron E. Krueger, M.S., Sc.D. (hon.), Professor of Forestry, Emeritus.
Arthur W. Sampson, Ph.D., Professor of Forestry, Emeritus.
Harold F. Heady, Ph.D., Associate Professor of Forestry.
Edward C. Stone, Ph.D., Associate Professor of Forestry.
Paul J. Zinke, Ph.D., Assistant Professor of Forestry.

Arthur B. Anderson, Ph.D., Lecturer in Forestry.
David L. Brink, Ph.D., Lecturer in Forestry.
Paul Casamajor, M.F., Lecturer in Forestry for the fall semester.
Eric L. Ellwood, Ph.D., Lecturer in Forestry.
Rudolf F. Grah, Jr., Ph.D., Lecturer in Forestry.
Joseph E. Marian, D.Tech. Sci., Lecturer in Forestry.
Marshall N. Palley, Ph.D., Lecturer in Forestry.
Arno P. Schniewind, Ph.D., Lecturer in Forestry.

Letters and Science List.—Courses 1, 103, 122, and 125 are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

LOWER DIVISION COURSES

1. Elements of Forestry. (3) II. Mr. Grah
Forests in their relation to national life; the life history of the tree and the forest; general principles of forestry.

49. Forestry Field Practice Course. (No credit) The Staff (Mr. Stone in charge)
Prerequisite: one-half year of mechanical drawing, Engineering 21, Botany 1, and an average grade of C or higher. This course is prerequisite to all required courses in the School of Forestry.
Approximately ten weeks of field laboratory work in forest surveys and mapping, forest mensuration, silviculture, logging, and milling operations at Meadow Valley near Quincy in the Plumas National Forest.

UPPER DIVISION COURSES

Course 49 is prerequisite to all required courses in the School of Forestry.

103. Principles of Forest Ecology. (4) I. Mr. Stone
Lectures and laboratory. Prerequisite: Botany 1 and Chemistry 1A.
Basic factors controlling associations of plants under natural conditions.

104. Silviculture. (4) I. Mr. Muelder
Lectures and laboratory. Prerequisite: course 103.
Methods of governing growth and reproduction of forests through the application of ecological laws.

106. Forest Planting. (3) I. Mr. Muelder
Lectures, laboratory, or field trips. Prerequisite: Botany 1.
Artificial establishment of forests from collection of seed to planting of trees; the physiological, environmental, and genetic factors affecting survival and growth of forest seedlings; financial aspects of forest plantations.
108. **Dendrology.** (3) I. Mr. Zinke
Lectures, laboratory, and field trips. Prerequisite: Botany 1.
Identification by morphological characters of important forest trees of North America; their ecological and geographical distribution; field identification of many forest shrubs.

110. **Forest Mensuration.** (4) II. Mr. Palley
Lectures and conferences. Prerequisite: a course in elementary statistics and course 49.
Principles underlying log scaling and the estimation of timber volume and value; growth of stands; the application of statistical analysis to forest measurements.

112. **Lumber Manufacturing.** (3) I. Mr. Dickinson
Senior and graduate students from other departments may be admitted with consent of the instructor.
Organization and characteristics of the lumber industry; the manufacture of lumber from log pond to finished product; seasoning, grading, marketing.

114. **Wood Technology.** (3) I. Mr. Cockrell
Lectures and laboratory. Prerequisite: Chemistry 1A and Botany 1. Junior and senior students from other departments may be admitted with consent of the instructor.
Anatomy of wood; properties and uses; identification of commercial species.

115. **Physical Properties of Wood.** (3) I. Mr. Cockrell
Lectures and laboratory. Prerequisite: Physics 2A–2B or the equivalent.
Density, moisture relations, shrinking and swelling, strength, thermal, electrical, and acoustic properties of wood.

118. **Forest Influences.** (3) I. Mr. Zinke
Lectures and laboratory or field trips. Prerequisite: course 103, Physics 2A–2B, senior standing. Recommended: Soil Science 100 and Geography 111.
The influence of forests and brush on soil moisture, run-off, stream flow, floods, erosion, local climate, and soil productivity for forest growth.
126. Production Methods in the Forest Industries. (3) II. Mr. Grah
Prerequisite: 6 units of economics and senior standing.
Production methods and principles involved in logging; cost analyses.

128. Forest Protection. (3) I.
Lectures and one field trip. Junior and senior students from other departments may be admitted with consent of the instructor.
Forest fire behavior; ignition and spread of forest fires and factors by which they are influenced; forest fire control organization and equipment; methods of fire prevention and suppression.

130. Industrial Forestry. (3) II. Mr. Barr
Prerequisite: senior standing. Senior and graduate students from other departments may be admitted with consent of the instructor.
The application of forest management to large properties under private ownership; nature and development of the industrial forest enterprise; costs and returns; integration of forest industries; status and trends of American industrial forestry.

132. Forest Photogrammetry. (3) II. Mr. Colwell
Lectures and laboratory.
The construction of planimetric and topographic maps from vertical and oblique aerial photographs. The use of aerial photographs in mapping vegetation types and estimating timber volumes. Construction of aerial photo mosaics.

198. Directed Group Study. (1-5) I and II. The Staff (Mr. Vaux in charge)
Prerequisite: senior standing and consent of the instructor.
Group study, or investigation, of special problems.

199. Special Study for Advanced Undergraduates. (1-5) I and II. The Staff (Mr. Vaux in charge)
Prerequisite: senior honor students with adequate background in the subject proposed.
This course may also be taken during the summer at the Forestry Camp at Meadow Valley, Plumas County.

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 18)

201A-201B. Seminar in Forestry. (2-2) Yr. Mr. Stone, Mr. Colwell
201A is not prerequisite to 201B.

202. Research in Forestry. (1-6) I and II. The Staff (Mr. Vaux in charge)
Original study on special topics in the laboratory, or in the field.

203. Seminar in Forest Ecology. (2) I. Mr. Stone
Prerequisite: course 103 and Botany 111.
Seminar on contemporary research in forest ecology.

204. Seminar in Silviculture. (2) I. Mr. Muelder
Prerequisite: course 104.
Regional silviculture; recent research findings and current needs.

205. Seminar in Wood Technology. (2) I. Mr. Cockrell
Prerequisite: course 114.

206. Seminar in Forest Management. (2) II. Mr. Barr
Prerequisite: course 120 and 6 units of economics.
207A–207B. Seminar in Forest Economics. (2–2) Yr.
Mr. Zivnuska, Mr. Vaux
Prerequisite: 12 units of economics, agricultural economics, or forest economics. 207A is not prerequisite to 207B.

207. Seminar in Wood Chemistry. (2) II.
Mr. Anderson
Prerequisite: consent of the instructor.
Chemical constitution and isolation of the various chemical entities present in wood; the general biological role of these components and their application in forest products industries.

225. Seminar in Forest Influences and Watershed Management. (2) I.
Mr. Zinke
Prerequisite: course 125 and consent of the instructor.
The influences of forests on soil properties, on water and its disposition, and on the local microclimate.

299. Special Study for Graduate Students. (1–4) I and II.
The Staff (Mr. Vaux in charge)
Reading and conferences for properly qualified graduate students under the direction of a member of the staff.

SELECTED RELATED COURSES IN OTHER DEPARTMENTS

Economics of Natural Resources (Agricultural Economics 175)
Taxonomy of Seed Plants (Botany 108)
Elementary Plant Physiology (Botany 111)
Principles of Plant Distribution (Botany 151)
Production Organization and Management (Business Administration 140)
Strength of Materials (Engineering 18A–18B)
Route Surveying (Civil Engineering 102)
Hydrology (Civil Engineering 160)
Forest Entomology (Entomology 114)
Principles of Genetics (Genetics 100)
Elementary Meteorology (Geography 111)
Natural Resources and Their Exploitation (Geography 153)
Forest Pathology (Plant Pathology 100)
Public Policy and Administration of Natural Resources (Political Science 185A)
Soil Characteristics (Soil Science 100)
Statistical Inference (Statistics 130A–130B)
Introduction to Wildlife and Fisheries Management (Zoology 116)

FRENCH

(Department Office, 4125 Dwinelle Hall)

Francis J. Carmody, Ph.D., Professor of French.
Warren Ramsey, Ph.D., Professor of French and Comparative Literature.
Manfred M. G. Sandmann, Litt.D., Professor of French and Romance Philology.
Ronald N. Walpole, Ph.D., Professor of French (Chairman of the Department).
Clarence D. Brenner, Ph.D., Professor of French, Emeritus.
Jacqueline de La Harpe, Docteur-ès Lettres, Professor of French, Emeritus.
Percival B. Fay, Ph.D., Professor of French, Emeritus.
Arnold H. Rowbotham, Ph.D., Professor of French, Emeritus.
Clifford H. Bissell, Ph.D., Associate Professor of French, Emeritus.
Mathurin Dondo, Ph.D., Associate Professor of French, Emeritus.
Letters and Science List.—All undergraduate courses except 20 are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Bensimon (Teaching Majors), Mr. Meylan.

The Majors.—Two majors are offered in the department: Plan A, emphasis on literature; Plan B, emphasis on language and culture. Required: courses 1, 2, 3, 4, 25, or their equivalents. (Students who receive grade A or B in French 4 will be admitted to the upper division courses without the requirement of course 25.) History 4A–4B, Philosophy 20A–20B, English 1A–1B, and Latin are strongly recommended.

Plan A.—24 upper division units, including courses 101A–101B (6 units), 109A–109B (6 units), and at least four semesters chosen from 112A, 112B, 118A, 118B, 120A, 120B, 121A, 121B. Courses 108, 142, 146 are not acceptable for the majors.

Plan B.—Required: courses 101A–101B (6 units), 109A–109B (6 units), 125 (1 unit), 130A–130B (6 units), 134A–134B (6 units). Students who fail to maintain an average of 2 grade points or better for each unit of work undertaken in the upper division courses in the Department of French will, upon approval of the Executive Committee of the College of Letters and Science, be excluded from the major in French.

Honors.—For the honors program consult one of the major advisers.

LOWER DIVISION COURSES

In courses 1, 2, 3, and 4, three hours of basic study will be supplemented by two hours of specialized practical work.

1. Elementary French. Beginners’ Course. (4) I and II.
   Sections meet five hours per week. Mr. Duisit in charge

French for Graduate Students. (No credit) I and II.
   (Formerly numbered 1G.) Mr. Vidal in charge
   First course (elementary).
   Second course (intermediate).
   Preparation for graduate reading examinations.

2. Elementary French (continuation of 1). (4) I and II.
   Sections meet five hours per week. Mr. Atherton in charge
   Prerequisite: course 1 or its equivalent.

3. Intermediate French. (4) I and II. Mr. Augst, Mr. Vidal
   Sections meet five hours per week. Some sections emphasize reading, others conversation. Reading sections are not designed for prospective French majors.

Reading sections: Mr. Vidal in charge; conversation sections: Mr. Augst in charge.
Prerequisite: course 2 or its equivalent.

Sections meet five hours per week.
Mr. Augst in charge
Prerequisite: course 3 (conversation) or its equivalent.

4R. Intermediate French. Reading. (4) I and II.
Mr. Vidal in charge
Sections meet five hours per week.
Prerequisite: course 3 or its equivalent.
Intended for students interested in reading short, representative works of certain great French writers, with classroom analysis in English. Not for prospective majors in French.

20. French Pronunciation. (1) I and II.
Prerequisite: course 2 or the equivalent.
A course in the pronunciation of French for students on the intermediate level.

25. Advanced French. (3) I and II.
Prerequisite: course 4, or a grade of A or B in course 4R.

UPPER DIVISION COURSES

The prerequisite to all upper division courses is 16 units of lower division courses, including course 4 with grade A or B, or course 25.
Courses 101A–101B and 109A–109B must usually be taken before any other upper division course, with the exception of courses 108 and 125.

Beginning each semester.
Mr. Bensimon in charge

*108A–108B. Reading in French Literature. (3–3) Yr.
Prerequisite: course 4 or 4R, or the equivalent. Does not satisfy any requirement for the major in French.
The masterpieces of French literature read in French, with classroom work in English.

Mr. Putter (in charge), Mr. Bensimon, Mr. Vidal
109A. Middle Ages Through Seventeenth Century.
Mr. Bensimon, Mr. Vidal
109B. Eighteenth and Nineteenth Centuries.

112A–112B. The Nineteenth Century. (2–2) Yr.
Mr. Putter

114A–114B. Contemporary French Literature. (2–2) Yr.
Mr. Ramsey

115A–115B. Modern French Drama. (2–2) Yr.
115A: Nineteenth Century; 115B: Twentieth Century.
Mr. Augst

116A–116B. French Literature from 1885 to 1914. (2–2) Yr.
Mr. Carmody

118A–118B. The Sixteenth Century. (2–2) Yr.
Mr. Meylan

120A–120B. The Seventeenth Century. (2–2) Yr.
Mr. Eustis

*121A–121B. The Eighteenth Century. (2–2) Yr.
Mr. Guy

125. Advanced French Pronunciation. (1) I and II.
   Miss Dufrenoy, Mr. Atherton, Mr. Augst, Mr. Duisit

130A–130B. Advanced Grammar and Composition. (3–3) Yr.
   Prerequisite: course 101A–101B. Mr. Carmody, Mr. Meylan

131A–131B. Advanced Literary Composition. (3–3) Yr.
   Mr. Duisit
   Prerequisite: course 101A–101B. Required for all candidates for the M.A.
   degree.
   A course in the development of an ability to write good literary French.

134A–134B. Survey of French Culture and Institutions. (3–3) Yr.
   Prerequisite: course 101A–101B.

*160. Contemporary Literature. (2) II.
   Mr. Guèdenet
   Prerequisite: courses 101A–101B and 109A–109B.

199. Special Study for Advanced Undergraduates. (1–3) I and II.
   The Staff (Mr. Meylan in charge)

   COURSES IN WHICH NO KNOWLEDGE OF FRENCH IS REQUIRED

   Lectures (in English) and collateral reading of representative works in
   English translation.

   39A. To the End of the Eighteenth Century. (2) I.
       Mr. Putter (in charge), Mr. Eustis

   39B. The Nineteenth Century. (2) II.
       Mr. Putter (in charge), Mr. Eustis

   39C. The Contemporary Period. (2) I.
       Mr. Ramsey
       Prerequisite: course 39B or consent of the instructor.

*142A–142B. French Literature of the Middle Ages. (2–2) Yr.
   Mr. Walpole
   (Formerly numbered 122A–122B.)
   142A. Epic, romance, history.
   142B. Drama, lyric and allegorical poetry.

*146A–146B. Readings in Contemporary French Literature. (2–2) Yr.
   Mr. Carmody
   (Formerly numbered 126A–126B.)
   Prerequisite: junior or senior standing and other specially qualified
   students.
   The masterpieces of French literature of today read in English translation.

   GRADUATE COURSES

   (Concerning conditions for admission to graduate courses, see page 18)
   Course 201A or 206A is required of all candidates for the M.A.
   degree.

201A–201B. Historical Grammar. (3–3) Yr.
   Mr. Walpole

*202A–202B. Studies in Medieval French Literature. (2–2) Yr.
   Reading knowledge of Old French is required.
   Mr. Walpole

203. Introduction to the Theory and History of French Syntax. (2) I.
   Mr. Sandmann

204A-204B. Studies in the Eighteenth Century. (2-2) Yr. Mr. Carmody
204A. Voltaire and the Philosophers.
204B. Jean-Jacques Rousseau.

206A-206B. Reading and Interpretation of Typical Old French Texts.
(2-2) Yr. Mr. Vidal

207A-207B. Studies in the Eighteenth-Century Novel. (2-2) Yr. Mr. Vidal

(2-2) Yr. Mr. Putter

*210A-210B. Studies in the Eighteenth-Century Drama. (2-2) Yr. Mr. Putter

215A-215B. Seminar in Contemporary Literature. (2-2) Yr. Mr. Ramsey

216A*-216B. French Poetry of the Renaissance. (2-2) Yr. Mr. Bensimon

217A-217B. Humanism in the French Renaissance. (2-2) Yr. Mr. Meylan

218A-218B. French Classicism. (2-2) Yr. Mr. Eustis

*219A-219B. Aspects of French Romanticism. (2-2) Yr. Mr. Bowman

220A-220B. Explication de Textes. (2-2) Yr. Mr. Eustis

230A-230B. French Literary Criticism. (2-2) Yr. Mr. Eustis

235. Methods of Literary Research with Special Reference to Bibliography.
(1) II. Mr. Eustis

For prospective doctoral candidates.

298. Special Study for Graduate Students. (1-4) I and II.
The Staff (Mr. Eustis in charge)

RELATED COURSES

See courses listed under Comparative Literature and Romance Philology.

GENETICS

(Department Office, 343 Mulford Hall)

Spencer W. Brown, Ph.D., Professor of Genetics.
Everett R. Dempster, Ph.D., Professor of Genetics.
James A. Jenkins, Ph.D., Professor of Genetics.
I. Michael Lerner, Ph.D., Professor of Genetics (Chairman of the Department).
Curt Stern, Ph.D., Professor of Genetics and Zoology.
Patricia St. Lawrence, Ph.D., Assistant Professor of Genetics.

<*>

Donald R. Cameron, Ph.D., Lecturer in Genetics.
G. Ledyard Stebbins, Ph.D., Professor of Genetics, Davis.

Let ters and Science List.—All undergraduate courses in genetics are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Adviser: Mr. Dempster.

* Not to be given, 1960-1961.
The Major.—Course work leading to the degree of Bachelor of Science may be undertaken subject to the requirements of the College of Agriculture (see page 78 of the CIRCULAR OF INFORMATION). Students may elect to follow the animal science curriculum (see page 80 of the CIRCULAR OF INFORMATION), the plant science curriculum (see page 83 of the CIRCULAR OF INFORMATION), or the group major in Genetics in the College of Letters and Science (see page 68 of the CIRCULAR OF INFORMATION).

LOWER DIVISION COURSE

10. Heredity and Evolution. (3) II.
   Mr. Lerner
   Designed for students not specializing in biology. Not open for credit to students who have had or are taking upper division genetics, botany, or zoology courses.
   Survey of basic principles of inheritance, variation, and evolutionary change in plants, animals, and man.

UPPER DIVISION COURSES

100. Principles of Genetics. (3) I.
   Mr. Jenkins
   Prerequisite: general botany or general zoology. Course 100C may be taken concurrently. Not open to students who are taking, or who have received credit for, Zoology 114.
   Introduction to genetics with some consideration of its applications in agriculture and biology.

100C. Principles of Genetics Laboratory. (1) I.
   Mr. Jenkins
   Prerequisite: course 100 or Zoology 114 (may be taken concurrently). Laboratory work in elementary genetics to supplement course 100 or Zoology 114.

101. Cytogenetics. (3) II.
   Mr. Brown
   Prerequisite: course 100; general cytology.
   Genetics as related to cytological conditions.

102. Biometrical Genetics. (4) I.
   Mr. Dempster
   Lectures and laboratory. Prerequisite: course 100, Statistics 2.
   Genetics with special reference to the application of statistical methods.

*103A–103B. Organic Evolution. (2–2) Yr.
   Mr. Stebbins
   Lectures, student reports, discussion. Prerequisite: elementary genetics, elementary botany or zoology, and taxonomy or cytology. 103A is not prerequisite to 103B. 103A given in the fall semester of odd-numbered years; 103B given in the spring semester of even-numbered years.
   Organic evolution from the dynamic point of view.

104. Physiological Genetics. (3) I.
   Miss St. Lawrence
   Prerequisite: course 100, Chemistry 8, or their equivalents. Recommended: a course in biochemistry.
   An introduction to biochemical and physiological genetics.

*105. Principles of Population Genetics. (2) I.
   Mr. Lerner
   Prerequisite: course 100 and elementary statistics. Offered in odd-numbered years.
   A survey of genetic forces operating on Mendelian populations, with special emphasis on selection.

198. Lectures in Advanced Genetics. (3) II.
   Prerequisite: course 100.
   Selected topics in advanced genetics. May be repeated for credit.

199. Special Study for Advanced Undergraduates. (1-5) I and II.
The Staff (Mr. Dempster in charge)

**GRADUATE COURSES**

(Concerning conditions for admission to graduate courses, see page 18)

201. Advanced Cytogenetics. (3) II. Mr. Cameron
Lectures and laboratory. Prerequisite: course 101, may be taken concurrently; or consent of the instructor.
A study of chromosome morphology and behavior as related to problems in genetics.

*205. Advanced Population Genetics. (2) II. Mr. Dempster
Lecture and laboratory. Prerequisite: upper division work in statistics or biometrical genetics and consent of the instructor. Offered in even-numbered years.
A quantitative approach to the genetics of laboratory and domestic populations. Discussion and formulation of experimental designs and analyses, selection procedures, and mating plans.

280. Graduate Seminar in Genetics. (1-4) I and II.
The Staff (Mr. Lerner in charge)
Intensive study of special topics in genetics under the supervision of members of the staff.

299. Research in Genetics. (1-6) I and II.
(Formerly numbered 200.) The Staff (Mr. Dempster in charge)

**Staff Seminar in Genetics. (No credit) I and II.**
The Staff (Miss St. Lawrence in charge)
Weekly meeting for the presentation of special topics by members of the staff, visiting investigators, and graduate students.

**RELATED COURSES IN OTHER DEPARTMENTS**

Human Evolution and Fossil Man (Anthropology 152)
Bacterial Genetics (Bacteriology 107)
Plant Cytology (Botany 130)
Biological Effects of Radiation (Medical Physics 131)
Cytology (Zoology 107 and 107C)
Genetics (Zoology *114)
Human Genetics (Zoology 115)
Genetics Review (Zoology 244)
Seminar in Advanced Genetics (Zoology *245)

**GEOGRAPHY**

(Department Office, 230 Giannini Hall)

James J. Parsons, Ph.D., Professor of Geography (Chairman of the Department).
John B. Leighly, Ph.D., LL.D., Professor of Geography, Emeritus.
Carl O. Sauer, Ph.D., D.Phil. (h.c.), LL.D., Professor of Geography, Emeritus.
Clarence J. Glacken, Ph.D., Associate Professor of Geography.
John E. Kesseli, Ph.D., Associate Professor of Geography.
Erhard Rostlund, Ph.D., Associate Professor of Geography.
Paul Wheatley, Ph.D., Associate Professor of Geography.
James E. Vance, Jr., Ph.D., Assistant Professor of Geography.

* Not to be given, 1960-1961.
‡ In residence spring semester only, 1960-1961.
Robert E. Dickinson, Ph.D., *Visiting Professor of Geography.*
Edwin M. Loeb, Ph.D., *Lecturer in Geography.*
Ann Nicholls Marshall, Ph.D., *Visiting Associate Professor of Geography for the fall semester.*
Nicholas T. Mirov, Ph.D., *Lecturer in Geography.*

*Letters and Science List.*—All undergraduate courses in geography are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

*Departmental Major Adviser:* Mr. Rostlund.

*The Major.*—Required: Geography 1, 2, 4, and former course Mathematics C or the equivalent. Recommended: Botany 10, Geography 5A–5B, Geology 10, Paleontology 1, Soils 10, and a course in elementary statistics (Economics 2 or the equivalent).

Twenty-four units of upper division work in geography, or from 18 to 21 units of upper division work in geography and from 3 to 6 units chosen under an approved plan from the following: Anthropology 101A–101B; Botany 151; Economics 110, 113, 114; Forestry 103, 125; History 161A–161B, 181A–181B; Sociology and Social Institutions 133, 145, 167; Soils 101, 101F, 105; Zoology 125.

Each program should normally include Geography 101 or 102, 105A, 121A or 121B, and 151.

**LOWER DIVISION COURSES**

1. *Introduction to Physical Geography.* (3) I and II. Mr. Wheatley
   Two lectures and two section meetings per week.

2. *Introduction to Cultural and Historical Geography.* (3) II. Mr. Rostlund
   Two lectures and two section meetings per week.

4. *Map Reading and Map Interpretation.* (3) I. Mr. Kesseli
   One lecture and two two-hour laboratory periods per week.

5A–5B. *Economic Geography.* (3–3) Yr. Mr. Dickinson
   Two lectures and two section meetings per week. 5A is not prerequisite to 5B.
   The distribution of the world’s resources and industries.
   5A. Geography of world agriculture.
   5B. Mineral resources, manufacturing regions, trade routes, and trade centers.

**UPPER DIVISION COURSES**

*101. Field Geography.* (3) I.
   Field trips Saturdays. Admission only after consultation with instructor.
   Field study of a unit area with systematic mapping of the elements that constitute the natural region and of the forms of its utilization.

102. *Field Geography.* (3) II. Mr. Parsons
   Field trips Saturdays. Admission only after consultation with instructor.
   Study of type areas of physical and cultural interest.

105A–105B. *Cartography.* (3–3) Yr. Mr. Kesseli, 1
   One lecture hour and two three-hour laboratory periods per week. Prerequisite: consent of the instructor.
   105A: Map projections. 105B: Cartographic representation.

1 In residence fall semester only, 1960–1961.
*108. Analysis of Land Forms. (3) I. Mr. Kesseli
Origin of land forms. Review of the varied interpretation of processes involved, with emphasis on recent views.

109. Topographical Photo Interpretation. (3) II. Mr. Kesseli
One lecture hour and two two-hour laboratory periods per week. Prerequisite: consent of the instructor.
The identification and classification of data on air photographs; the solution of selected problems in photogrammetry.

111. Elementary Meteorology. (3) I. Mr. Leighly
Prerequisite: a knowledge of elementary physics and calculus is desirable.

113. Climatology. (3) II.

*121 A. Geography of Eastern North America. (3) I. Mr. Rostlund

121B. Geography of Western North America. (3) II. Mr. Rostlund

122A. Geography of Middle America. (3) I. Mr. Parsons
122B. Geography of South America. (3) II. Mr. Parsons

123A. Geography of Mediterranean Europe. (3) I. Mr. Glacken

*123B. Geography of Northern Europe. (3) II. Mr. Wheatley

124. Geography of the Soviet Union. (3) I. Mr. Mirov

125A. Geography of Southeast Asia. (3) II. Mr. Wheatley

125B. Geography of East Asia. (3) I. Mr. Glacken, Mr. Wheatley
Prerequisite: junior standing.

*126. The Geography of the Middle East. (3) I. Mr. Wheatley
A study of the natural environments and resources of Turkey, Egypt, the Levantine states, Saudi Arabia, Iraq and Iran, followed by an outline of the successive stages in the creation of the present-day humanized landscapes.

127. Geography of Southern Africa. (3) II. Mr. Loeb

§128. Geography of Australia. (3) I. Mrs. Marshall
Physical and historical geography of the Australian continent. Special attention to settlement in relation to climate.

*130. Geography of the Tropics. (2) II. Mr. Parsons
An analysis of the resources of the warm and wet lands of the equatorial regions; the economic potentialities of the tropics and the obstacles to their exploitation inherent in the physical and cultural environment.

131. Geography of California. (3) II. Mr. Kesseli

*141. Economic Geography: Primary Production. (3) I. Mr. Kesseli
Analysis of the distribution of agricultural and mineral raw materials in relation to world commerce.

*142. Economic Geography: Industrial Localization. (3) I. Mr. Kesseli
Factors and trends in the geographic distribution of manufacturing industries.

§ To be offered one semester only, 1960–1961.
151. American Geographic Thought. (2) I. Mr. Glacken
Prerequisite: three upper division courses in geography.
Reports and conferences on the objectives, subdivisions, and methods of geography by American geographers of the late nineteenth and the twentieth century.

153. Natural Resources and Their Exploitation. (3) II. Mr. Rostlund
Conservative and destructive uses of habitat (occupied area) by cultures (economic systems) throughout human time, with emphasis on contemporary problems.

155. Urban Geography. (3) I. Mr. Dickinson
A study of the origin, development, distribution, and regional variation of the world's cities, with emphasis on an analysis of the functions and patterns of American cities.

*161. Geography of Domesticated Plants and Animals. (3) II. ______
A consideration of the processes, times, and places of appropriation of elements of flora and fauna into agricultural economics and of the successive geographic dispersal of the domesticated forms.

176. The Relations Between Nature and Culture. (2) II. Mr. Glacken
A critical survey, from antiquity to the present, of leading theories of the effects of the physical environment on culture; the influence of these theories on such fields as geography, history, and anthropology; contemporary views of the nature of the physical environment and its relation to population and economic potentials.

H195. Special Study for Honors Candidates. (1–3) I and II. The Staff
199. Special Study for Advanced Undergraduates. (1–3) I and II.
The Staff (Mr. Glacken in charge)

GRADUATE COURSES
(Concerning conditions for admission to graduate courses, see page 18)
For facilities for research, see the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION.

201. Seminar in Latin-American Geography. (2) I. Mr. Parsons
202. Seminar in Historical Geography. (2) I. Mr. Wheatley, Mr. Loeb
203. Seminar in Cultural Geography. (2) II. Mr. Glacken
*205. Seminar in Physical Geography. (2) I. Mr. Kesseli
*207. Seminar in History of Geography. (2) II. ______
208. Seminar in Economic Geography. (2) II. Mr. Dickinson
219A–219B. Research. (1–5; 1–5) Yr. The Staff (Mr. Kesseli in charge)

GEOLOGY
(Department Office, 203A Bacon Hall)
Perry Byerly, Ph.D., Professor of Seismology and Director of the Seismographic Stations.
Charles M. Gilbert, Ph.D., Professor of Geology (Chairman of the Department).
Charles Meyer, Ph.D., Professor of Geology.

Letters and Science List.—All undergraduate courses in geology, except 150, are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

MAJOR IN GEOLOGY

Departmental Major Advisers: Mr. Curtis (fall semester); Mr. Evernden (spring semester).

The Major.—Required courses Chemistry 1A–1B; Physics 2A–2B, 3A–3B; Mathematics 3A–3B; Paleontology 1; Geology 5, 6, 101, 103, 107, 118; and at least 10 units selected from either one of the following two groups of courses.

Group 1: Geology 104A–104B, 105, 116, 117, 131, 133, and Chemistry 109 or 110A.

Group 2: Geology 105, 116, 117; Paleontology 111, 112, 136, and 137.

All students majoring in geology are advised to elect Zoology 1A in satisfaction of the Letters and Science requirement in Biological Sciences and to choose other elective courses on the advice of the major adviser. As preparation for graduate work in geology, Mathematics 4A–4B or 14A and additional chemistry and physics are strongly recommended. Other recommended electives include any course listed in the two groups above, Statistics 2, Chemistry 5, Geology 102B–102C, 106A–106B, 111A–111B, and 122A–122B.

Geochemistry.—Students interested in geochemistry as a major field should complete the field major in physical sciences with emphasis on chemistry and geology. For this program, upper division electives should be selected with approval of the field major adviser from the following list of recommended courses: Chemistry 104, 110B, 120, 122, 123; Geology 101, 103, 104A–104B, 118, 131, 133.

The Honors Major Program.—To be eligible for graduation with honors, a student must have enrolled in the honors major program by the start of his senior year and must have a 3.0 or higher grade point average. Courses required in addition to the regular major program are Mathematics 4A–4B and Geology H196.

MAJOR IN GEOPHYSICS

Departmental Major Advisers: Mr. Curtis (fall semester); Mr. Evernden (spring semester).

The Major Program.—Required courses: Chemistry 1A; Geology 5, 101, 103, 121 or 122A–122B; Mathematics 3A, 3B, 14A, 14B; Geology 6; Physics 4A, 4B, 4C, 105A, 110A, 110B.

2 In residence fall semester only, 1960–1961.
3 In residence spring semester only, 1960–1961.
Other upper division courses selected to complete the requirements for the A.B. degree should be chosen with the advice of the major adviser. Recommended electives include: Geology 121 or 122A-122B; Physics 105B; Electrical Engineering 106; Mathematics 119A-119B.

The Honors Major Program.—To be eligible for graduation with honors, a student must have enrolled in the honors major program by the start of his senior year and must have a 3.0 or higher grade-point average. Courses which must be included in the major program are Geology 121 and 122A-122B, plus Geology 199 (2) which includes writing a thesis.

GEOLoGY
Lower DIvision CoursEs

3. General Geology: Historical. (3) II. Mr. Hay
Three lectures and one discussion section per week. Prerequisite: course 5 or 10.
Origin and geological history of the earth and the evolution of its animal and plant inhabitants.

5. General Geology. (4) I. Mr. Hay
Three lectures and one three-hour laboratory period per week. Prerequisite: Chemistry 1A. For majors in geology, geophysics, and engineering.
A survey of materials and physical processes occurring in the earth, with special emphasis on their physical and chemical backgrounds.
Students who have received credit for 3 units of geology without laboratory may satisfy the requirement for the major by completing the laboratory course 5L.

5L. General Geology Laboratory. (1) I. Mr. Hay
One three-hour laboratory per week. Prerequisite: a lecture course in geology; Chemistry 1A.

6. Introduction to Mineralogy. (4) I and II. Mr. Weiss, Mr. Fyfe
(Formerly Mineralogy 6.)
Two lectures and two three-hour laboratory periods per week. Prerequisite: Chemistry 1A and Physics 2A or equivalent.
Determination of common rock-forming minerals, their origin, relationships, and physical properties; study of simple crystals.

10. Introduction to Geology. (3) I and II. Mr. Gilbert, Mr. Christensen
Designed for students not majoring in any physical science or engineering; not open to students who have completed any college course in geology.
An introduction to the phenomena and basic principles of geology, with laboratory exercises concerning the nature of minerals and rocks, structure of rock masses in the field, earthquakes, use and interpretation of geologic maps, and evolution of natural landscapes.

15. General Geology. (3) II.
Two lectures and one three-hour laboratory period per week. Prerequisite: Chemistry 1A, Physics 2A-2B, Mathematics 3A-3B, or consent of the instructor. For majors in engineering. Not open to students who have passed course 5 or 10.
A survey of materials and physical processes occurring in the earth. Similar in scope to course 5 but with some topics omitted.

Upper DIvision CoursEs

101. Field Geology. (4) I and II.
The Staff (Mr. Evernden and Mr. Christensen in charge)
(Formerly numbered 102A.)
One lecture per week and one three-hour laboratory and field trips all day Saturday. Prerequisite: courses 5, 6, and 103.
Geology

Geology of the Berkeley Hills and vicinity. Training in geologic field methods and mapping, in the solution of structural and geomorphic problems, in the interpretation of field data, and in the preparation of geologic reports.

102B–102C. Field Geology. (1–1) Yr. Beginning either semester.
Mr. Wahrhaftig, Mr. Weiss, Mr. Gilbert
One week-long field trip. Prerequisite: courses 101 and 103.
Additional training in geologic mapping and report writing; the geology of areas beyond the environs of San Francisco Bay.

103. Introduction to Petrology. (4) I and II. Mr. Christensen, Mr. Gilbert
Two lectures and two three-hour laboratory periods per week.
Prerequisite: course 5 and 6, or course 150.
Characteristics, origin, mode of occurrence, and nomenclature of rocks, and description of the more common types. Laboratory practice in determination of textures, mineral components, and systematic classification of rocks by observation of hand specimens.

104A–104B. Microscopic Petrography Laboratory. (3–3) Yr. Mr. Curtis
Lecture and two three-hour laboratory periods per week. Prerequisite: course 6; and for course 104B, course 103.
The optical properties of crystals, followed by determination of minerals and then of rocks by means of the microscope. Approximately one-third of the year is devoted to each of these three topics.

105. Stratigraphy. (3) I. Mr. Hay
Two lectures and one three-hour laboratory per week. Several all day field trips in lieu of laboratories will be scheduled on week ends. Prerequisite: course 5, and course 3 or Paleontology 1; course 103 recommended.
The origin and relationships of stratified rocks; principles of stratigraphic measurement and correlation.

106A–106B. Economic Geology. (3–3) Yr. Mr. Meyer
(106A formerly numbered 106; 106B formerly numbered 108.)
Two lectures and one three-hour laboratory period per week. Prerequisite: Chemistry 5 and course 103 (may be taken concurrently), or course 150.
The genesis and geological characteristics of economic mineral deposits.

107. Geology of North America. (2) II. Mr. Williams
Prerequisite: courses 3 and 103.
The sedimentary, igneous, and structural evolution of the continent.

111A–111B. Petroleum Geology. (3–3) Yr. Mr. Evernden
Prerequisite: course 5, Physics 4A (or 2A–2B); course 101, or 150; course 103 is desirable. Students who have taken or are taking course 121 or 122 may not take course 111B for credit.
The geology of petroleum and of ground water; problems of subsurface structure and correlation.

116. Structural Geology. (2) II. Mr. Christensen
Prerequisite: courses 5, 101.
Deformation of the earth's crust; mountain growth; folding and faulting and their economic aspects; graphic solution of fault problems.

117. Geomorphology. (3) I. Mr. Wahrhaftig
Two lectures and one additional conference hour per week. Students who have not completed course 101 or who are not taking it concurrently will be admitted only by consent of the instructor.
Nature, evolution, and classification of land forms; use of physiographic methods in elucidating the later geologic history of various regions and in interpreting conditions of the geologic past.

118. Advanced Summer Field Course. (4). Mr. Gilbert, Mr. Curtis
Prerequisite: course 101 with a grade of C or better.
The aim of the course is to develop: (1) facility and accuracy in geological mapping; (2) ability to observe and interpret rocks, structures and physiographic features, and other geological phenomena; and (3) the capacity to execute independently a geological survey and prepare a suitable report. Satisfactory completion of this course satisfies the undergraduate thesis requirements for students whose major is geology.

120. Elementary Seismology. (2) I.
Prerequisite: course 5 or 1, Physics 2A or the equivalent.
A general discussion of earthquakes.

121. Practical Seismometry. (4) II.
Mr. Byerly
Three lectures and one three-hour laboratory period per week. Prerequisite: Physics 2A–2B, and Mathematics 4A, 4B.
Paths of seismic waves and their relation to the structure of the earth, with emphasis on problems of seismic prospecting; elementary theory of the seismograph; laboratory analysis of seismograms and interpretation of travel-time curves in terms of structure.

122A–122B. Principles of Geophysics. (2–2) Yr. Mr. Verhoogen
Two lectures per week, and occasional conference hours. Prerequisite: course 5 (or 1), Mathematics 14A–14B (may be taken concurrently), Physics 4A, 4B.
122A. General geophysics.
122B. Applications to geologic problems.

131. Paragenesis of Minerals. (3) I.
Mr. Fyfe
(Formerly Mineralogy 101.)
Three lectures per week. Prerequisite: course 103 (may be taken concurrently); Chemistry 5 recommended.
Geochemical treatment of the formation and association of minerals.

133. Crystal Chemistry of Minerals. (3) II.
Mr. Pabst
(Formerly Mineralogy 103.)
Three lectures per week. Prerequisite: course 103 (may be taken concurrently); Chemistry 5 recommended.
The crystal chemistry of minerals, with problems on the derivation of formulas and cell contents from analyses.

150. Geology for Engineers. (3) II.
Mr. Weiss
Four all-day field trips in lieu of eight laboratory periods will be held on Saturdays during the latter half of the semester; students enrolling in this course must have Saturdays free during this period. Prerequisite: course 5 or 15.
Occurrence, association, and recognition of minerals and rocks, with particular reference to deposits of economic importance; elements of stratigraphy; geometry of rock formations and structures in the field.

H196. Honors Course in Geology. (3) II. Mr. Turner, Mr. Williams
One two-hour period per week. Prerequisite: senior and honors standing in the geology major.
A seminar dealing with major topics in physical geology, including reports on original literature and a comprehensive examination.

Geology

199. Special Study for Advanced Undergraduates. (1-4) I and II.
The Staff (Mr. Curtis in charge)
For properly qualified senior students who wish to undertake selected readings or research under the guidance of a member of the department.

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

201A-201B. Seminar in Geochemistry. (2-2) Yr. Mr. Fyfe
Prerequisite: consent of the instructor.
Principles and general problems of geochemistry. Course content varies from year to year.

204A-204B. Elastic Waves. (2-2) Yr.
(204A formerly numbered 204.)
Prerequisite: Mathematics 119, Physics 105A-105B or the equivalent.
204A: Mr. Byerly; 204B: ———.
The theory of stress and strain, and wave motion in elastic solids, with special application to seismic waves.

205. Laboratory Investigation of Ores. (3) II. Mr. Meyer
Prerequisite: courses 104A-104B, 106A-106B or the equivalent, Geology 131 or the equivalent.
Application of laboratory methods and interpretive procedures to problems of metalliferous geology

206. Seminar in Geology of Metalliferous Deposits. (3) I. Mr. Meyer
Prerequisite: course 106A-106B or the equivalent.
Study of the literature of selected mining districts with laboratory demonstration of textural and mineralogic features, bearing on their origin.

207. Seminar in Volcanology. (2) I. Mr. Williams
The origin and nature of volcanic processes; principal types of activity as exemplified by modern volcanoes; characters and classification of lavas and pyroclastic rocks.

*208. Physics of Solids. (2) II. Mr. Verhoogen
A survey of physical and chemical properties of solids, with reference to rock-forming materials. Content will vary from year to year.

209A-209B. Physical Stratigraphy and Tectonics. (2-2) Yr.
Prerequisite: consent of the instructor. Mr. Weiss
Critical study of original literature dealing with various aspects of physical stratigraphy and tectonics, with discussions and occasional lectures. Topics will vary from year to year.

210. Advanced Optical Mineralogy. (3) I. Mr. Pabst
One lecture and two three-hour laboratory periods per week. Prerequisite: course 104A-104B.
Study of mineral grains by immersion methods; mineralogical examination of crushed rocks.

211. Petrofabric Analysis. (2) II. Mr. Turner
Prerequisite: consent of the instructor.
The nature and interpretation of microscopic fabric of deformed rocks.

*212. Universal-Stage Petrography. (2) I. Mr. Turner
Prerequisite: course 210 or 214A, and consent of the instructor.
Use of the universal stage in petrographic determinations and in problems of optical mineralogy.

213. Seminar in Geomorphology. (2) II.  
Mr. Wahrhaftig  
Prerequisite: course 117 or the equivalent.  
The topics to be considered will vary from year to year.

*214A–214B. Advanced Petrology. (2–4; 2–4) Yr.  
Mr. Turner  
Prerequisite: course 104A–104B, 131 (may be taken concurrently). Recommended: Chemistry 122. A reading knowledge of French or German is required of candidates for the Ph.D. degree.  
Discussion of problems of petrogenesis. Microscopic study of suites of rock sections.  
214A: igneous rocks; 214B: metamorphic rocks.

215. Sedimentology. (2–3) II.  
Mr. Hay  
Prerequisite: course 103, a course in field geology, and consent of the instructor; for the laboratory, course 104A–104B.  
Discussion of problems in sedimentary petrogenesis. Laboratory study of sedimentary rocks. Content will vary from year to year.

216. Advanced Structural Geology. (2) I.  
Mr. Weiss  
Prerequisite: course 101, and consent of the instructor.  
Geometrical investigation of deformed rocks; use of stereographic and equal area projections in structural geology; study of folding, lineation and related topics. Lectures, laboratory periods and field trips.

217. Advanced Seismometry. (2) II.  
Mr. Byerly  
The general mathematical theory of the seismograph; discussion of the problems of modern seismometry and of recent results.

218A–218B. Seminar in Seismology. (2–2) Yr.  
Mr. Byerly  
Critical study of original literature relating to seismological problems. The content will vary from year to year.

*219. Seminar in General Geophysics. (2) II.  
Mr. Verhoogen  
A survey of the theory of the figure of the earth, its gravitational field, earth tides, isostasy, and internal constitution. The content will vary from year to year.

220. Research. (1–5) I and II.  
The Staff (Mr. Meyer in charge)

237A. Crystallography. (3) I.  
Mr. Pabst  
(Formerly Mineralogy 207A.)  
Three lecture periods per week. Prerequisite: consent of the instructor.  
Geometrical crystallography, including a discussion of space groups, Hermann-Mauguin symbols, the reciprocal lattice, the stereographic and gnomic projections, crystal morphology and twinning.

237B. X-Ray Crystallography. (3) II.  
Mr. Pabst  
(Formerly Mineralogy 207B.)  
Two lectures and one laboratory period per week. Prerequisite: course 237A or equivalent.  
Lattice geometry and identification of crystals by means of X-ray diffraction, with practice in the use of the powder, rotation, oscillation, Weissenberg, and precession methods.

298. Directed Studies. (2) I and II.  
The Staff (Mr. Verhoogen, Mr. Gilbert in charge)  
Selected readings in geology and geophysics.

GERMAN

(Department Office, 5319 Dwinelle Hall)

†Madison S. Beeler, Ph.D., Professor of German and Linguistics.
C. Grant Loomis, Ph.D., Professor of German (Chairman of the Department).
Philip Motley Palmer, Ph.D., Professor of German.
Heinz Politzer, Ph.D., Professor of German.
Clair Hayden Bell, Ph.D., Professor of German, Emeritus.
Edward V. Brewer, M.A., Professor of German, Emeritus.
Arthur G. Brodeur, Ph.D., Professor of Germanic Philology and English, Emeritus.
Lawrence M. Price, Ph.D., Professor of German, Emeritus.
Archer Taylor, Ph.D., Professor of German, Emeritus.
Erwin G. Gudde, Ph.D., Associate Professor of German, Emeritus.
Franz Schneider, Ph.D., Associate Professor of German, Emeritus.
Marianne Bonwit, Ph.D., Associate Professor of German.
Andrew O. Jászi, Ph.D., Associate Professor of German.
Karl S. Guthke, Dr.phil., Associate Professor of German.
* Joseph Mileck, Ph.D., Associate Professor of German.
Blake L. Spahr, Ph.D., Associate Professor of German.
Eugene K. Grotegut, Ph.D., Assistant Professor of German.
Frederic C. Tubach, Ph.D., Assistant Professor of German.
Hunter G. Hannum, Ph.D., Instructor in German.
Kathleen Harris, A.B., Acting Instructor in German.
Richard M. Scheirich, M.A., Acting Instructor in German.
Theodore G. Gish, M.A., Associate in German.
Edith Lewy Hecht, M.A., Associate in German.
Vasa Mihailovich, M.A., Associate in German.
Leslie L. Miller, M.A., Associate in German.

Letters and Science List.—All undergraduate courses in German are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Adviser: Miss Bonwit.

The Major.—Courses 1, 2, 3, 4, or their equivalents, completed satisfactorily. Twenty-four units in upper division courses, including one full year's course in composition and at least 6 units made up from 118A, 118B, 119A, 119B, 123A, 123B, 124, 135A, and 140. Six of the 24 units may be related work in other departments. Attention is also directed to the courses listed under "Foreign Literature in Translation," pages 198 and 199.

Honors.—To be recommended for honors at graduation, students must have completed with distinction the courses outlined for the major.

Higher Degrees.—See the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION.

GERMAN

German for Graduate Students. (No credit) I and II.
(Formerly numbered 1G and 2G.) Mr. Spahr in charge
First course (elementary), second course (intermediate).
Preparation for graduate reading examinations.

LOWER DIVISION COURSES

1. Elementary German. Beginners’ Course. (4) I and II.  Mr. Grotegut in charge
   In addition to regular sections, five sections in the fall semester, and two sections in the spring semester, meet five hours per week for students primarily interested in conversational German. Enrollment in these sections is limited to fifteen students.

12. Elementary German. Intensive Course. (8) I and II.  Mrs. Hecht
   Two hours daily, four times per week.
   This course is equivalent to course 1 and 2. Enrollment limited to twenty students.

2. Elementary German (continuation of 1). (4) I and II.  Mr. Grotegut in charge
   Prerequisite: course 1 or two years of high school German.
   In addition to regular sections, two sections in the fall semester, and four sections in the spring semester, meet five hours per week for students primarily interested in conversational German. Enrollment in these sections is limited to fifteen students.

3. Intermediate German. (4) I and II.  Mr. Tubach in charge
   Prerequisite: course 2 or three years of high school German.
   Two sections are for students primarily interested in conversational German. Enrollment in these sections is limited to fifteen students.

4. Intermediate German. (4) I and II.  Mr. Tubach in charge
   Prerequisite: course 3 or four years of high school German.
   One section is for students primarily interested in conversational German. Enrollment in this section is limited to fifteen students.

3S. Scientific German. (4) I and II.  Mr. Hannum in charge
   Prerequisite: course 2 or the equivalent. Open only to students in the colleges of Chemistry and Engineering, premedical and predental students, and students in the College of Letters and Science who are majoring or preparing for a major in one of the scientific departments.

4S. Scientific German. (3) II.  Mr. Hannum
   Prerequisite: course 3S or 3 or the equivalent.

39. Great Writers in German Literature.
   Any one of these courses is open to students in all departments of the University. No knowledge of German required.

39A. Medieval Period. (2) I, Mr. Spahr.
39B. Eighteenth Century. (2) I, Miss Bonwit.
39C. Nineteenth Century. (2) II, Mr. Loomis.
39D. Twentieth Century. (2) II, Mr. Politzer.

UPPER DIVISION COURSES

Prerequisite: 16 units of lower division German courses.

100A. Twentieth-Century German Drama. (3) I.  Mr. Hannum
100B. Twentieth-Century German Prose. (3) II.  Mr. Hannum
100A is not prerequisite to 100B.

104A. Nineteenth-Century German Prose. (3) I.  Miss Bonwit
104B. Nineteenth-Century German Drama. (3) II.  Mr. Jászi
104A is not prerequisite to 104B.
106. The Early Works of Goethe and Schiller. (3) I. Mr. Loomis

112A–112B. Survey of German Culture and Institutions. (2–2) Yr. Mr. Guthke
112A is not prerequisite to 112B.
Open to all upper division students who have a reading knowledge of German, and recommended for prospective teachers.

118A. History of German Literature in the Middle Ages. (3) I. Mr. Tubach
Prerequisite: 6 units from any of the above-listed upper division courses.

118B. History of German Literature from the Reformation to Lessing. (3) II. Mr. Spahr
Prerequisite: same as for course 118A. 118A is not prerequisite to 118B.

119A. German Literature in the Classical Period: with Emphasis on Goethe and Schiller. (3) I. Miss Bonwit
Prerequisite: same as for course 118A.

119B. German Literature from the Romantic Movement to 1900. (3) II. Miss Bonwit
(Formerly numbered 118C.) Prerequisite: same as for course 118A. 119A is not prerequisite to 119B.

*123A–123B. Introduction to German Poetic Forms and Theories from 1624 to 1885. (1–1) Yr. Mr. Loomis
Prerequisite: same as for course 118A. 123A is not prerequisite to 123B.
Study of metrics, figures of speech, and stanzaic patterns, including odes, songs, ballads, sonnets, epigrams, and the like.

*124. German Poetry of the Twentieth Century. (2) I. Mr. Jászi
Prerequisite: same as for course 118A.

130A–130B. Advanced Grammar and Composition. (3–3) Yr. Mr. Tubach, Mr. Palmer
Not open to native Germans except with consent of the instructor.

131A–131B. Composition and Style. (2–2) Yr. Mr. Guthke
Prerequisite: grade B or higher in course 130A–130B.

135A. Middle High German. (3) I. Mr. Spahr
Prerequisite: same as for course 118A. This course should be taken with or after course 118A.
Outlines of grammar; the Nibelungenlied and selected readings.

135B. Middle High German. (3) II. Mr. Spahr
Prerequisite: course 135A.
Readings in Middle High German literature.

*140. Introduction to Descriptive and Historical German Grammar. (3) II. Mr. Beeler
Prerequisite: same as for course 118A.
Designed for prospective teachers and those planning to take courses in linguistics.

199. Special Study for Advanced Undergraduates. (1–3) I and II. Miss Bonwit in charge

GRADUATE COURSES
(Concerning conditions for admission to graduate courses, see page 18.)
Prerequisite: an undergraduate major in German or its equivalent. For advanced study in German literature and linguistics a reading knowledge of French and of Latin is required, and a general acquaintance with German history strongly advised.

203. Studies in Middle High German Literature. (2) II. Mr. Spahr
Prerequisite: course 135A.

205. German Literature during the Renaissance and Reformation. (2) II. Mr. Loomis

206. German Literature during the Seventeenth Century. (2) I. Mr. Loomis

214. Lessing and His Time. (2) I. Mr. Guthke
220. Goethe to the Period of the Italian Journey. (2) II.
221. Goethe from the Period of the Italian Journey to His Death. (2) II.

228. Early German Romanticism: 1795–1810. (2) I. Mr. Politzer
229. Kleist, Büchner, Grabbe. (2) II. Mr. Guthke
231. Grillparzer and the Austrian Drama. (2) I. Mr. Politzer
238. German Realism, 1850–1900. (2) I. Miss Bonwit
239. Interpretation and Criticism of German Poetry. (2) I. Mr. Jászi

240. Twentieth-Century German Prose. (2) II. Mr. Mileck
Thomas Mann, Hermann Hesse, and Franz Kafka.

249. Seminar in German Literature. (2 or 3) I and II. The Staff (Mr. Palmer in charge)
I. Topic: Studies in Heine. (2) Mr. Politzer
II. (Sec. 1) Topic: Naturalism. (2) Mr. Guthke; (Sec. 2) Topic: Schiller’s Aesthetics. (2)

298. Special Study for Graduate Students. (1–4) I and I. Mr. Palmer in charge

German Linguistics

For the courses in English philology, see the Department of English, page 182.

260. Germanic Linguistics. (3) II. Mr. Beeler
Prerequisite: some acquaintance with at least two of the older Germanic languages.
Phonology, morphology, and lexicography of the Germanic languages; the relationship of the Germanic languages to one another; the reconstruction of Proto-Germanic; Proto-Germanic and Indo-European.

262. History of the German Language. (3) I. Mr. Palmer
Prerequisite: Grade B or higher in course 135A.

265. Gothic. (3) II. Mr. Beeler

275. Old High German. (3) II. Mr. Palmer

290. Seminar in Germanic Linguistics. (2 or 3) II. Mr. Palmer
Topic: Old Saxon (2).

Related Courses

The Symbolist Movement in European Literature (Comparative Literature 201A*–201B).

GREEK

For courses in the Greek language and literature, see under Department of Classics, page 89.

HISTORY

(Department Office, 3229 Dwinelle Hall)

Walton E. Bean, Ph.D., Professor of History.
Woodbridge Bingham, Ph.D., Professor of History.
Carl Bridenbaugh, Ph.D., Litt.D., Margaret Byrne Professor of History.
Delmer M. Brown, Ph.D., Professor of History (Chairman of the Department).
George H. Gutzridge, M.A., Sather Professor of History.
George P. Hammond, Ph.D., LL.D., Professor of History and Director of the Bancroft Library.
Lawrence A. Harper, J.D., Ph.D., Professor of American History.
James F. King, Ph.D., Professor of History.
*David S. Landes, Ph.D., Professor of History and Economics.
Joseph R. Levenson, Ph.D., Professor of History.
Bryce Lyon, Ph.D., Professor of History.
Henry F. May, Ph.D., Professor of History.
Hans W. Rosenberg, Ph.D., Shepard Professor of History.
Carl E. Schorske, Ph.D., Professor of History.
*Charles G. Sellers, Ph.D., Professor of History.
Engel Sluiter, Ph.D., Professor of History.
† Raymond J. Sontag, Ph.D., Litt.D., LL.D., Sidney Hellman Ehrman Professor of European History.
† Kenneth M. Stampp, Ph.D., A. F. and May T. Morrison Professor of History.
John D. Hicks, Ph.D., LL.D., A. F. and May T. Morrison Professor of History, Emeritus.
Lawrence Kinnaird, Ph.D., Professor of History, Emeritus.
Franklin C. Palm, Ph.D., Professor of Modern European History, Emeritus.
John J. Van Nostrand, Ph.D., LL.D., Professor of Ancient History, Emeritus.
PauL B. Schaeffer, Ph.D., Associate Professor of European History, Emeritus.
*Robert J. Brentano, D.Phil., Associate Professor of History.
William J. Bouwsma, Ph.D., Associate Professor of History.
A. Hunter Dupree, Ph.D., Associate Professor of History.
Richard Herr, Ph.D., Associate Professor of History.
*Charles Jelavich, Ph.D., Associate Professor of History.
Adrienne Koch, Ph.D., Associate Professor of History.
Thomas S. Kuhn, Ph.D., Associate Professor of the History of Science.
Martin E. Malia, Ph.D., Associate Professor of History.
Armin Rappaport, Ph.D., Associate Professor of History.
Nicholas V. Riasanovskiy, D.Phil., Associate Professor of History (Vice-Chairman of the Department).
*H. Franz Schurmann, Ph.D., Associate Professor of History and Associate Professor of Sociology and Social Institutions.
† Werner T. Angress, Ph.D., Assistant Professor of History.
*Gene A. Brucker, Ph.D., Assistant Professor of History.
Richard T. Drinnon, Ph.D., Assistant Professor of History.
Robert C. Padden, Ph.D., Assistant Professor of History.
James R. Seobie, Ph.D., Assistant Professor of History.

History

William G. Sinnigen, Ph.D., Assistant Professor of History.
Richard A. Webster, Ph.D., Assistant Professor of History.
George W. Stocking, Jr., Ph.D., Instructor in History.

Thomas G. Barnes, Ph.D., Lecturer in History.
Walter F. Cannon, Ph.D., Visiting Assistant Professor of History.
Carlo M. Cipolla, Laurea, Professor of Economics for the fall semester.
P. C. Gupta, Ph.D., Visiting Professor of History for the spring semester.
Cyril Mango, Ph.D., Lecturer in History for the spring semester.
Esther Morrison, Ph.D., Lecturer in History for the spring semester.
Jack R. Pole, Ph.D., Visiting Associate Professor of History.
Clark C. Spence, Ph.D., Lecturer in History.

Letters and Science List.—All undergraduate courses in history are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Sinnigen, Chairman; Mr. Bean, Mr. Barnes, Mr. Cannon, Mr. Drinnon, Miss Koch, Mr. Padden, Mr. Rappaport, Mr. Sluiter, Mr. Spence, Mr. Stocking, Mr. Webster.

The Major.—The major program in history shall total at least 36 units of history and include the following:

(a) By the end of the sophomore year: (1) History 4A-4B; (2) one of the following: History 8A-8B; 17A-17B; 33A-33B; or 19A-19B.

(b) In the junior and senior years: (1) a minimum of 10 units of upper division history in the field of concentration. (2) History 101; (3) a history proseminar (a C course); (4) a minimum of 6 units of upper division history outside the field of concentration; (5) a one-year course in American history (this may be fulfilled by a course taken to fulfill another requirement, e.g., 8A-8B, 17A-17B, 33A-33B).

Honors Work in the Lower Division.—The department offers at the freshman and sophomore level honors courses History H4B, H17A-H17B and 33A-33B, which are open, with consent of the instructor, to qualified students whether or not they intend to major in history.

Honors Program for History Majors.—Students who complete a major in history with distinction are eligible for recommendation for honors upon passing the comprehensive examination. Attention is directed to course 19B (3 units, one semester) and to the CIRCULAR OF INFORMATION, BERKELEY, concerning honors.

New Honors Program (effective for juniors in 1960–1961, and for seniors in 1961–1962). Students with an over-all grade-point average of 3.0 may apply to the departmental honors committee for admission as candidates for honors. Applications will normally be filed (on a form available at the departmental office) before registration for the junior year, though they will be considered at any time up to the beginning of the senior year.

The major program for honors candidates will consist of the following:

(a) By the end of the sophomore year: (1) History 4A-4B, or 4A-H4B; (2) one of the following: History 8A-8B, 17A-17B, H17A-H17B, 19A-19B, or 33A-33B.

(b) In the junior year, 12 units of upper division history courses, normally including two, and in special cases, more than two, proseminars (C courses; see under course listings, Group II, B, "Proseminars in History"); but honors candidates will not take History 101.
(c) In the senior year, History 198A-198B (6 units per semester), the second semester of which is devoted to preparing a senior thesis (see under course listings, Group II, D, "Honors Courses").

Students who complete this program with work of an honors grade will be recommended for honors at graduation; and those who complete the program with special distinction will be recommended for high honors or highest honors.

Teacher-Training Curriculum.—The curriculum for the Certificate of Completion (with a teaching major in social studies) differs from that of the undergraduate major in history. For further information concerning the teacher-training curriculum, see the Announcement of the School of Education, and consult the department's Social Studies Adviser, Mr. Harper.

Higher Degrees.—Students planning to work toward the degrees of M.A. and Ph.D., should consult the Announcement of the Graduate Division, Northern Section, and the Graduate Division bulletin entitled Announcement in the Social Sciences, and confer with the graduate adviser.

LOWER DIVISION COURSES

In courses 4A-4B, 8A-8B, 17A-17B, and 19A-19B weekly sections of no more than 20 students are organized to give supplementary instruction in historical geography, map work, bibliography, and methods of historical study.

4A-4B. History of Western Civilization. (3-3) Yr.
    Mr. Lyon, Mr. Bouwsma, Mr. Angress, Mr. Cannon

H4B. History of Western Europe from 1648. (3) II.
    Mr. Schorske
Prerequisite: consent of the instructor. Limited to ten students per section.
Reading, discussion, and reports, focusing on selected movements and epochs.

8A-8B. History of the Americas. (3-3) Yr.
    Mr. Sluiter
Survey of western hemisphere history since 1492.

17A-17B. History of the United States. (3-3) Yr.
    Mr. Dupree, Mr. Rappaport
Prerequisite: sophomore standing. A student may not receive credit for both courses 17A-17B and 171A-171B.

H17A-H17B. History of the United States. (3-3) Yr.
    Mr. Stampp
Prerequisite: sophomore standing and consent of the instructor. Limited to ten students per section.
Reading, discussion, and reports, focusing on selected movements and epochs. Offered in 1960-1961 and thereafter.

19A-19B. Introduction to the History of Asia. (3-3) Yr.
    Mr. Bingham
(Formerly numbered 190A-190B.)
19A. To 1600.
19B. Since 1600.
Survey of political and cultural history of major countries of Asia from ancient to modern times. Development of civilizations of China, India, Iran, Arabia, Turkey, Mongolia, Japan, Southeast Asia. Relations with western Europe, Russia, and America.

33A-33B. American Studies. (3-3) Yr.
    Miss Koch
Open to sophomores with consent of the instructor. Limited to fifteen students.
An honors course in the study of American culture. The class will study significant ideas and issues, drawing on material from history, literature,
political science, philosophy, and other fields. The course will emphasize dis­cussion and the writing of essays and will include occasional joint meetings with the staff and students of the two equivalent courses (English 33A–33B and Political Science 33A–33B).

**Upper Division Courses**

*Group I—Unrestricted Courses*

(Open to all students in the upper division; prerequisites as noted)

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**111A–111B. Ancient History. (3–3) Yr.**

111A. Greek history to the Roman conquest. II.
111B. Roman history to Justinian.

Mr. Sinnigen

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**Economic History of Europe. (Economics 112A–112B) (3–3) Yr.**

Mr. Cipolla, Mr. Landes

This course is acceptable as a course requirement for the history major.

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**115A–*115B. Byzantium. (3–3) Yr.**

115A. The Eastern Empire to 700. II.
115B. 700 to 1453.

Mr. Mango

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**121A–121B. Medieval History. (3–3) Yr.**

The emphasis is on Western Europe.
I. 500 to 1100.
II. 1100 to 1500.

Mr. Lyon

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**122. Medieval Culture. (3) II.**

Intellectual and social history of medieval Europe from St. Augustine to Dante with special emphasis on the Renaissance of the twelfth century.

Mr. Schaeffer

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**123. Medieval France. (3) II.**

History of France from the barbarian conquest of Roman Gaul to the end of the fifteenth century.

Mr. Schaeffer

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**125A–125B. Medieval Institutions. (3–3) Yr.**

Mr. Lyon

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**129. Medieval and Renaissance Italy. (3) I.**

Mr. Cipolla

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**130. Italian Culture in Transition, 1450 to 1650. (3) II.**

Prerequisite: consent of the instructor.

Mr. Brucker, Mr. Ferruolo

Prominent developments in Italian history, society, literature, music, and the visual arts will be studied in mutual context, in order to provide the broadest possible view of the transition from renaissance to baroque. Two lectures and one discussion hour. Given in conjunction with the departments of Art, Architecture and Music.

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**131A–131B. The Renaissance and Reformation. (3–3) Yr.**

Mr. Brucker

History of Western Europe from the fourteenth to the end of the sixteenth century.

Mr. Bouwsma

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§ To be given one semester only, 1960–1961.
134A–134B. Modern European Intellectual and Cultural History. (3–3) Yr.
Mr. Schorske
The history of European ideas since 1789 in their social and political setting. Attention will center on such topics as romanticism, idealism, conservatism, liberalism, socialism, and positivism.

135A. History of Russia to 1689. (3) II.
Mr. Riasanovsky
From the beginnings to 1689: Kievan and Moscovite Russia.

135B. History of Russia, 1689–1890. (3) I.
Mr. Malia
From 1689 to 1890: Peter the Great through the Great Reforms.

136. History of Russia since 1890. (3) II.
Mr. Malia
1890 to the present: The Russian revolutions and the Soviet regime.

*139A–139B. History of Southeastern Europe and the Near East.
(3–3) Yr.
Mr. Jelavich
Principally the history of the Ottoman Empire, Turkey, Albania, Bulgaria, Greece, Yugoslavia, and Rumania since the eighteenth century.

*140A–140B. The Habsburg Monarchy and the Succession States.
(2–2) Yr.
Mr. Jelavich
Principally the history of the Austrians, Magyars, Czechs, Slovaks, Poles, Rumanians, Croats, and Slovenes since the French Revolution. Emphasis will be on the formation and development of the national states and the cultural and intellectual problems of the area.

141. History of Modern France. (3) I.
Mr. Herr

142A–142B. History of Germany and Central Europe, 1350–1815. (3–3) Yr.
142A. 1350–1648. Mr. Rosenberg
142B. 1648–1815. Emphasis will be placed on social, institutional, and economic developments.

*143A–143B. Germany from 1815 to the Present. (3–3) Yr. Mr. Angress

144A*–144B. European Diplomatic History. (3–3) Yr. Mr. Sontag
International relations since 1815, studied in relation to economic, social, and cultural changes.

*145. The Revolutionary Era in Europe. (3) I.

*146. Europe since 1870. (3) II.

*147A–147B. Social History of Western Europe. (3–3) Yr. Mr. Landes
A comparison of British and French development, with special attention to the structure and values of the two societies, the shifting distribution of occupations and wealth, and the tensions consequent on rapid economic change.

148A–148B. History of Modern Italy. (3–3) Yr. Mr. Webster
B. 1870–1945. Italy under Liberal and Fascist Governments.

*150A–150B. Medieval England. (3–3) Yr. Mr. Brentano
150A. To 1066.
150B. 1066 to about 1500. Emphasis will be placed on constitutional and intellectual developments.

151A–151B. History of Modern England. (3–3) Yr. Mr. Guttridge
Prerequisite: an elementary knowledge of the history of Western Europe.
151A. 1500 to 1740.
151B. 1740 to the present.

152A–152B. Constitutional History of England. (3–3) Yr. Mr. Barnes

*155A–155B. The British Commonwealth and Empire. (3–3) Yr. ———
  Prerequisite: course 151B or the equivalent.
  155A. To 1870.
  155B. Since 1870.

159. Recent History of Great Britain, 1900 to the Present. (3) I. Mr. Cannon

160A–160B. History of Spain and Portugal. (3–3) Yr. Mr. Herr

161A–161B. Hispanic-American History. (3–3) Yr. Mr. King
  Spanish and Portuguese America from fifteenth-century beginnings to the present. Balanced attention given to the growth of the colonial empires, the rise of the modern nations, the amalgamation of cultures, and the development of institutions and ways of life.

*162. History of the Caribbean Area. (3) I. Mr. King
  Caribbean history from the eighteenth century to the present. The rise and decline of the sugar colonies and of slavery, revolution and independence, international relations, and evolving economic, social, and political patterns in colonies and free areas all receive attention.

163. History of Brazil. (3) I. Mr. Sluiter

164. History of Argentina. (2) I. Mr. Scobie
  Prerequisite: course 161B or permission of the instructor.
  Emphasis is on the political and economic development of the Argentine nation, 1800 to the present. Some attention is also given to colonial origins, cultural and social developments, and questions of international relations.

165A–165B. Modern Social History of Latin America. (3–3) Yr. Mr. Scobie
  Prerequisite: course 165A or permission of the instructor is prerequisite for 165B.
  165A. Social history of Mexico, Brazil and Argentina since 1880.
  165B. Problems of environment, race, culture, economics, politics and international affairs throughout Latin America.

*166A–166B. History of Mexico. (3–3) Yr. Mr. Padden
  166A. Colonial Period.
  166B. National Period.

*167A–167B. The Diplomatic History of the United States. (3–3) Yr. Mr. Rappaport
  167A. 1776–1880.
  167B. 1880 to the present.

*168. History of Inter-American Relations. (3) II. Mr. King
  History of the relations of the Hispanic-American nations among themselves and with the United States since independence. Emphasis will be placed on the Pan-American movement and the development of the Organization of American States.

169A–169B. Intellectual History of Spanish America. (3–3) Yr. Mr. Padden

170A. The American Colonies to 1763. (3) I. Mr. Bridenbaugh

170B. The American Revolution, 1763 to 1789. (3) II. Mr. Bridenbaugh
  Prerequisite: this course is open only to students who have taken History 170A, unless written permission is granted by the instructor.

171A-171B. History of the United States. (3-3) Yr. Mr. Harper
A student may not receive credit for both courses 17A-17B and 171A-171B.
171A. To the end of Reconstruction.
171B. From the end of Reconstruction to the present.

*172A-172B. Constitutional History of the United States. (2-2) Yr.
Prerequisite: course 17A-17B or consent of the instructor. Mr. Harper

*172C-172D. Constitutional History of the United States. (1-1) Yr.
Mr. Harper
An extra hour of class discussion to be taken only with History 172A-172B.

173A. The Era of Sectional Conflict, 1820-1865. (3) II. Mr. Stampp
A survey of the social and economic institutions of the old South, of the
forces which encouraged sectionalism, and of the Civil War.

*173B. Reconstruction and the New Nation, 1865 to 1900. (3) II.
(Formerly numbered 173C.) Mr. Stampp
A survey of the social and political aspects of Reconstruction, of the
Negro's problems in freedom, of the New South, and of the Age of Big
Business.

174A-174B. Recent History of the United States. (3-3) Yr. Mr. Drinnon
174A. 1900 to 1928.
174B. 1928 to the present.

175A-175B. Intellectual History of the United States. (3-3) Yr. Mr. May
The course is carried on primarily by the intensive study of selected source
materials. An elementary knowledge of the political history of the United
States is assumed.

*176A-176B. Social History of the United States. (3-3) Yr. Mr. Stocking
176A. 1763 to 1865.
176B. 1865 to the present.

177A-177B. History of the United States, 1787 to 1845. (3-3) Yr.
177A. The Constitution and the Early Union to 1815. Mr. Pole
177B. The Jacksonian Era.

*180A-180B. History of the American Political Tradition. (3-3) Yr.
Miss Koch
A study of the men whose ideas influenced the development of the American
political tradition. Among the major influences to be considered are Franklin,
Jefferson, John Adams, Hamilton, Lincoln, Thoreau, Holmes, Wilson, Franklin
D. Roosevelt, John Dewey.

187A-187B. The West in United States History. (2-2) Yr. Mr. Spence

*188. The Opening of the Pacific, 1513 to 1800. (3) II. Mr. Sluiter
A history of European penetration, occupation, rivalry, and influence in
the Pacific Area from the sixteenth through the eighteenth centuries.

189A-189B. History of California. (2-2) Yr. Mr. Bean
189A. Spanish and Mexican period.
189B. American period.

* Not to be given, 1960-1961.
History

191A–191B. Social History of Asia. (3–3) Yr. Mr. Schurmann
Prerequisite: consent of the instructor. Recommended: A background in European and Asian history and a reading knowledge of either Chinese, Japanese, French, or German.
History of social structure and forces of major East Asian societies.
191A. Social History of China.
191B. Social History of Japan.

§ 192. Modern Chinese Administrative History. (3) II. Miss Morrison
Prerequisite: some previous work in Chinese history.
The Chinese administrative system since its nineteenth-century contact with the West. Reading, discussion, and papers concerning bureaucratic institutions in their relationships to each other, and to other institutions such as the gentry, parliament, and political parties.

194A–194B. History of China. (3–3) Yr. Mr. Levenson
194A. History of China to the fall of the Ming Dynasty (seventeenth century).
194B. History of China since the fall of the Ming Dynasty. Emphasis will be placed on the interplay of political, economic, and cultural forces in "traditional" and "transitional" China.

195A–195B. History of Japan. (3–3) Yr. Mr. Brown
195B. Period of Western influence.

197A*–197B. The History of India. (3–3) Yr. Mr. Gupta

Group II—Restricted Courses
A. HISTORICAL METHOD COURSE

Designed primarily for students whose major subject is history.

101. Introduction to Historical Method and Bibliography. (3) I and II. Mr. Stocking
Prescribed for history majors in the junior year. The course centers around the writing of a paper based upon original research and discussions of limited historical fields and general historical problems, particularly through the consideration of selected major historians.

*Theory of Historical Inquiry (Philosophy 147). (3) I. Mr. Strong

B. PROSEMINARS IN HISTORY

Designed primarily to give majors in history elementary training in historical research. Emphasis will be placed on writing and discussion. Prerequisite: History 101; a one-year upper division course in the same area of history; and the permission of the instructor. Enrollment is limited to 15 students.

*101C. Problems in Historiography. (3) II. Mr. Brentano

111C. Problems in Ancient History. (3) II. Mr. Sinnigen
Readings, discussions, and reports in one of the following fields of ancient history: Hellenic, Hellenistic, Roman Republic, Principate, and Late Empire.

*121C. Problems in Medieval History. (3) II. Mr. Lyon

*125C. Problems in Medieval Institutions. (3) I. Mr. Lyon

§ To be offered one semester only, 1960–1961.
History

*132C. Problems in the History of Europe in the Seventeenth and Eighteenth Centuries. (3) I.
Mr. Bouwsma

*133C. The Rise of the Dutch Republic and Empire. (3) II.
Mr. Sluiter
Prerequisite: course 131B or 132A or consent of the instructor.
Economic, political, religious, and cultural history of the Netherlands from the Burgundian and Habsburg periods through the Dutch Revolt and the Golden Age of the Republic, including overseas expansion and the establishment of the Dutch Empire.

134C. Problems in Modern European History. (3) II.
Mr. Angress

136C–136D. Russian Intellectual History. (3–3) Yr.
Mr. Malia, Mr. Riasanovsky
A one-year proseminar course in social and political thought of the revolutionary movement, with some attention also to literature and philosophy: eighteenth century to 1917. Open to qualified graduates and undergraduates. Limited to thirty students.

*139C. Problems in the History of Southeastern Europe and the Near East. (3)
II.
Mr. Jelavich

*141C. Problems in the History of Modern France. (3) II.
Mr. Mellon

*143C. Problems in German History. (3) I.
Mr. Angress
Prerequisite: consent of the instructor.
Students will examine selected topics of German history. Emphasis will be on discussion based on individual reading and interpretative essays.

*145C. Problems in the Revolutionary Era in Europe. (3) I.
Mr. Mellon

*151C. Burke and His Age. 1750 to 1800. (3) II.
Mr. Guttridge
(Formerly numbered 157.)
Prerequisite: consent of the instructor.

§151D. Problems in Nineteenth-Century English Intellectual History. (3)
I.
Mr. Cannon

152C. Problems in English Constitutional History. (3) II.
Mr. Barnes

*155C. History of Canada. (3) I.
(Formerly numbered 156.)
Prerequisite: consent of the instructor.
History of Canada from the early European settlements to its present status as a member nation of the Commonwealth. Emphasis will be placed both on internal developments and on the imperial connection with Great Britain.

159C. Problems in Recent British History. (3) II.

*160C. Problems in the History of Spain. (3) I.
Mr. Herr

*161C. Recent Hispanic American History. (3) I.
Mr. King
Prerequisite: consent of the instructor.
Problems in Hispanic American history since 1889.

165C. Problems in the Social History of Latin America. (3) II.
Mr. Scobie

‡ To be offered one semester only, 1960–1961.
*166C. Problems in the History of Mexico. (3) I and II. Mr. Padden
167C. Problems in United States Diplomatic History. (3) I and II.
Reading, discussion, and the writing of critical essays on selected topics.
Mr. Rappaport
170C. Problems in American Colonial History. (3) I. Mr. Harper
Studies in original sources on the period 1730 to 1789.

*173C. Problems in the Era of Sectional Conflict. (3) I and II.
Mr. Stampp
174C. Problems in the Recent History of the United States. (3) I and II.
Mr. Drinnon

*175C. Problems in American Intellectual History. (3) I. Mr. May
Prerequisite: consent of the instructor and some previous work in American intellectual history.
Intensive examination of a selected area of American intellectual history. Historical essays and research papers will be the main work of the course.

176C. Problems in American Social History. (3) II. Mr. Stocking
177C. Problems in the Early National Period of United States History.
(3) II.

*178C. Problems in the History of Science and Technology in American Society. (3) II.
Mr. Dupree

*189C. Problems in the History of California and the West. (3) I.

190C. Historical Problems in Asian Interrelationships. (3) I and II.
Instruction on seminar methods on assigned topics. Mr. Bingham
Prerequisite: consent of the instructor.
I. Special emphasis on problems concerning Southeast Asia between 1500 and 1900.
II. Special emphasis on problems concerning China between 1500 and 1900.

194C. Problems in the Intellectual History of Modern China. (3) II.
Mr. Levenson
Traditionalism and iconoclasm in China since its sixteenth-century contact with the West. Attention will be focused on the distinction between the study of the intellectual history and the study of abstract ideas, and on the connection between intellectual change and social change. Analysis will be made of the links between formal philosophy, canons of esthetic taste, and popular points of view.

*195C. Problems in Japanese Intellectual History. (3) II. Mr. Brown
Individual studies in Japanese intellectual problems of the last one hundred years.

G. TEACHING COLLOQUIUM

171L. Proseminar in United States History. (3) II. Mr. Harper
An analysis of concepts and theories concerning factors underlying United States history. Admission only with consent of the instructor. Recommended for teachers or prospective teachers.

D. HONORS COURSE

198. Individual Conferences and Assigned Reading. (3) I and II. Mr. Shaeffer

Limited to senior honors candidates in history, in their final semester before graduation. Intended as preparation for the comprehensive examination to be taken prior to graduation.

Not to be offered after 1960-1961.

*H198A–H198B. Senior Honors Colloquium. (6-6) Yr.

Limited to senior honors candidates in history, with no more than ten students per section.

In the fall semester, intensive reading, discussion, and reports on a theme relating several fields of historical inquiry. Subjects vary from section to section and year to year. The spring semester will be devoted to preparing a senior thesis.

Offered in 1961-1962 and thereafter.

E. SPECIAL INDIVIDUAL STUDY

Open to those history majors, with at least a B average in all courses, including history, who wish to undertake special advanced study. Consent of the instructor required.

199. Special Study for Advanced Students. (1-4) I and II. The Staff

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

Group I—Bibliography and Historiography Courses

201. Advanced Studies in the Sources and General Literature of the Several Fields of History. (3) I and II. The Staff

I. American History, Mr. Bean, Mr. Drinnon, Miss Koch, Mr. Pole, Mr. Rappaport, Mr. Spence, Mr. Stampp, Mr. Stocking. European History, Mr. Angress, Mr. Barnes, Mr. Guttridge, Mr. Kuhn, Mr. Malia, Mr. Schaeffer, Mr. Rosenberg, Mr. Sinnigen, Mr. Sontag, Mr. Webster. Latin American History, Mr. King, Mr. Padden. Chinese History, Mr. Bingham. Japanese History, Mr. Brown.

II. American History, Mr. Bridenbaugh, Mr. Harper, Mr. Stocking. European History, Mr. Cannon, Mr. Herr, Mr. Lyon, Mr. Rosenberg. Latin-American History, Mr. Scobie, Mr. Sluiter. Chinese History, Mr. Levenson (Elementary knowledge of Chinese required).

202. Historical Method and Bibliography. (3) I and II. Mr. Schorske; II: Mr. Sontag. Mr. Schorske, Mr. Sontag

Designed especially for candidates for higher degrees in history. Stress is laid on practical exercises.

*Seminar in Theories of History (Philosophy 247). (3) II. Mr. Strong

Group II—Research Seminars

211A*–211B. Seminar in Ancient History. (3-3) Yr. Mr. Sinnigen

In 1960-1961 topics and research in the Age of Augustus.

A reading knowledge of French or German, and Latin or Greek is required.

*220. Historical Auxiliaries to Medieval Studies. (3) I. Mr. Brentano
   (Formerly numbered 205.)
   Emphasis upon diplomatic and practical paleography.

221A*-221B. Seminar in Medieval History. (3-3) Yr. Mr. Lyon

*225A-225B. Seminar in Medieval English History. (3-3) Yr.
   Mr. Brentano

*231A-231B. Seminar in the Renaissance and Reformation. (3-3) Yr.
   Mr. Brucker

232A*-232B. Seminar in European History in the Seventeenth and
   Eighteenth Centuries. (3-3) Yr.
   Mr. Bouwsma

234A*-234B. Seminar in European Intellectual History. (3-3) Yr.
   Mr. Schorske

235A-*235B. Seminar in Russian History. (3-3) Yr. Mr. Riasanovsky
   While meant to cover a broad field and serve various interests, the seminar
   centers on Russian thought and politics in the nineteenth century.

236. Seminar in Modern Russian History. (3) II. Mr. Malia

*239A–239B. Seminar in Central and Southeastern Europe. (3-3) Yr.
   Mr. Jelavich

242A–242B. Seminar in Germany and Central Europe, 1350–1815. (3-3) Yr.
   Mr. Rosenberg

*241A–241B. Seminar in Modern French History. (3-3) Yr.

243A*-243B. Seminar in Modern German History. (3-3) Yr. Mr. Angress

244A*-244B. Seminar in European Diplomatic History. (3-3) Yr.
   Mr. Sontag

248. Seminar in Modern Italian History. (3) II. Mr. Webster

251A–251B. Seminar in English History. (3-3) Yr.
   Mr. Guttridge
   Reading and research in selected topics, 1660 to 1832.

*255A–255B. Seminar in the History of the British Empire and
   Commonwealth. (3-3) Yr.

260A–260B. Seminar in the History of Spain. (3-3) Yr. Mr. Herr
   Prerequisite: course 160A–160B, a reading knowledge of Spanish, and
   French or German.

261A*-261B. Seminar in Hispanic-American History. (3-3) Yr.
   Mr. King

263. Seminar in Hispanic-American History: Colonial Period and Brazil.
   (3) I.
   Mr. Sluiter

265. Seminar in Modern Social History of Latin America. (3) I.
   Mr. Scobie

266A*-266B. Seminar in Mexican History. (3-3) Yr.
   Mr. Padden

267A*-267B. Seminar in the Diplomatic History of the United States.
   (3-3) Yr.
   Mr. Rappaport
   Prerequisite: course 167A–167B.

270A–270B. Seminar in American Colonial History. (3-3) Yr.
   Mr. Bridenbaugh

* Not to be given, 1960-1961.
History

271A*-271B. Seminar in the History of the American West. (3-3) Yr.
   Mr. Spence

272A*-272B. Seminar in Economic and Legal History of the U.S. (3-3) Yr.
   Mr. Harper

273A*-273B. Seminar in the History of the Old South, the Civil War, the
   Reconstruction. (3-3) Yr.
   Mr. Stampp

274A*-274B. Seminar in the Recent History of the United States. (3-3) Yr.
   Mr. Drinnon

275A*-275B. Seminar in the Intellectual History of the United States.
   (3-3) Yr.
   Mr. May
   Recommended: History 175A-175B or the equivalent.

*276A-276B. Seminar in American Social History, 1700 to 1900. (3-3) Yr.
   Mr. Stocking

277A*-277B. Seminar in the Early National Period of United States
   History. (3-3) Yr.
   Miss Koch

278A*-278B. Seminar in the History of Science and Technology in
   America. (3-3) Yr.
   Mr. Dupree

281A-281B. Seminar in North American History. (3-3) Yr. Mr. Hammond

*282A-282B. Spanish Borderlands. (3-3) Yr.
   Mr. Hammond
   Prerequisite: graduate standing and consent of the instructor.
   Includes the northern area of Mexico as well as those parts of the United
   States influenced by Spanish culture.

290A-290B. Seminar in the History of Asia. (3-3) Yr.
   Mr. Bingham

*291A-291B. Seminar in the Social History of Asia. (3-3) Yr.
   Mr. Schurmann

*294A-294B. Seminar in the History of Modern China. (3-3) Yr.
   Mr. Levenson

295A*-295B. Seminar in Japanese History. (3-3) Yr.
   Mr. Brown

297A*-297B. Seminar in the History of India. (3-3) Yr.
   Mr. Gupta

Advanced Study in Economic History (Economics 210A-*210B). (3-3) Yr.
   Mr. Cipolla

Topics in Economic History (Economics 212A-212B). (3-3) Yr.
   This is a lecture course.
   Mr. Cipolla, Mr. Rosovsky

Group III—Individual Research and Study

298. Directed Research. (1-6) I and II.
   The Staff

299. Independent Study. (3-6) I and II.
   Graduate Advisers
   Individual study, in consultation with the graduate adviser, intended to
   provide opportunity for M.A. and Ph.D. candidates to bring together their
   work in a particular field during the semester immediately prior to the ex-
  aminations. 1960-1961: I and II. Mr. Dupree, Mr. Herr, Mr. King, Mr. Lev-
   enson, Mr. Lyon, Mr. May.

* Not to be given, 1960-1961.
History of Science

All the courses in this section are acceptable for major credit in history and most of them are acceptable for major credit in philosophy as well. (For details see the cross-listings in the philosophy section of this bulletin.) Students interested in graduate programs in the history of science should consult Mr. Kuhn or Mr. Dupree.

Upper Division Courses

105A-105B. History of Scientific Thought and Technique. (3–3) Yr.
105A. Antiquity to Newton. Mr. Kuhn
105B. Newton to the present.
A survey of the main stages in the development of the principal physical and biological sciences. The relations of science to social need and to technological development provide subsidiary themes.

127A*-127B. Topics in the History of Physical Science. (3–3) Yr.
(Formerly Philosophy 127A-127B.) Mr. Kuhn
Prerequisite: high school or college physics will normally be prerequisite to 127A and college physics is required for 127B.
127A. Scientific Cosmology: Aristotle to Newton.
127B. Matter and Energy: Dalton to Einstein.
Intensive study, using primary sources where possible, of a closely related series of episodes in the development of scientific thought.

*178A—178B. History of Science and Technology in American Society. (3–3) Yr. Mr. Dupree
A survey of the role of science and technology as a force in American life, emphasizing the development of scientific ideas and institutions.
178A. Colonial times to 1865.
178B. 1865 to the present.

Graduate Courses

201. Advanced Studies in the Sources and General Literature of the History of Science. (3) I. Mr. Kuhn
205. Seminar in the History of Science. (3) II. Mr. Kuhn
(Formerly numbered 204.)

208A*—208B. Seminar in the History of Science and Technology in America. (3–3) Yr.

Italian

(Department Office, 4226 Dwinelle Hall)

Michele De Filippis, Ph.D., Professor of Italian, Emeritus.
Arnolfo B. Ferruolo, Dottore in Lettere, Professor of Italian (Chairman of the Department).
Aldo D. Scaglione, Dottore in Lettere, Associate Professor of Italian.
Nicholas J. Perella, Ph.D., Assistant Professor of Italian.
John A. Scott, M.A., Assistant Professor of Italian.
Remo Ceserani, Dottore in Lettere, Acting Assistant Professor of Italian.
Franco Fido, Dottore in Lettere, Instructor in Italian.
Cecilia Ross, Ph.D., Associate in Italian.

Letters and Science List.—All undergraduate courses in Italian are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Scott (I), Mr. Perella (II).

The Major.—16 units of lower division courses: Italian 1, 2, 3, 4, or their equivalents. 24 units of upper division courses in the department: 101A–101B, 103A–103B, 109A–109B, and at least 6 more units of upper division courses.

The department recommends a supplementary choice of appropriate courses in the following departments: Art, Classics, English, French, German, History, Music, Philosophy, Spanish and Portuguese. A reading knowledge of Latin is also recommended.

Honors.—In addition to satisfying with distinction the requirements for the major, candidates for honors must take course H 195 in the two semesters of their senior year and pass a comprehensive examination.

1. Elementary Italian. (4) I and II.
   Mr. Ferruolo (in charge)
   Five meetings per week.

2. Elementary Italian (continuation of 1). (4) I and II.
   Mr. Ferruolo (in charge)
   Five meetings per week. Prerequisite: course 1 or the equivalent.

3. Intermediate Italian. (4) I and II.
   Mr. Fido (in charge)
   Five meetings per week. Some sections emphasize reading, others conversation. Prerequisite: course 2 or the equivalent.

4. Intermediate Italian (continuation of 3). (4) I and II.
   Mrs. Ross
   Five meetings per week. Prerequisite: course 3 or the equivalent.

39. Italian Literature in English Translation.
   A survey of the most important works in Italian literature from the origins to the present, with lectures in English and readings of representative works in translation.

39A. From the Middle Ages to the End of the Renaissance. (3) I and II.
   Mr. Ceserani, Mr. Scott

39B. From the End of the Renaissance to the Present. (3) I and II.
   Mr. Scaglione, Mr. Perella

   Beginning each semester.
   Mr. Fido

103A–103B. A Survey of Italian Literature. (3–3) Yr.
   Mr. Scott
   A study of representative authors and works, with a consideration of the more important aspects of Italian literary history in their philosophical and historical background.

   Mr. Scaglione

110A–110B. Italian Literature of the Fourteenth Century. (3–3) Yr.
   Mr. Ceserani
   A study of the literature of the Trecento, with special emphasis on Dante's minor works, Petrarch's poetry, and Boccaccio's *Decameron*.

112A–112B. Italian Literature of the Renaissance. (3–3) Yr.
   Mr. Ferruolo
   A study of the main trends in the literature of the fifteenth and sixteenth centuries. Authors to be discussed will include Lorenzo De'Medici, Poliziano, Castiglione, Leonardo, Machiavelli, Ariosto, and Tasso.
Italian Literature of the Eighteenth Century. (3) I. Mr. Fido
A study of the literature of this century, with special emphasis on the works of Vico, Goldoni, Parini, and Alfieri.

*115A-115B. Italian Literature of the Nineteenth Century. (3-3) Yr. Mr. Perella
A study of the prose and poetry of this period; in particular, the works of Foscolo, Leopardi, Manzoni, Carducci, Pascoli, and Verga.

116. Italian Literature of the Twentieth Century. (3) II. Mr. Fido
A study of the main trends in poetry, drama, and the novel, from Pirandello to the present.

H195. Special Study for Honors Candidates. (1-3) I and II. The Staff

199. Special Study for Advanced Undergraduates. (1-3) I and II. Mr. Ferruolo, Mr. Scaglione
This course is specifically designed for students who wish individually to pursue a program of reading and study not covered by any other course. The number of units of credit is determined by the instructor.

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 18)

*201. Historical Grammar. (2) I. Mr. Ceserani

202. Early Italian Texts. (2) I. Mr. Ceserani

203. Methods of Literary Study and Stylistic Analysis. (2) II. Mr. Fido

*204. Italian Literary Criticism. (2) II. Mr. Scott

*209. Studies in the Divina Commedia. (2) II. Mr. Scaglione

211. Seminar on Petrarch. (2) I. Mr. Ferruolo
A study of the fundamental aspects of Petrarch’s work, in relation to the rise and development of Humanism.

*213. Boccaccio and the Novella. (2) I. Mr. Scaglione
A study of the various types of the Italian novella, from Boccaccio to Bandello. The evolution of the genre and its forms.

215. Chivalric Poetry in Italy. (2) II. Mr. Scaglione
The relationship between the genre and its French medieval sources, with a study of its evolution in Italy, through Pulci, Boiardo, and Ariosto.

217. Studies in the Renaissance. (2) II. Mr. Ferruolo

*218. Seminar on the Baroque. (2) I. Mr. Perella
A study of Baroque literature in Italy, with emphasis on the pastoral drama, Marino, and the Marinisti.

221. Romanticism in Italy. (2) I. Mr. Fido
A study of the Romantic movement in Italy in its relationship to European Romanticism, with emphasis on Foscolo, Leopardi, and Manzoni.

* Not to be given, 1960-1961.
Italian; Journalism

299. Special Study for Graduate Students. (1–4) I and II.

Mr. Ferruolo, Mr. Scaglione

This course is specifically designed for students who wish individually to pursue a special program of study and research not covered by any other course or seminar. The number of units of credit is determined by the instructor.

Italian for Graduate Students. (No credit) I.

(Formerly numbered 1G.)

Mr. Scott

First course.

RELATED COURSES

The Literature of the Renaissance in Western Europe (Comparative Literature *151A–151B).

Humanistic Literature in Latin (Romance Philology 204).

Italian Culture in Transition, 1450–1650 (History *130).

JOURNALISM

(Department Office, 5205 Dwinelle Hall)

*Robert W. Desmond, Ph.D., Professor of Journalism.
Charles M. Hulten, M.A., Professor of Journalism (Chairman of the Department).

Philip F. Griffin, M.A., Associate Professor of Journalism.

Albert G. Pickerell, Ph.D., Associate Professor of Journalism.

Walter Gieber, Ph.D., Assistant Professor of Journalism.

Jean S. Kerrick, Ph.D., Assistant Professor of Journalism.

Galen R. Rarick, M.A., Acting Assistant Professor of Journalism.

Allan Temko, A.B., Lecturer in Journalism.

Letters and Science List.—All courses except 131, 152, and 181 series. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Desmond, (spring semester); Mr. Griffin, Mr. Gieber, Miss Kerrick, Mr. Rarick.

The Major.—(1) English 1A–1B or Speech 1A–1B; (2) one year course selected from Economics 1A–1B, History 4A–4B, 17A–17B, Political Science 1 and 2; (3) one semester course selected from Anthropology 2A, Psychology 1A, Sociology and Social Institutions 1; and (4) Journalism 21. Recommended: Students are urged to elect other lower division courses that will best prepare them for upper division study in fields of their interest other than journalism. The faculty of the department will be happy to consult with students regarding these choices. The major includes 24 units in upper division courses in the department. The candidate must submit his program to a departmental adviser for approval.

Courses in journalism must include 131A, 131B, either 140 or 141, and one of the courses in the 181 series. Unless special departmental approval is obtained, only one part of 181 may be offered in completion of the requirements for the major.

Honors Program.—A candidate for honors with the bachelor's degree will elect, in each semester of the senior year, Journalism H198, (2–4 units). These units will be included in the units required for the major. Journalism H198 will consist of an approved program of independent study. The candidate will present an acceptable term paper in some area of journalism.

Higher Degree.—Students interested in graduate study in journalism are invited to consult the Dean of the Graduate Division or the Graduate Adviser for the department.


2 In residence spring semester only, 1960–1961.
LOWER DIVISION COURSE

21. Elementary News Writing. (3) I and II.
   Mr. Griffin, Miss Kerrick, Mr. Rarick
   Prerequisite: English 1A–1B or Speech 1A–1B.
   Journalistic writing, including its evolutionary development, its social
   and its compositional problems.

UPPER DIVISION COURSES

121. The Reporter and the News. (3) II.
   Mr. Griffin
   Prerequisite: English 1A–1B, or Speech 1A–1B, and course 21 or consent
   of the instructor. Not open for credit to students who have received credit
   for courses 120A or 120B.
   The reporter's functions and responsibilities as a communicator in all
   media; interrogation and evaluation of data.

   Mr. Gieber
   Lecture and laboratory. Prerequisite: course 21 or the equivalent. Prescribed
   in the junior year for journalism majors. 131A is not prerequisite
   to 131B.
   131A: Laboratory study of news presentation, including reporting and
   editing.
   131B: Organization and administration of news functions. A field study
   of a community and its news outlet is required.

140. History of Journalism. (3) I.
   Mr. Gieber
   Study of the development of journalism, particularly in the United
   States, with an introduction to the important papers and personalities.

141. The Press and Society. (3) II.
   Mr. Hulten
   An examination of the press as an important institution in the nation and
   in the world.

145. Great Figures in Journalism. (2) II.
   Mr. Desmond
   The careers of persons who have played roles in the evolution of the press
   in the United States and other countries.

147. Analytical Studies in Journalism. (3) I.
   Miss Kerrick
   Prerequisite: consent of the instructor.
   A study of recent reports of quantitative research relating to journalism,
   with special attention to methods developed. A semester report demonstrating
   familiarity with the purpose and method of such research will be required.

151. Literature of the Press. (3) I.
   Mr. Griffin
   A survey of significant writing in the American and British press, from
   Stephen Crane to Rebecca West, George Orwell, and John Hersey. Journalism
   as an innovative force in the emergence of literary forms and styles.

152. Magazine Article Writing. (3) II.
   Mr. Temko
   Prerequisite: upper division standing and consent of the instructor.
   Writing for magazines, specialized publications, and newspaper feature
   sections. Magazine publishing practices as they affect the professional
   writer.

165. The Press, the Law and the Constitution. (3) I.
   Mr. Picklerell
   Introduction to historical development of freedom of press and speech;
   development of rights to publish news and comment, restrictions to rights
   affected by controls over defamation, licensing and taxation, access to infor-
   mation, and the doctrine of privacy.
181. Senior Course in Journalistic Problems. Mr. Pickerell, Mr. Earick
Prerequisite: course 131 or, for 181J, consent of the instructor. Restricted to majors with senior standing, except that certain nonmajors may be admitted to 181J with the consent of the instructor. Unless departmental approval is given, only one part of 181 may be taken in satisfaction of the major.

181I. Radio Journalism. (3) II.
(Formerly numbered 180.)
Two hours of lecture and one two-hour laboratory per week.

Mr. Rarick

181J. Newspaper Advertising. (3) I.
(Formerly numbered 171.)
Two hours of lecture and one two-hour laboratory per week.

Mr. Rarick

*181K. Problems of Publishing. (3) II.
(Formerly numbered 170.)
Two hours of lecture and one two-hour laboratory per week.

Mr. Pickerell

181L. Reporting of Public Affairs. (3) II.
(Formerly numbered 184.)
Two hours of lecture and one two-hour laboratory per week.

Mr. Pickerell

190A*–190B. Press and World Affairs: Comparative World Journalism.
(3–3) Yr.

190B: Comparative World Journalism.
Comparative study of press systems, especially those in Europe with those in the Western Hemisphere.

Mr. Desmond

190B is not prerequisite to 190A.

195. Critical Reviewing for the Press. (3) I.
Prerequisite: senior standing and consent of the instructor.
Theory and technique of reviewing current literature, drama, film, and the arts. The reviewer's function in sustaining standards of artistic excellence, guiding popular taste, and providing constructive criticism for working artists. Practice in writing reviews.

Mr. Temko

196. Theories and Problems in the Conduct of International Information Programs. (3) I.
Prerequisite: senior or graduate standing and consent of the instructor.
A study of governmental efforts at international persuasion; problems of message content, and propaganda directed at the peoples of the world by various countries.

Mr. Hulten

H198. Senior Honors Program. (2-4) I and II.
The Staff
Prerequisite: senior standing, a grade-point average of not less than 3, and consent of committee in charge.
A program of special inquiry into journalistic studies to be completed in part by presentation of written paper and an oral report. Students must submit a prospectus of their study before admission to course.

* Not to be given, 1960-1961
199. Special Study for Advanced Students. (1–4) I and II. Mr. Griffin  
Prerequisite: for students whose major is journalism, at least a B average in all journalism courses undertaken or consent of the instructor; for others, at least a B average in all courses undertaken and consent of the instructor.

GRADUATE COURSES

Prerequisite: courses 121 or 131 and 140. Admission to all graduate courses is at the discretion of the instructor. See also page 18.

201. Research Methods in Journalism. (2) I. Miss Kerrick
Required of all candidates for the Master of Journalism degree.
Materials and techniques of journalistic research. Study of bibliographical method, historical and sociological investigation, quantitative and qualitative analysis.

220. The Newspaper and Public Affairs. (2) I. Mr. Griffin
A seminar requiring investigation in the theory and practice of the newspaper press in reporting public affairs, and in the interrelationships between public agencies and the press. With field work.

231. The Newspaper and Its Audience. (2) II. Miss Kerrick
A seminar in the development and performance of the newspaper press, with special reference to audience problems. With reports from students.

240. Seminar in History of Journalism. (2) II. Mr. Gieber

251. Literature of the Press. (2) II. Mr. Griffin
Study of journalistic writings, principally contemporary, having characteristics common to certain literary forms.

263. Public Opinion, Propaganda, and the Mass Media. (2) I. Mr. Rarick
Critical analysis of the place of the press, radio, films, and television in shaping the public mind; effects on public opinion of practices in these media; propaganda and information techniques of governments, political parties, pressure groups, and other organized bodies.

265. The Law of Communications. (2) II. Mr. Pickerell
A seminar inquiring into contemporary legal controls affecting the press, radio and films, with special attention to issues of press freedom, contempt of court, the law of libel, and privilege. Case studies.

270. Economic Organization of the Press. (2) II. Mr. Rarick
A seminar analyzing the business practices and financial structure of the newspaper press and its relationship to the community in which it operates. Case studies.

290. Seminar in Comparative World Journalism. (2) II. Mr. Desmond

296. Seminar in International Persuasion. (2) II. Mr. Hulten
Prerequisite: course 196 or consent of instructor.
Advanced study of use of communication in international relations; examination of propaganda campaigns and techniques; problems of administrative organization and policy direction and control.

298. Group Study in Journalism. (2) I and II. Mr. Hulten
Group study in journalistic problems.

299. Special Research Projects and Field Study in Communications. (1–4) I and II. Mr. Hulten
May be taken both semesters.
Individual investigation of a selected topic, conducted under guidance of a member of the faculty.
RELATED COURSES IN OTHER DEPARTMENTS

Field Work in Legislative Process (Political Science 400A-400B).
Introduction to Social Science (Social Science 1A-1B).

LANDSCAPE ARCHITECTURE

(Department Office, 101 Agriculture Hall)

H. Leland Vaughan, B.L.A., Professor of Landscape Architecture (Chairman of the Department).
Francis J. Violich, B.S., Professor of City Planning and Landscape Architecture.
John W. Gregg, B.S., D.L.A., Professor of Landscape Architecture, Emeritus.
Harry W. Shepherd, B.S., Professor of Landscape Architecture, Emeritus.
R. Burton Litton, Jr., M.L.A., Associate Professor of Landscape Architecture.
Robert J. Tetlow, M.S., Associate Professor of Landscape Architecture.
May K. Arbogast, M.S., Assistant Professor of Landscape Architecture.
Robert T. Buchanan, M.L.A., Assistant Professor of Landscape Architecture.
David B. Chase, M.L.A., Assistant Professor of Landscape Architecture.

Geraldine K. Scott, B.S., Lecturer in Landscape Architecture.

Departmental Major Advisers: Mr. Litton, Mr. Vaughan.

Preparation for the Major.—For courses required in preparation for the major, see page 107 of the Circular of Information. For further information, consult the Bulletin of the College of Environmental Design.

The Major.—Required: Landscape Architecture 49 and a minimum of 35 units in landscape architecture, selected with the approval of the major adviser, including courses 1, 2, 20, 111A, 111B, 120, 130, 131, 132A, and 132B. The department will certify to the completion of a major program for graduation only on the basis of at least a grade average of C for all courses taken in landscape architecture. Students who do not maintain such an average may be required to withdraw from the major in landscape architecture.

LOWER DIVISION COURSES

1. Theory and Elementary Design. (4) I and II. Mr. Chase, ———
Lecture and laboratory. Prerequisite: Architecture 1N or equivalent.
Theory and principles of landscape architecture; elementary problems in analysis and design.

2. History and Literature of Landscape Architecture. (2) I. Mr. Litton
Limited to major students in landscape architecture.
Study and analysis of landscape design through the ages, with emphasis on its relation to climate, topography, and society in various times and localities.

11. Delineation. (1) I and II. Mr. Buchanan
Laboratory. Limited to major students in landscape architecture or in city and regional planning.

1 In residence fall semester only, 1960–1961.
2 In residence spring semester only, 1960–1961.
Study of the methods of graphic communication in landscape architecture. May be repeated once for credit.

20. Introduction to Plant Materials and Planting Design. (3) II.
   (Formerly numbered 113A.) Mrs. Arbegast
   Lecture, laboratory, and field trips. Prerequisite: general botany.
   Identification of common trees and shrubs; study of form, color, texture and other characteristics essential to understanding the use of plants in design.

49. Summer Travel and Observation Course. (No credit.)
   The Staff (Mr. Tetlow in charge)
   Limited to major students in landscape architecture.
   Six weeks of field trips, study, and analysis of outstanding works in site planning and landscape design throughout central California.

UPPER DIVISION COURSES

Architecture 1N and 2N, Art 2A, Botany 1, Engineering 21, Landscape Architecture 1, 2, 20, or their equivalents, are prerequisite to all upper division courses in landscape architecture for majors in landscape architecture.

100. Survey of Landscape Architecture. (3) I and II.
   Mr. Chase, ———, ———
   Lecture and laboratory. Prerequisite: advanced standing in architecture, decorative art or city and regional planning. Not open to majors in landscape architecture.
   An introduction to the history, theory, and materials of landscape architecture; contemporary application and practice.

111A-111B. Landscape Construction. (3-3) Yr.
   Lectures and laboratory. Mr. Buchanan, Mr. Litton
   Problems of design and construction; calculations and graphic solutions to problems involving grading and surfacing; simple structures; irrigation and drainage.

120. Plant Materials and Elementary Planting Design. (3) I.
   (Formerly numbered 112A.) Mrs. Arbegast
   Lecture, laboratory, and field trips. Prerequisite: course 20 or the equivalent.
   Reading assignments on ecology and plant geography; identification of trees, shrubs, vines and ground covers; elementary problems in planting design.

121. Plant Materials and Planting Design. (3) I. Mrs. Scott
   (Formerly numbered 113B.)
   Lecture, laboratory, and field trips. Prerequisite: courses 20 and 120, or equivalent.
   Horticultural considerations, problems in planting design, planting plans and specifications.

122. Advanced Planting Design and Plant Materials. (3) II. Mrs. Scott
   (Formerly numbered 112B.)
   Lecture, laboratory, and field trips. Prerequisite: courses 20 and 120, or equivalents.
   Planting design problems of complex nature; study of succulents, palms, tropical plants, ferns, and natives.
130. Theory and Design. (3) I. Mr. Buchanan, Mr. Litton
(Formerly numbered 101A.)
Lecture and laboratory.
Theory and principles of landscape architecture; practice in analysis and
design with reference to problems of limited scope.

131. Theory and Intermediate Design. (3) II. Mr. Tetlow
(Formerly numbered 101B.)
Lecture and laboratory. Prerequisite: course 130, or enrollment in the De­partment of City and Regional Planning.
Theory and principles of landscape architecture; practice in analysis and
design with special reference to problems of residential sites and related pub­lic and private use areas.

(132A formerly numbered 114.) Mr. Vaughan
Lecture and laboratory. Prerequisite: course 131.
Analysis and design of complex site projects; practice in preparation of
working drawings for construction and planting as integral parts of the de­sign process; introduction to office procedure, contract documents, specifica­tions, and estimates.

134. Park and Recreation Area Planning. (4) I. Mr. Violich
(Formerly numbered 115.)
Lecture, laboratory, seminars, and field trips. Prerequisite: City and Re­gional Planning 100 or 110.
Principles, standards and procedures in planning of areas for park recreation use; problems in design of park recreation sites and systems, with par­ticular emphasis on their relation to city, state or region as a whole.

135. Site Planning. (4) II. Mr. Vaughan
(Formerly numbered 116.)
Lecture, laboratory, seminars, and field trips. Prerequisite: City and Re­gional Planning 100 or 110 and advanced standing in architecture or land­scape architecture.
Principles, standards and procedures in planning large-scale site develop­ments under single authority, and involving interprofessional collaboration;
with special reference to the landscape architect’s role.

198. Directed Group Study. (1–5) I and II. The Staff (Mr. Litton in charge)
Prerequisite: consent of the instructor.
Group study or investigation of special problems.

199. Special Study for Advanced Undergraduates. (1–5) I and II.
The Staff (Mr. Litton in charge)

GRADUATE COURSES
(Concerning conditions for admission to graduate courses, see page 18)

201A–201B. Graduate Design and Theory. (1–6; 1–6) Yr.
Advanced problems and research. The Staff (Mr. Vaughan in charge)

203. Urban Design and Landscape Architecture. (3) II.
Lecture and laboratory. Prerequisite: graduate standing in landscape
architecture.
Landscape architecture in the design of specific development projects
within the context of general plan policy. Relation of urban design to urban
general planning. Laboratory problems and seminars in collaboration with City and Regional Planning 258.

298. **Group Study.** (1-6) I and II. The Staff (Mr. Vaughan in charge)
Prerequisite: graduate standing in landscape architecture or city and regional planning.
Group study or investigation of advanced special problems.

**LATIN**

For courses in the Latin language and literature, see under Department of Classics, page 92.

**LAW**

(Department Office, 225 Law Building)

Edward L. Barrett, Jr., B.S., LL.B., *Professor of Law.*
Rex A. Collings, Jr., M.A., LL.B., *Professor of Law.*
John G. Fleming, D.Phil., *Professor of Law.*
Richard W. Jennings, M.A., LL.B., *James W. and Isabel Coffroth Professor of Law.*
Sam Kagel, A.B., LL.B., *Professor of Law.*
Adrian A. Kragen, A.B., LL.B., *Shannon Cecil Turner Professor of Law.*
William T. Laube, Jr., A.B., J.D., LL.M., A. F. and May T. Morrison Professor of Law.
David W. Louisell, LL.B., *Professor of Law.*
*Frank C. Newman, A.B., LL.B., LL.M., J.S.D., Professor of Law.*
William Lloyd Prosser, A.B., LL.B., LL.D., Dr.Jur. h.c., *Elizabeth Josselyn Boalt Professor of Law (Chairman of the Department).*
Stefan A. Riesenfeld, B.S., LL.B., Dr.Jur., Dott. in giur., S.J.D., *Emanuel S. Heller Professor of Law.*
Sho Sato, A.B., LL.B., *Professor of Law.*
Arthur H. Sherry, A.B., LL.B., *Professor of Law and Criminology.*
Barbara Nachtrieb Armstrong, J.D., Ph.D., LL.D., A. F. and May T. Morrison Professor of Municipal Law, Emeritus.
William Warren Ferrier, A.B., J.D., *Professor of Law, Emeritus.*
Jerome A. Cohen, A.B., LL.B., *Acting Associate Professor of Law.*
Edward C. Halbach, Jr., A.B., J.D., *Acting Associate Professor of Law.*
Geoffrey C. Hazard, Jr., B.A., LL.B., *Associate Professor of Law.*
John R. Hetland, LL.B., *Acting Associate Professor of Law.*
Ira M. Heyman, A.B., LL.B., *Acting Associate Professor of Law.*
Nicholas Johnson, A.B., LL.B., *Acting Associate Professor of Law.*
Justin Sweet, A.B., LL.B., *Associate Professor of Law.*
Herma H. Schreter, A.B., J.D., *Acting Assistant Professor of Law.*

Brent M. Abel, A.B., LL.B., *Lecturer in Law.*
John P. Austin, A.B., LL.B., *Lecturer in Law.*

1 In residence fall semester only, 1960-1961.
Spurgeon Avakian, A.B., LL.B., Lecturer in Law.
Newell C. Barnett, A.B., LL.B., Lecturer in Law.
Valentine Brookes, A.B., LL.B., Lecturer in Law.
John W. Cowee, M.B.A., Ph.D., LL.B., Professor of Insurance.
Folger Emerson, A.B., LL.B., Lecturer in Law.
David Hardy, A.B., LL.B., Lecturer in Law.
Robert Cronley Harris, A.B., LL.B., Lecturer in Law.
Tevis Jacobs, A.B., J.D., Lecturer in Law.
William N. Keeler, A.B., J.D., Lecturer in Law.
Lewis J. Keller, A.B., LL.B., Lecturer in Law for the fall semester.
Joseph Chanslor Kimble, A.B., LL.B., Lecturer in Law.
Scott C. Lambert, LL.B., Lecturer in Law.
Dana Latham, A.B., LL.B., Lecturer in Law.
Robert B. McKay, B.S., LL.B., Visiting Professor of Law.
William D. McKee, B.S., LL.B., Lecturer in Law.
James E. Sabine, A.B., LL.B., Lecturer in Law.
Samuel Taylor, A.B., LL.B., Lecturer in Law.

Curriculum of the School of Law

For admission requirements and for the requirements for the degree of Master of Laws (LL.M.) and of Doctor of the Science of Law (J.S.D.), consult the Announcement of the School of Law.

Nonresidents of California enrolled as students in the School of Law pay a fee of $310 each semester, which includes the incidental fee charged all students.

Professional Curriculum

First Year

200A–200B. Contracts. (3–3) Yr. Mr. Laube, Mr. Sweet
202. Crimes. (3) II. Mr. Barrett, Mr. Collings
206A–206B. Pleading and Procedure in Civil Cases. (3–3) Yr. Mr. Collings, Mr. Hazard, Mr. Louisell
208A–208B. Property. (3–3) Yr. Mr. Hetland, Mr. Heyman
210. Equity. (3) I. Mr. McKay
212A–212B. Torts. (3–3) Yr. Mr. Fleming, Mr. Prosser
214A–214B. Introduction to Law. (1–½) Yr. Mr. Hazard, Mrs. Schreter and Law Associates

Second Year

220. Administrative Law: First Course. (3) II. Mr. Cohen, Mr. McKay
222A–222B. Business Associations; Corporations. (3–3) Yr. Mr. Jennings, Mr. Johnson
224A–224B. Constitutional Law. (2–2) Yr. Mr. Barrett, Mr. Heyman
227. The Legal Profession. (1) II. Mr. Riesenfeld (in charge), Mr. Ehrenzweig, Mr. Keeler
230. Marital Property. (2) I. Mr. Collings, Mrs. Schreter
232. Security Transactions. (2) I. Mr. Hetland, Mr. Riesenfeld
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Year(s)</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>234A-234B</td>
<td>Estates and Trusts.</td>
<td>(2-2) Yr.</td>
<td></td>
<td>Mr. Halbach, Mr. Hetland</td>
</tr>
<tr>
<td>237A-237B</td>
<td>Income Taxation.</td>
<td>(2-2) Yr.</td>
<td></td>
<td>Mr. Kragen, Mr. Sato</td>
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<td></td>
<td><em>(Third Year)</em></td>
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<tr>
<td>240</td>
<td>Administrative Law: Second Course.</td>
<td>(2)</td>
<td>I</td>
<td>Mr. Newman</td>
</tr>
<tr>
<td>242</td>
<td>International and Maritime Law.</td>
<td>(2)</td>
<td>II</td>
<td>Mr. Riesenfeld</td>
</tr>
<tr>
<td>243A-243B</td>
<td>Commercial Transactions.</td>
<td>(2-2) Yr.</td>
<td></td>
<td>Mr. Laube</td>
</tr>
<tr>
<td>244</td>
<td>Creditors’ Remedies.</td>
<td>(3)</td>
<td>II</td>
<td>Mr. Riesenfeld</td>
</tr>
<tr>
<td>245</td>
<td>Comparative Jurisprudence.</td>
<td>(2)</td>
<td>I</td>
<td>Mr. Ehrenzweig</td>
</tr>
<tr>
<td>246</td>
<td>Conflict of Laws.</td>
<td>(3)</td>
<td>II</td>
<td>Mr. Ehrenzweig, Mrs. Schreter</td>
</tr>
<tr>
<td>247</td>
<td>Corporation Finance and Securities Regulation.</td>
<td>(2)</td>
<td>I</td>
<td>Mr. Jennings</td>
</tr>
<tr>
<td>248</td>
<td>Selected Problems in Corporations and Partnerships.</td>
<td>(2)</td>
<td>II</td>
<td>Mr. Jennings</td>
</tr>
<tr>
<td>249</td>
<td>Sales.</td>
<td>(2)</td>
<td>I</td>
<td>Mr. Louisell, Mr. Fleming</td>
</tr>
<tr>
<td>250A-250B</td>
<td>Evidence.</td>
<td>(2-2) Yr.</td>
<td></td>
<td>Mr. Louisell, Mr. Sherry</td>
</tr>
<tr>
<td>251</td>
<td>Selected Problems in Comparative Jurisprudence.</td>
<td>(3)</td>
<td>II</td>
<td>Mr. Ehrenzweig</td>
</tr>
<tr>
<td>252</td>
<td>Selected Problems in Constitutional Law.</td>
<td>(2)</td>
<td>II</td>
<td>Mr. McKay</td>
</tr>
<tr>
<td>253</td>
<td>Family Law.</td>
<td>(2)</td>
<td>II</td>
<td>Mrs. Schreter</td>
</tr>
<tr>
<td>254</td>
<td>Federal Jurisdiction.</td>
<td>(2)</td>
<td>I</td>
<td>Mr. Barrett</td>
</tr>
<tr>
<td>256</td>
<td>Selected Problems in Property and Future Interests.</td>
<td>(2)</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>257</td>
<td>Insurance.</td>
<td>(2)</td>
<td>I</td>
<td>Mr. Ehrenzweig, Mr. Cowee</td>
</tr>
<tr>
<td>258</td>
<td>Law of International Organization.</td>
<td>(2)</td>
<td>I</td>
<td>Mr. Cohen</td>
</tr>
<tr>
<td>259</td>
<td>International Conflict of Laws in the United States.</td>
<td>(2)</td>
<td>II</td>
<td>Mr. Ehrenzweig</td>
</tr>
<tr>
<td>262</td>
<td>Labor Law.</td>
<td>(3)</td>
<td>I</td>
<td>Mr. Kagel</td>
</tr>
<tr>
<td>263</td>
<td>Negotiation, Conciliation, Arbitration.</td>
<td>(2)</td>
<td>II</td>
<td>Mr. Kagel</td>
</tr>
<tr>
<td>264</td>
<td>Modern Social Legislation.</td>
<td>(2)</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>265</td>
<td>Advanced Legal Writing.</td>
<td>(1-2)</td>
<td>I and II</td>
<td>Mr. Prosser</td>
</tr>
<tr>
<td>266</td>
<td>Legislation.</td>
<td>(2)</td>
<td>I and II</td>
<td>Mr. Cohen</td>
</tr>
<tr>
<td>268</td>
<td>State and Local Government Law.</td>
<td>(2)</td>
<td>I</td>
<td>Mr. Keller</td>
</tr>
<tr>
<td>270</td>
<td>Government Control of Business.</td>
<td>(2)</td>
<td>I</td>
<td>Mr. Riesenfeld</td>
</tr>
<tr>
<td>271</td>
<td>Trial Practice.</td>
<td>(2)</td>
<td>I and II</td>
<td>Mr. Hazard, Mr. Louisell</td>
</tr>
<tr>
<td>274</td>
<td>Restitution.</td>
<td>(2)</td>
<td>II</td>
<td>Mr. Sweet</td>
</tr>
<tr>
<td>275</td>
<td>Selected Problems in Contracts.</td>
<td>(2)</td>
<td>I</td>
<td>Mr. Sweet</td>
</tr>
</tbody>
</table>

* Not to be given, 1960-1961.
276. Fair Trade Practices and Copyrights. (2) II. Mr. Fleming

277. Advanced Study in Criminal Law. (2) II. Mr. Collings

*278. Selected Problems in Criminal Law and Administration. (2) I. Mr. Sherry

279. Natural Resources Law. (2) II. Mr. Sato

280. Oil and Gas Law. (2) I. Mr. Johnson

*281. Estate Planning and Taxation. (3) I. Mr. Halbach

282. Estate and Gift Taxation. (2) I. Mr. Halbach, Mr. Kragen

283. Selected Problems in Estate Planning. (2) II. Mr. Halbach

284. Selected Problems in the Taxation of Business Enterprise. (2) II. Mr. Kragen

Graduate Curriculum

285A–285B. Seminar in Administrative Law and Procedure. (2-2) Yr. Mr. Cohen, Mr. Newman, Mr. Riesenfeld

286A–286B. Seminar in Business Associations. (2-2) Yr. Mr. Jennings

287A–287B. Seminar in Commercial Transactions. (2-2) Yr. Mr. Fleming, Mr. Laube, Mr. Prosser, Mr. Riesenfeld, Mr. Sweet

288A–288B. Seminar in Constitutional Law. (2-2) Yr. Mr. Barrett, Mr. Heyman

289A–289B. Seminar in Criminal Law and Procedure. (2-2) Yr. Mr. Barrett, Mr. Collings, Mr. Sherry

290A–290B. Seminar in International and Maritime Law. (2-2) Yr. Mr. Riesenfeld

291A–291B. Seminar in Labor Law and Procedure. (2-2) Yr. Mr. Kagel

292. Seminar in Legal Education. (1) I and II. The Staff (Mr. Newman in charge)

293A–293B. Seminar in Legal History and Jurisprudence. (2-2) Yr. Mr. Ehrenzweig, Mr. Riesenfeld

294A–294B. Seminar in Legislation and Legislative Procedure. (2-2) Yr. Mr. Cohen, Mr. Newman

295A–295B. Seminar in Practice and Procedure. (2-2) Yr. Mr. Barrett, Mr. Hazard, Mr. Louisell

296A–296B. Seminar in Property and Trust Administration. (2-2) Yr. Mr. Halbach, Mr. Hetland, Mr. Heyman

297A–297B. Seminar in Public Finance and Taxation. (2-2) Yr. Mr. Kragan, Mr. Sato

298A–298B. Seminar in Roman and Comparative Law. (2-2) Yr. Mr. Ehrenzweig, Mr. Riesenfeld

299. Research in Legal Problems. (1-5) I and II. The Staff (Mr. Ehrenzweig in charge)

LIBRARIANSHIP

(Department Office, 425 Library)

Donald Coney, M.A., Professor of Librarianship.
*J. Periam Danton, Ph.D., Professor of Librarianship.
LeRoy C. Merritt, Ph.D., Professor of Librarianship (Acting Chairman of the Department).
Edward A. Wight, Ph.D., Professor of Librarianship.
Edith M. Coulter, M.A., B.L.S., Professor of Librarianship, Emeritus.
*Anne E. Markley, M.A., Associate Professor of Librarianship.
Fredric J. Mosher, Ph.D., Associate Professor of Librarianship.
Ray E. Held, Ph.D., Assistant Professor of Librarianship.

Mae J. Durham, B.L.S., Lecturer in Librarianship.
Vivian Prince, M.L.S., Lecturer in Librarianship.
George A. Vdovin, M.L.S., Lecturer in Librarianship.

The School of Librarianship offers curricula leading to the degrees of Master of Library Science, Doctor of Library Science, and Doctor of Philosophy.

Applicants for admission to any of the curricula should send to the Dean of the School transcripts of their academic records in order that their qualifications for admission to the School may be determined. Graduate standing, without deficiencies, in the University of California, which is determined by the Dean of the Graduate Division, is required for admission. (For regulation concerning such status, see Announcement of the Graduate Division, Northern Section.)

Program for the First Professional Degree (Master of Library Science)

To secure adequate opportunity for those who enroll in the School, only a limited number will be accepted for the first-year curriculum. No one should come to Berkeley without previously having made application to the School and having received notice of acceptance. Early application is desirable. Selection is based primarily on scholarship.

The work is organized as a professional curriculum and particular subjects may not, as a rule, be taken separately. The courses are planned to occupy a student's entire time and only the exceptional or previously experienced should expect to do any outside work.

Preliminary Preparation.—A good general education is the best basis for librarianship. The Dean of the School will be glad to give advice in reference to undergraduate courses. Two modern foreign languages (not less than 8 college semester units of each) are required for admission. German and French are particularly recommended. Ability to use the typewriter with accuracy and a fair degree of speed is expected of all students. Experience in library work is highly desirable but is not required for admission.

Applicants are required to take the Aptitude Test of the Graduate Record Examination and should do so, if possible, not later than the spring of the year of application.

Applications from those who obtain less than a 2.5 grade-point average in their last two years of college or university work cannot be considered.

Applications from those over thirty-five years of age will be considered only when the applicants hold responsible library positions from which they can obtain leaves of absence. Exceptions to this rule may be considered only under unusual circumstances, such as the possession of a doctor's degree, or successful experience in a related field.

State Credential for School Librarians.—The California State Department of Education accepts the completion of the first year’s work in satisfaction of its technical requirements for the special credential in librarianship, but candidates for it must also do directed practice work in school libraries during the second semester. Students undertaking this work register and receive credit for Education 323, 4 units. To meet additional requirements of the State Department of Education for this credential, candidates should take the following courses (totaling at least 9 units) before enrollment in the School, or after the completion of the first year’s work: educational psychology (Education 100A, 4 units); a course dealing with elementary and secondary education (Education 100B, 3 units); and 2 elective units.

In 1960–1961, courses in librarianship will be offered in summer sessions, and in the fall and spring semesters. Students may begin the first-year curriculum only with the fall semester or summer sessions. Advanced curricula may be commenced in either the fall or spring semesters, or in summer sessions.

First-Year Courses

The 28-unit program of each student must include the following basic courses: 201, 202, 203, 204; the remaining units are to be elected from other courses in the first-year curriculum and must include not fewer than four or more than six upper division or graduate courses in appropriate subjects approved by the Dean of the School of Librarianship.

201. Introduction to Cataloguing and Classification. (4) I. Miss Prince
Survey of the history, theory, methods, and principles of organizing library collections for use; library classification systems; principles of subject cataloguing; rules for the description and entry of general materials in library catalogues; functions and arrangement of library catalogues.

202. Bibliography and Reference Materials. (3) I. Mr. Held, Mr. Mosher
Basic reference materials, including national and subject bibliography. Lectures, discussions, and reports on assigned problems.

203. Introduction to Librarianship. (3) I. Mr. Wight
Introductory survey of the evolution of libraries and basic information about the principal fields of library service, with emphasis on major trends and problems. Introduction to administrative theory and practice as applied to libraries. Readings and written reports.

204. Selection and Acquisition of Library Materials. (2) I. Mr. Merritt
Theories, principles, and practice of selecting books and other library materials. Techniques of acquisition by public, school, academic, and special libraries.

205. Special Problems in the Selection of Materials and Evaluation of Collections. (2) II. Mr. Merritt
Prerequisite: course 204.
Problems in selecting records, motion pictures, maps, and other library material in special format; special problems in selecting material in particular subject fields; methods of evaluating library collections and the effectiveness of the selection process.

206. School Library Administration. (2) II. Mrs. Durham
A general survey of elementary and secondary school libraries. Emphasis on the function, administration, organization, services, materials, and the planning and equipment of school libraries in relation to the modern school. Lectures, committee and individual reports, readings, class discussions, and field trips. Experiences gained in practice work are utilized.
207. Municipal and County Library Administration. (2) II. Mr. Wight
Government, organization, and administration of municipal, county, and regional public libraries. Library service programs in relation to varying community patterns. Lectures, readings, reports, field trips.

208. College and University Library Administration. (2) II. Mr. Held
A general introduction to the organization and administration of college and university libraries and their place in the institutions of which they are a part. Problems and practices with respect to the library's government, functions, staff, collections, finances, and building are considered by means of written assignments, readings, and class discussion.

209. Library Work with Children. (2) I and II. Mrs. Durham
Lectures and discussion.
A general survey of children's books and reading preferences. Historical backgrounds and development; types of children's literature; levels of interest; criticism and evaluation; illustration; trends; book selection; storytelling; organization and administration of a children's room in a public library.

211. Development of the Book. (2) II. Mr. Mosher
Prerequisite: consent of the instructor.
Materials and techniques of book production. Early records and the manuscript period. Development of paper, type, and binding. Letterpress, offset, rotogravure, and other methods of printing.

212. Reference and Government Publications. (4) II. Mr. Held, Mr. Mosher
A continuation of course 202. Sources of information in subject fields. Emphasis is placed on types of information in foreign, national, state, and municipal documents. Problems in informational service.

214. Special Problems in Cataloguing and Classification. (2) II. Miss Prince
Prerequisite: course 201 or equivalent.
Materials requiring special description and analysis—films, phonorecords, music, monographs in series, maps, etc.; Library of Congress classification and subject cataloguing systems; arrangement of large catalogues—dictionary, divided, and classified; the cataloguing department; current problems; literature of cataloguing and classification.

215. Reading and Reading Interests. (2) II. Mr. Merritt
Prerequisite: course 204.
Reading interests, habits, and needs of different types and groups of readers. The nature of reading, problems of reading, selection of reading by children, young people, college students, and public library patrons. The role of the library in adult education.

217. Bibliography of Science and Technology. (2) II. Mr. Vdovin
Prerequisite: science major or consent of the instructor.
Scientific and technical literature with emphasis on reference and bibliographical aids. Periodical and serial literature and its use and control through abstracts and indexes.

Programs for Advanced Degrees

Librarians who already hold a professional bachelor's or master's degree may become candidates for the Doctor of Library Science or the Doctor of Philosophy degrees.
**Advanced Courses**

**†218. Advanced Cataloguing.** (2) I or II.  
Miss Prince  
Prerequisite: course 214.  
Modern trends and problems in cataloguing with emphasis on cooperative cataloguing, cataloguing policies, and the cataloguing of manuscripts and other special classes of library materials; study of areas of investigation and research in the field of cataloguing; discussion and reports.

**†219. Advanced Classification.** (2) I or II.  
Miss Prince  
Prerequisite: course 201, 214.  
History and theory of classification; comparative study of library classification systems leading, in the latter half of the semester, to intensive study and use of the Library of Congress system; individual problem or paper.

**†220A. Descriptive Bibliography.** (2) I or II.  
Miss Prince  
Prerequisite: courses 201, 202, 211, 212, 214, or equivalent (the last three either previously or concurrently).  
Historical and analytical bibliography as methods of investigation, based on McKe-row and Esdaile; methods of bibliographical description, based on Bowers; study of the bibliography of book rarities, with emphasis on American and western imprints.

**220B. Subject Bibliography.** (2) II.  
Miss Prince  
Prerequisite: courses 201, 202, 212 (the last either previously or concurrently).  
The history of bibliographical organization; methodology of enumerative bibliography, including form, style, and procedure; individual oral and written reports on the status of bibliographical control in selected subject fields, including location of special library collections and related research materials.

**221. Book Collecting for University Libraries.** (2) I.  
Mr. Merritt  
Prerequisite: courses 204 and 208. Required of all candidates for advanced degrees who intend to specialize in the college and university library field.  
Problems connected with the acquisition, development, and maintenance of the book, periodical, and other collections of university libraries.

**225. History of Libraries.** (2)  
Mr. Danton, Mr. Held  
225A. History of Ancient and Medieval Libraries. I. Mr. Held.  
*225B. History of Scholarly Libraries.** II. Mr. Danton.  
225C. History of Popular Libraries. I. Mr. Held.

**226. History of Printing.** (2)  
Mr. Mosher  
Prerequisite: course 211 or the equivalent.  
226A. Origins of Printing and Publishing in Europe. I.  
226B. History of Books and Printing from the Sixteenth Century. I.  
226C. History of Printing and Publishing in the United States. I.

**228. Problems in Reading.** (2) I.  
Mr. Merritt  
Prerequisite: course 215.  
Analysis of reading of college students and the general adult population; characteristics and interests of readers, distribution and content of publications, methods of stimulating reading, and the effects of reading; the library and adult education.

† Depending upon demand, any one of seminars 218, 219, and 220A will be offered in the fall semester and any two during the spring semester.  
‡ Either 226A or 226B or 226C will be given during the fall semester, 1960–1961.
230. Library Administration. (2) I.  Mr. Wight
The basic advanced course in the principles and practice of library administration. Analysis of the organization and management of modern libraries of various types. Prerequisite to courses 232, 233, 234.

232. University Library Administration. (2) II.  Mr. Coney
Prerequisite: courses 208, 230, or equivalent as determined by the instructor. Required of all advanced degree candidates who intend to specialize in the college and university library field.
Study of current issues in personnel, finance, service, and the organization of materials and work. Individual projects, work periods, consultation, reports, and class discussion.

*233. Junior College Library Administration. (2) II.  Mr. Merritt
Prerequisite: 206 and 230.
Government, administration, collection building, and evaluation of the public junior college library. Theory and examination of current practice through intensive survey of actual operation.

234. Problems in Public Library Administration. (2) II.  Mr. Wight
Prerequisite: courses 207 and 230. Required of all candidates for advanced degrees who intend to specialize in the public library field.
Detailed application of the principles of public administration to the management and operation of public libraries. Case study approach through critical analysis of the functions and problems of selected libraries. Assignments adapted to special interests of students.

*238. Library in the Community. (2) I.  Mr. Wight
Analysis of the community for the librarian. Social backgrounds, economic and educational levels, and community groups, as they affect library use. Methods of integrating the library with the community.

240. Content Analysis. (2) II.  Mr. Merritt
Problems in methods of determining maturity level, social and moral attitudes, and other educational and propagandistic assumptions in materials of communication.

*245. Bibliographic Organization and Retrieval of Information. (2) I.
Prerequisite: courses 201, 202, 203, 212.
Bibliographic control of information with emphasis on periodical and serial literature. Development of serial publication; literature use; basic information theory; traditional indexing procedures; mechanical and electronic aids; classification, alphabetic arrangement and unarranged headings as devices for information organization and retrieval.

251. Methods of Research in Librarianship. (2) I and II.  Mr. Held, Mr. Mosher, Mr. Wight
History and function of research in contemporary society. Value and meaning of research. Techniques of bibliographical, historical, and sociological research, and their implications for the definition and investigation of library problems. Required of all candidates for the doctor's degree.

299. Special Study. (1-8) I and II.  The Staff (Mr. Merritt in charge)
Individual direction of student's choice, planning and writing of a special study or dissertation. This course must be taken for a total, in all semesters, of 4 units or more.

* Not to be given, 1960-1961.
Linguistics

Linguistics

(Department Office, 2323 Dwinelle Hall)

†Madison S. Beeler, Ph.D., Professor of Linguistics and German.
C. Douglas Chrétien, Ph.D., Professor of Linguistics.
Murray B. Emeneau, Ph.D., Professor of General Linguistics and Sanskrit.
Mary R. Haas, Ph.D., Professor of Linguistics and Siamese (Chairman of the Department of Linguistics).
William F. Shipley, Ph.D., Assistant Professor of Linguistics.

Denzel R. Carr, Ph.D., Professor of Oriental Languages.
Yuen Ren Chao, Ph.D., Litt.D., Agassiz Professor of Oriental Languages and Literature.
John J. Gumperz, Ph.D., Assistant Professor of South Asian Languages.
Sydney M. Lamb, Ph.D., Lecturer in Linguistics.
Yakov Malkiel, Ph.D., Professor of Romance Philology.
David W. Reed, Ph.D., Associate Professor of English.
Jesse O. Sawyer, Ph.D., Lecturer in Speech.
Gene M. Schramm, Ph.D., Assistant Professor of Near Eastern Languages.
Francis J. Whitfield, Ph.D., Professor of Slavic Languages and Literatures.

Letters and Science List.—All undergraduate courses in Linguistics are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Adviser: Mr. Shipley.

The Major.—Required: 5 or 6 units of lower division courses in Latin or Greek (if Latin was taken in high school, Greek is recommended); 12 units of lower division courses in French or German; 25 or 26 units of upper division courses in linguistics and allied fields. Eighteen units of this last requirement are to consist of the following courses without substitution: Linguistics 100, 130, 140, 150; Sanskrit 190A–190B. The remaining 8 to 9 units (three courses) must be selected from among the following: Linguistics 145, 160, 170; Anthropology 120; English 110, 131; German 140. Recommended: Anthropology 2A–2B, Linguistics 35.

Honors Program in Linguistics.—A candidate for honors with the bachelor’s degree will elect, in each semester of the senior year, Linguistics H195 for 2 units. These units will be in addition to the units required to be chosen from the list of optional courses. For the first semester, Linguistics H195 shall consist of an approved program of independent study by which the student attains reasonable mastery of an appropriate topic in descriptive or historical linguistics. He shall demonstrate this mastery by presenting an acceptable term paper in which he summarizes and analyzes the material he has covered. For the second semester, Linguistics H195 shall represent another program of independent study like that pursued in the first semester. Prospective candidates for higher degrees should consult the chairman of the department or the Dean of the Graduate Division.

Courses in specific languages are offered by the departments of Classics (Greek, Latin, Sanskrit), English (Celtic, Old English, Middle English), French (French, Old French), German (German, Gothic, Old High German, Middle High German), Italian, Near Eastern Languages (Akkadian, Arabic, Coptic, Egyptian, Hebrew, Hindi, Persian, Sumerian, Syriac, Turkish, Urdu), Oriental Languages (Cantonese, Classical Chinese, Indonesian/Malay, Japa-

LINGUISTICS

Chinese, Korean, Mandarin, Mongolian, Thai, Tibetan), Romance Philology (Late Latin, Old Provencal), Scandinavian (Danish, Norwegian, Swedish, Old Icelandic, Old Swedish), Slavic (Bulgarian, Czech, Polish, Russian, Serbo-Croatian, Ukrainian, Old Church Slavic), Spanish and Portuguese (Spanish, Portuguese, Old Spanish). See also list of Related Courses in Other Departments, page 257.

LOWER DIVISION COURSE

35. Language and Linguistics. (3) I. Mr. Shipley
   Prerequisite: sophomore standing.
   How languages differ from one another in form and content; the structure of language. How languages change; the reconstruction of former languages. Bird’s-eye view of the languages of the world and their relationships.

UPPER DIVISION COURSES

100. Principles of Descriptive and Historical Linguistics. (3) I. Mr. Chrétien
   The classical works of Sapir and Bloomfield. Modern developments.

130. Phonetics and Phonemics. (3) I and II. Miss Haas, Mr. Shipley
   I: Miss Haas; II: Mr. Shipley
   Two lectures and two hours of section work per week. Prerequisite: upper division status.

140. Linguistic Analysis. (3) I and II. ______, Mr. Emeneau
   Prerequisite: course 130 or equivalent course in phonetics and phonemics.
   Lectures and practice in analysis of morphology and syntax.

145. Types of Linguistic Structure. (3) II. Mr. Shipley
   Prerequisite: course 130 or equivalent course in phonetics and phonemics.
   A rapid general survey followed by a more detailed presentation of selected languages from various parts of the world.

150. Introduction to Indo-European Comparative Grammar. (3) I. Mr. Beeler
   Prerequisite: a fair knowledge of at least one of the older Indo-European languages (e.g., Latin) and one of the modern Indo-European languages other than English or a Romance language.

160. Dialectology. (2) I. Mr. Gumpers
   Prerequisite: course 130, 140.

170. American Indian Languages. (3) II. Miss Haas
   A brief survey of the native languages of North America; grammatical structure of selected languages; the application of the comparative method to American Indian languages.

H195. Special Study for Honors Candidates. (1–5) I and II. The Staff

199. Special Study for Advanced Undergraduates. (1–5) I and II. The Staff

GRADUATE COURSES

200. Proseminar. (2) I and II. Mr. Chrétien
   Introduction to research.
‡207. Statistical Linguistics. (2) II. Mr. Chrétien

220A–220B. Linguistics Laboratory. (3–3) Yr. Mr. Shipley
Open to qualified language students and students of anthropology who have had course 130 and either 140 or 145. May be repeated without duplication of credit with consent of the instructor.
The technique of recording and analyzing a foreign language by working directly with a native speaker.

230. Seminar in Descriptive Linguistics. (2) I and II. The Staff
May be repeated with consent of the instructor.

250. Seminar in Historical Linguistics. (2) I and II. The Staff
May be repeated with consent of the instructor.

260. Seminar in American Indian Linguistics. (2) I and II. Miss Haas
May be repeated with consent of the instructor.

‡270. Problems in Pacific Linguistics. (2) I and II. Mr. Chrétien

280. Seminar in Applications of Linguistics. (2) I and II. The Staff
Prerequisite: open to qualified graduate students in linguistics and the language departments with consent of the instructor. May be repeated without duplication of credit with consent of the instructor.
Research in the relationship between linguistic methodology and language teaching and translation. The mastery of oral production and aural comprehension by means of bilingual phonemic presentation. The mastery of grammatical control by means of bilingual structural analysis.

298. Special Study. (1–5) I and II. The Staff

299. Directed Research. (1–5) I and II. The Staff (Miss Haas in charge)

RELATED COURSES IN OTHER DEPARTMENTS

Language and Culture (Anthropology 120).
Language (English 25).
The English Language (English 110).
American English (English 131).
Introduction to Descriptive and Historical German Grammar (German* 140).
Germanic Linguistics (German *260).
Seminar in Linguistic Structures of South Asia (Near Eastern Languages 275A–275B).
Semitic Linguistic Structures (Near Eastern Languages 161).
Languages of Eastern Asia (Oriental Languages 100).
Introduction to Malayo-Polynesian Linguistics (Oriental Languages *118).
Malayo-Polynesian Linguistics (Oriental Languages *208).
Linguistic History of the Roman Empire (Romance Philology 200).
Late Latin Language and Literature (Romance Philology 201).
General Romance Linguistics (Romance Philology *202).
Linguistic Geography Applied to Romance Dialectology (Romance Philology 205).
Seminar in Comparative Slavic Linguistics (Slavic Languages and Literatures 220).
General Phonetics (Speech 103).

† To be given if a sufficient number of students enroll.
MATHEMATICS

(Department Office, 301 Campbell Hall)

Shiing-Shen Chern, D.Sc., Professor of Mathematics.
Stephen P. Diliberto, Ph.D., Professor of Mathematics.
Alfred L. Foster, Ph.D., Professor of Mathematics.
Bernard Friedman, Ph.D., Professor of Mathematics (Chairman of the Department).
*Leon A. Henkin, Ph.D., Professor of Mathematics.
‡Gerhard P. Hochschild, Ph.D., Professor of Mathematics.
Harry D. Huskey, Ph.D., Professor of Mathematics and Electrical Engineering.
Tosio Kato, D.Sc., Professor of Mathematics.
*John L. Kelley, Ph.D., Professor of Mathematics.
Derrick H. Lehmer, Ph.D., Professor of Mathematics.
Hans Lewy, Ph.D., Professor of Mathematics.
Michel Loève, Docteur ès Sciences, Professor of Mathematics and Statistics.
Charles B. Morrey, Jr., Ph.D., Professor of Mathematics.
Anthony P. Morse, Ph.D., Professor of Mathematics.
Edmund Pinney, Ph.D., Professor of Mathematics.
Murray H. Protter, Ph.D., Professor of Mathematics.
†Raphael M. Robinson, Ph.D., Professor of Mathematics.
Maxwell A. Rosenlicht, Ph.D., Professor of Mathematics.
¥Abraham Seidenberg, Ph.D., Professor of Mathematics.
Edwin H. Spanier, Ph.D., Professor of Mathematics.
Alfred Tarski, Ph.D., Professor of Mathematics.
René J. De Vogelaere, Ph.D., Professor of Mathematics.
Frantisek Wolf, Ph.D., Professor of Mathematics.
Benjamin A. Bernstein, Ph.D., Professor of Mathematics, Emeritus.
Thomas Buck, Ph.D., Professor of Mathematics, Emeritus.
Griffith C. Evans, Ph.D., Professor of Mathematics, Emeritus.
Sophia L. McDonald, Ph.D., Professor of Mathematics, Emeritus.
Charles A. Noble, Ph.D., Professor of Mathematics, Emeritus.
Raymond H. Seioberté, Ph.D., Associate Professor of Mathematics, Emeritus.
Pauline Sperry, Ph.D., Associate Professor of Mathematics, Emeritus.
Arthur R. Williams, Ph.D., Assistant Professor of Mathematics, Emeritus.
William G. Bade, Ph.D., Associate Professor of Mathematics (Vice-Chairman of the Department).
*Errett A. Bishop, Ph.D., Associate Professor of Mathematics.
Hans J. Bremermann, Ph.D., Associate Professor of Mathematics.
Paul L. Chambré, Ph.D., Associate Professor of Mathematics and Engineering Science.
H. Otto Cordes, Ph.D., Associate Professor of Mathematics.
István Fáry, Ph.D., Associate Professor of Mathematics.
*Jacob Feldman, Ph.D., Associate Professor of Mathematics.
Harley Flanders, Ph.D., Associate Professor of Mathematics.
Henry Helson, Ph.D., Associate Professor of Mathematics (Vice-Chairman of the Department).
Bertram Kostant, Ph.D., Associate Professor of Mathematics.
Stephen Smale, Ph.D., Associate Professor of Mathematics.
1Paul Emery Thomas, Ph.D., Associate Professor of Mathematics.

1 In residence fall semester only, 1960–1961.
2 In residence spring semester only, 1960–1961.
Letters and Science List.—All undergraduate courses in mathematics are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Bremermann, Mr. Cordes, Mr. Lehmer, Mr. Morrey, Mr. Protter, Mr. Wolf. Adviser for major in teaching of mathematics: Mr. Sachs (I); Mr. Kelley (II).

The Major in Mathematics.—The major in mathematics consists of Mathematics 1A–1B, 2A–2B, 104, 113A, 135A, 130A or 140, and 12 additional units of upper division mathematics.

Mathematics 185 is a desirable part of the major program; this course, together with 104, 105 is equivalent to the graduate course 201A–201B. Courses in number theory, 115A–115B, and numerical analysis, 128A, 128B (relating to large-scale digital computers), are also available. Attention is directed to Philosophy 12A and Mathematics 125A–125B, for those who are interested in logic. Statistics 112 and 113 will be of interest to many students. Special attention is also directed to the course in analytic mechanics, Physics 105A–105B.

Subject to the requirement of competence in the major, and with the approval of the adviser, the student is at liberty to take theoretical courses in astronomy, physics, statistics, or other sciences as part of his major in mathematics, as well as other upper division courses in mathematics.

The Major in the Teaching of Mathematics.—This major prepares students for the profession of secondary teaching. Enrollment in the major is limited to 30 new students per year. Attention of students in this major is called to the ANNOUNCEMENT OF THE SCHOOL OF EDUCATION; a teaching minor also is

1 In residence fall semester only, 1960–1961.
2 In residence spring semester only, 1960–1961.
required for the secondary teaching credential. No education courses are required for graduation.

The major in teaching of mathematics consists of Mathematics 1A–1B or 3A, 3B, 4A and Philosophy 12A, and special sections of 113A–113B, 115A, 130A–130B, 135A, 160, and Statistics 112. Special arrangements for transfer students can be made with the adviser.

**Honors with the Bachelor's Degree for Majors in Mathematics.**—In addition to completing the established requirements for the major, to graduate with Honors, a student must: (a) earn a grade-point average greater than 3 in upper division mathematics courses; (b) complete two of the following three requirements, (1) Mathematics 117, (2) Mathematics 118, (3) a graduate course or seminar; (c) either pass a comprehensive examination at the end of his senior year or write a thesis—the choice to be made by the student. At the discretion of the major adviser, 3 units credit in Mathematics 199 may be given for passing the comprehensive examination or writing the thesis. (d) At the discretion of the major adviser, 6 units of the regular major requirements may be waived for honor students.

Honors, High Honors, and Highest Honors will be awarded on the basis of the examination or theses and performance in courses which constitute the student’s major.

**G. Solid Geometry.** (2) I. The Staff

§1A–1B. Calculus with Analytic Geometry, First Course. (4–4) Yr. Beginning each semester. Mr. Morrey, Mr. Loève, Mr. Protter

Prerequisite: two years of high school algebra, plane geometry, plane trigonometry.

Students will be placed in Mathematics 1A on the basis of the mathematics aptitude test of the College Board Examinations which is required of all entering freshmen. Students with advanced standing, who have not taken this test, will be required to take a placement examination in elementary algebra which will be given during registration week.

Elements of analytic geometry, introduction to differential and integral calculus with applications. (1A–1B covers the material of 3A–3B and two-thirds of 4A.)

§1C–1D. Calculus with Analytic Geometry, First Course, with Honors. (4–4) Yr. Beginning each semester. Mr. Kostant, Mr. Smale

Prerequisite: two years of high school algebra, plane geometry, plane trigonometry.

Students will be screened for Mathematics 1C on the basis of the mathematics aptitude test of the College Board Examinations which is required of all entering freshmen. Students with advanced standing, who have not taken this test, will be required to pass a qualifying examination in elementary algebra which will be given during registration week.

Honors course, corresponding to 1A–1B, for able students with strong mathematical background and interest. Emphasis on theory, rigor, and hard problems. Recommended as preparation for the major particularly for honor candidates. Enrollment limited to twenty students.

*2A–2B. Calculus with Analytic Geometry, Second Course. (4–4) Yr.

Beginning each semester. The Staff

Prerequisite: course 1A–1B.

Thorough technique of differential and integral calculus. Analysis of functions of several variables. Partial differentiation, multiple integrals. Differential equations. (Covers the material of one-third of 4A, 4B and two-thirds of 119 and 122.)


§ To be given, 1960–1961 only.
3A. Analytic Geometry and Calculus, First Course. (3) I and II.
Mr. Rosenlicht, Mr. Carter
Prerequisite: two years of high school algebra or course D (passed with a grade of C or better), plane geometry, plane trigonometry. Students may not receive credit for 3A after having completed 3R or 16A–16B.
Students will be placed in Mathematics 3A on the basis of the mathematics aptitude test of the College Board Examinations which is required of all entering freshmen. Students with advanced standing, who have not taken this test, will be required to take a placement examination in elementary algebra which will be given during registration week.
Elements of analytic geometry, introduction to differential calculus.

3B. Analytic Geometry and Calculus, Second Course. (3) I and II.
Prerequisite: courses 3A or 3R, or 16A–16B.
Mr. Fáry
Continuation of 3A. Introduction to differential and integral calculus, with applications.

3H. Analytic Geometry and Calculus, Second Course. (3) I and II.
Mr. Phelps
Prerequisite: course 3A with high attainment; admission on recommendation of the department.
Course substantially the same as 3B, but designed for students with special facility for mathematics.

4A. Analytic Geometry and Calculus, Third Course. (3) I and II.
Prerequisite: course 3B.
Mr. Cordes
Continuation of 3B. Thorough technique of differential and integral calculus.

4C. Introduction to Mathematical Analysis, Third Course. (3) I.
Prerequisite: course 3D or consent of the instructor.
Mr. Flanders
Continuation of 3D. Infinite sequences, vector analysis, surface integrals, linear ordinary differential equations.

4G. Analytic Geometry and Calculus, Third Course. (3) I and II.
Prerequisite: course 3B or 3H with high attainment; admission on recommendation of the department.
Course substantially the same as 4A, but designed for students with special facility for mathematics.

4B. Analytic Geometry and Calculus, Fourth Course. (3) I and II.
Prerequisite: course 4A.
Mr. Foster
Continuation of 4A. Geometry and analysis of functions of several variables, partial derivatives, multiple integrals.

4D. Introduction to Mathematical Analysis, Fourth Course. (3) II.
Mr. Flanders
Prerequisite: course 4C or consent of the instructor. Completion of the 3C–4D sequence is equivalent to 3A–4B, 119, 122.
Taylor and Fourier series, integral transforms, special functions, partial differential equations, potentials, integral equations, first variation.

4H. Analytic Geometry and Calculus, Fourth Course. (3) I and II.
Prerequisite: course 4A or 4G with high attainment; admission on recommendation of the department.
Course substantially the same as 4B, but designed for students with special facility for mathematics.
4. **Analytic Geometry and Calculus, Third and Fourth Courses.** (6) I and II. 
   Prerequisite: same as for 4A. 
   Mr. Cavailles

5. **Mathematics for Liberal Arts Students.** (3) I and II. 
   Not open to students who have had 3A or 16A. 
   Mr. Lehmer 
   Designed to give conceptions of modern mathematics to students who have no technical background. The content varies to include one or more of the following topics: algebra, geometry, set theory, logic, number theory, statistics, mathematical methods in science.

11. **Introduction to Linear Algebra.** (3) I. 
   Mr. Zelinsky 
   Prerequisite: course D or the equivalent. A student may not receive credit for course 11 if he has credit for 190B. 

**Philosophy 12A. Logic.** 
   This course, given in the Department of Philosophy, is prerequisite to Course 125A–125B and is recommended for all mathematics majors.

14A–14B. **Calculus and Advanced Calculus.** (5–5) Yr. Beginning each semester. 
   Mr. Abraham, Mr. Byrant 
   Prerequisite: course 3B. Students may not receive credit for 14A after completing 4A and 4B; they may not receive credit for 14B after completing 110A and 110B. 
   14A covers the subject matter of 4A and two-thirds of 4B; 14B covers the remaining third of 4B and 110A–110B.

16A–16B. **Analytic Geometry and Calculus.** (3–3) Yr. Beginning each semester. 
   Mr. Woll 
   Prerequisite: two years of high school algebra or course D, plane geometry, plane trigonometry. Students may not receive credit for 16A taken concurrently with or following 1A, 3A or 3R, nor for 16B taken concurrently with or following 3B. Students may not remove deficiencies in 1A, 3A or 3R by taking 16A nor in 3B by taking 16B. 
   16A. Straight lines, parabolas, derivates, maximum and minimum of algebraic and transcendental functions. Applications.
   16B. Integration, partial differentiation, maximum and minimum of functions of several variables, the method of least squares.

**Upper Division Courses**

*101A–101B. Elementary Mathematics for Advanced Students.** (3–3) Yr. 
   Prerequisite: courses 4A–4B, 8. Course 101A is not prerequisite to 101B. 
   Designed for students who are preparing to teach mathematics in secondary schools. 
   Selected topics in elementary algebra and geometry, treated from an advanced standpoint.

104. **Advanced Calculus.** (3) I and II. Mr. Lewy, ———, Mr. Wolf 
   Prerequisite: course 2A–2B or 14A–14B. 
   Point sets on the line and in Euclidean spaces, metric spaces, spaces of functions, differentiation, Riemann integration, interchange of order of limit operations, methods of successive approximations, existence theorems.

105. Integration. (3) II. 
Prerequisite: course 104.
Functions of bounded variation, Riemann-Stieltjes integration, measure theory, Lebesgue-Stieltjes integration, Fubini and Radon-Nikodym theorems.

Mr. Wolf

111. Algebra. (3) I and II. 
(Formerly numbered 111A.)
Prerequisite: course 4A–4B.
Linear dependence, matrices, characteristic values, quadratic forms.

Mr. Kato, Mr. Smale

112. Linear Geometry. (3) I and II. Mr. Dubins, Mr. Spanier, Mr. Thomas
Prerequisite: One semester of calculus.
Linear equations, matrices, determinants, groups of transformations, analytic affine and Euclidean geometry of 2 and 3 dimensions, quadratic forms and the principal axis theorem, analytic projective geometry.

Mr. Barankin

113A. Abstract Algebra. (3) I and II.
Prerequisite: one year of calculus or course 112.
Sets, equivalence relations, integral domains, mathematical induction, rings, fields, field of quotients, unique factorization for integers and polynomials, real and complex numbers, elementary group theory.

Mr. Bredon, Mr. Hirsch, Mr. Greenberg, Mr. Sachs

113B. Linear Algebra. (3) II.
Prerequisite: course 113A or 112.
Vector spaces and linear transformations, matrices, rank, determinants, duality, bilinear and quadratic forms, unitary spaces, similarity and unitary similarity, canonical forms.

Mr. Woll

*114. Introduction to the Theory of Potential. (3) II.
Prerequisite: 110A–110B or the equivalent.
Newtonian and vector potential, differential operators, problems related to Maxwell’s equations.

115A–115B. The Theory of Numbers. (3–3) Yr. Mr. Flanders, Mr. Lehmer
Prerequisite: one year of calculus.
Divisibility, congruences, theory of prime numbers, Diophantine analysis, partitions.

Mr. Kosinski

117. Analysis of Mathematical Problems. (3) I.
Prerequisite: upper division standing in mathematics and consent of the instructor. Intended primarily for honor students. Enrollment limited to fifteen students.
An undergraduate seminar in methods of attack on mathematical problems, without regard to particular field.

Mr. Kosinski

118. Analysis of Mathematical Problems. (3) II.
Prerequisite: upper division standing in mathematics and consent of the instructor. Intended primarily for honor students. Enrollment limited to fifteen students.
An undergraduate seminar in methods of attack on mathematical problems, without regard to particular field.

Mr. Flanders

119. Differential Equations. (3) I and II.
(Formerly numbered 119A.)
Prerequisite: course 4B. Beginning with the first Summer Session, 1959, only 1 unit of credit will be allowed for students who have credit for course 110B.

*121. Mathematical Introduction to Economics. (3) I.
Prerequisite: course 4A-4B.
Monopoly, competition, theory of dimension, taxation, utility, economic dynamics.

122. Advanced Calculus. (3) I and II.
Mr. Bredon, Mr. Morse, Mr. Phelps, Mr. Pinney,
(Formerly numbered 122A.)
Prerequisite: course 4B. Beginning with the first Summer Session, 1959, only 1 unit of credit will be allowed for students who have credit for course 110A.

125A-125B. Mathematical Logic. (3-3) Yr. Mr. Vaught
Prerequisite: one year of calculus or Philosophy 12A or consent of instructor.

128A. Numerical Analysis. (3) I and II. Mr. De Vogelaere, Mr. Lehman
Prerequisite: courses 2A-2B or 4A-4B, and 119A, or 14B. 128B is not prerequisite for 128A.
Interpolation, polynomial approximation of functions, operational calculus, numerical integration and summation, numerical solution of ordinary differential equations. Emphasis is on material appropriate for programming large computers.

128B. Numerical Analysis. (3) I and II. Mr. Huskey
Prerequisite: courses 2A or 4A-4B, 111 or 113B, 119. 128A is not prerequisite for 128B.

130A–130B. Projective Geometry. (3–3) Yr.
Mr. Hirsch, Mr. Kosinski, Mr. Sachs
(130A formerly numbered 9; 130B formerly numbered 112A.)
Prerequisite: course 1A–1B, 3A–3B.

135A–135B. Foundations of Mathematics. (3–3) Yr. Beginning each semester. Mr. Dubins, Mr. Levy, Mr. Montague
Prerequisite: one year of calculus or consent of instructor. Recommended: Philosophy 12A.
Elements of set theory: operations on sets; relations, functions, set theoretical equivalence; cardinals, ordinals; ordering, well ordering; introduction into axiomatic foundations. Elements of theoretical arithmetic; natural numbers; successive extensions—integers, rationals, real numbers; basic arithmetical operations; applications of continuity principle.

140. Metric Differential Geometry. (3) I and II. Mr. Protter
(Formerly numbered 112B.)
Prerequisite: course 2A or 4A–4B or 14B.
Vector analysis. Study of curves and surfaces in three dimensions.

145. Theory of Boolean Algebras. (3) II. Mr. Vaught
Prerequisite: course 125A.
Postulates, treatment as rings or lattices; relation to sentential calculus and calculus of classes; elementary development from the axioms; infinite operations, atoms; subalgebras, homomorphisms, direct products; representation theorem and its connection with completeness theorems of logic.

Introduction to Continuous Probability (Statistics 155). (3) II. Mr. Cogburn

185. Introduction to the Theory of Functions of a Complex Variable. (3) I and II. Mr. Koranyi, Miss Naim, Mr. Thomas
Prerequisite: course 104 or 123 or 14B and consent of the instructor.

190A–190B. Survey of Algebra and Analysis. (3–3) Yr. Mr. Helson, Mr. Uzawa
For upper division and graduate students in social sciences. Students may not receive credit for 190B if he has credit for course 11.
The first semester covers analytic geometry, calculus, and difference equations. The second semester includes partial differentiation, matrices, and selected topics related to current literature in social science.

199. Special Study for Advanced Undergraduates. (1–5) I and II.
The Staff (Mr. Cordes in charge)
Investigation of special problems under the direction of members of the department. In particular, this course offers an opportunity to students with facility for mathematics to anticipate some of the advanced courses by individual study.

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

201A–201B. Function Theory. (3–3) Yr. Beginning each semester. Mr. Woll, Mr. Morse
Prerequisite: course 111A and 119. Students with facility for mathematics may take this course in the senior year. It includes the material of course 185 and former course 150A–150B.
Point sets in Euclidean space, measure, generalizations of integral, includ-
Mathematics

ing Lebesgue and Lebesgue-Stieltjes integrals; classical theorems on the complex variables; application of real variable theory to complex variable.

202. Foundations of Analysis. (3) I and II. Mr. Spanier
(Formerly numbered 210A.)
Prerequisite: former course 150A or 201A or consent of the instructor.
Set theory, the real number system, topological spaces, metric spaces, compactness, completeness, function spaces.


203. Measure and Integration. (3) I and II. Mr. Kelley
(Formerly numbered 210B.)
Prerequisite: former course 150B or 201B or consent of the instructor.
General theory of measure and integration, including the Fubini theorem on product measures and the Radon-Nikodym theorem on absolutely continuous set functions.

205A–205B. Theory of Functions of a Complex Variable. (3-3) Yr. Mr. Wolf
Prerequisite: courses 201A–201B or former course 150A–150B with 185.
The theory of analytic functions and topics such as meromorphic functions, entire functions, modular functions, and Abelian integrals, analytic theory of differential equations, inequalities, etc., to be selected by the instructor.

206. On Hilbert Space. (3) II. Mr. Kelley
(Formerly numbered 211A.)
Prerequisite: former course 150A–150B and 185 or 201A–201B or consent of the instructor.
The elementary theory of Banach spaces, with special emphasis on Hilbert space; linear operators; the spectral theorem for bounded self adjoint operators.

207. Linear Operations. (3) I. Mr. Bade
(Formerly numbered 211B.)
Prerequisite: course 206 or consent of the instructor.
Completely continuous operators, differential operators, unbounded symmetric operators, perturbation theory and additional topics selected by the instructor.

215A–215B. Algebraic Topology. (3-3) Yr.
Study of homology groups of polyhedra: exact sequences for subcomplexes, simplicial mappings, and invariance. Two-dimensional manifolds, cohomology, introduction to homotopy groups; Brouwer's fixed point theorem, Hopf's extension theorem, cup and cap products, Poincaré duality, singular homology De Rham's theorem.

217. Special Functions and Asymptotic Integration. (3) I. Mr. Pinney
Prerequisite: course 185.
A thorough study of the properties of the Bessel, Legendre, and hypergeometric functions and of the asymptotic evaluation of integrals by the methods of stationary phase and steepest descents.

219A–219B. Ordinary Differential Equations. (3-3) Yr. Mr. Diliberto
Prerequisite: courses 111A, 119 (formerly 119A), 122 (formerly 122A) or former course 150, and 185 (which may be taken concurrently).
220A–220B. Higher Mathematics for Physical Sciences. (3–3) Yr.  
Mr. Chambre  
Prerequisite: courses 110A–110B, 122 (formerly 122A), and 185, or consent of the instructor. 185 may be taken concurrently. Primarily for students in engineering.  

Mr. Friedman, Mr. Bremermann  
Prerequisite: courses 119 (formerly 119A), 122 (formerly 122A), and 185, or their equivalents, or consent of the instructor. Primarily for students in physics and mathematics.  

221A–221B. Logarithmic and Newtonian Potential. (3–3) Yr.  
Mr. Lewy  
Prerequisite: course 201A–201B or the equivalent.  
Relation to distributions of mass, analysis of harmonic functions, tensor invariants in Euclidean and Riemannian metric spaces.

*222A—222B. Partial Differential Equations. (3–3) Yr.  
Prerequisite: either 201A–201B, or former course 150A–150B and 185. Course 220A–220B or 220C–220D recommended.  
Theory of initial value and boundary value problems for hyperbolic, parabolic, and elliptic partial differential equations, with emphasis on nonlinear equations.

225A–225B. Metamathematics. (3–3) Yr.  
Mr. Craig  
Prerequisite: courses 125A–125B and 135A.  

†230A–230B. Algebraic Geometry. (3–3) Yr.  

235A–235B. Set Theory. (3–3) Yr.  
Mr. Tarski  
Prerequisite: courses 125A and 135A–135B.  

Mr. Chern  
Prerequisite: graduate standing or consent of the instructor.  
*245A–245B. General Algebraic Systems. (3–3) Yr. Mr. Vaught
Prerequisite: courses 111A–111B, 125A–125B, and 135A.

250A–250B. Algebra. (3–3) Yr. Beginning each semester.
Mr. Foster, Mr. Greenberg, Mr. Zelinsky
Prerequisite: course 111A–111B.
Topics selected from the following list: finite groups, Abelian groups, polynomial and Noetherian rings, valuations, algebraic and transcendental field extensions, Galois theory, multilinear algebra, rings and linear algebras, ideal theory, algebraic number theory.

252. Representation of Groups and Algebras and Selected Topics. (3) II.
Prerequisite: course 111A–111B.
The classical representation theory of groups and algebras (initiated by Schur), with emphasis on finite groups. Certain applications to physical problems.

Prerequisite: courses 125A, 130A, 135A.


Advanced Probability (Statistics 265A–265B).

*270. Technical Hydrodynamics. (3) I. Mr. Wehausen
Theoretical analyses of motion of frictionless and viscous fluids, flow of compressible fluids at sub- and supersonic velocities.

275. Special Topics in Applied Mathematics. (3) I.
Mr. Carter
The application of such topics as operator theory, boundary-value problems, and integral equations to problems arising from electromagnetic theory, quantum theory, and statistical mechanics.

276. Special Topics in Topology. (3) II.
Mr. Spanier
Prerequisite: course 215A.
This is to be a course devoted to some field of current interest in topology such as one of the following subjects: homotopy theory, fiber bundles, sheaves, cohomology operations, theory of manifolds.

290. Seminars. (2–6) I and II.
The Staff (Mr. Lewy in charge)
Topics in foundations of mathematics, theory of numbers, numerical calculation, analysis, geometry, algebra, and their applications, by means of lectures and informal conferences; work based largely on original memoirs. During 1960–1961, there will be, in particular, lecture seminars on the following subjects, in charge of the persons indicated:
(b) Several complex variables, I, II, Mr. Bremermann; (c) Selected topics of analysis, I, II, Mr. Cordes; (e) Applied mathematics, I, II, Mr. Kato; (h) Harmonic analysis, I, II, Mr. Helson; (k) Lie groups, I, II, Mr. Kostant; (l) Asymptotic methods in analysis, I, II, Mr. Lehman; (r) Algebraic groups, I, II, Mr. Rosenlicht; (s) Symmetric complex domains, I, II,

Mathematics; Military Science and Tactics

Mr. Koranyi; (t) Algebraic topology, I, II, Mr. Lundell; (v) Foundations of Mathematics, I, II, Mr. Vaught; (w) Functional analysis and partial differential equations, I, II, Mr. Wolf.

295. Individual Research Leading to Higher Degrees. (2–6) I and II.
The Staff (Mr. Lewy in charge)

Mathematical Colloquium. (No credit) I and II.
The Staff (Mr. Bremermann in charge)

Meetings for the presentation of original work by members of the staff and graduate students.

RELATED COURSES IN OTHER DEPARTMENTS

Logic. (Philosophy 12A–12B) (3–3) Yr.
Statistics. See Department of Statistics.

MILITARY SCIENCE AND TACTICS

(Department Office, 149 Harmon Gymnasium)

John T. Malloy, Colonel, Infantry; Professor of Military Science and Tactics (Chairman of the Department).
Keith H. Houlson, Lieutenant Colonel, Transportation Corps; Associate Professor of Military Science and Tactics.
Andrew Blase, Lieutenant Colonel, Artillery; Associate Professor of Military Science and Tactics.
Donald G. Gray, Major, Armored; Associate Professor of Military Science and Tactics.
Albert R. Escola, Major, Military Police Corps; Associate Professor of Military Science and Tactics.
Sammy J. Black, Captain, Corps of Engineers; Assistant Professor of Military Science and Tactics.
Raymond W. Cooke, Captain, Artillery; Assistant Professor of Military Science and Tactics.
Howard H. Mann, Captain, Infantry; Assistant Professor of Military Science and Tactics.
Clayton V. Fitzgerald, Captain, Infantry; Assistant Professor of Military Science and Tactics.
Earl L. Hoag, First Lieutenant, Signal Corps; Assistant Professor of Military Science and Tactics.

LOWER DIVISION COURSES

The lower division or basic courses meet the requirement established by the Board of Regents for military training in the first and second undergraduate years. Enrollment is limited to students who are male citizens of the United States, able-bodied, and under twenty-three years of age at the time of initial enrollment. A first-year or second-year student claiming exemption because of noncitizenship, physical disability, age, or prior military service will present a petition to the Registrar on the prescribed form for such exemption. Pending action on his petition, the student will enroll in the course prescribed for his year and enter upon the work thereof. These courses consist of three hours of formal instruction per week for two academic years. Instruction is given in subjects common to all branches of the Army. Uniforms and textbooks, as required, are provided by the Government and must be returned in good condition on completion of the course.

The A part of a course is not a prerequisite for the B part of a course in either basic or advanced Military Science and Tactics.
1A. Military Science I. (2) I. The Staff (Mr. Fitzgerald in charge)
Organization of the Army and R.O.T.C.; individual weapons and marksmanship; leadership laboratory.

1B. Military Science I. (2) II. The Staff (Mr. Fitzgerald in charge)
American military history; leadership laboratory.

21A. Military Science II. (2) I. The Staff (Mr. Gray in charge)
Map and aerial photograph reading; United States Army and national security; leadership laboratory.

21B. Military Science II. (2) II. The Staff (Mr. Gray in charge)
Introduction to operations and basic tactics; leadership laboratory.

Upper Division Courses

Students who successfully complete the basic course or who have received credit in lieu thereof may apply for enrollment in the advanced course. For admission to the upper division or advanced course, a student must:

1. Be a male citizen of the United States and be regularly enrolled in the University.
2. Be able to complete the course before the age of twenty-eight years.
3. Have attained upper division standing in the University.
4. Successfully complete such survey and screening tests as may be prescribed.
5. Pass successfully a prescribed physical examination.
6. Be selected by the Professor of Military Science and Tactics and the Chancellor at Berkeley.
7. Execute a written agreement with the Government to complete the two-year advanced course, including attendance at summer camp, and to accept a reserve commission.

The advanced course consists of five hours of formal instruction per week for two academic years. Instruction is given in subjects common to all branches of the Army. It includes a summer camp of six weeks' duration (3 units of University credit), held between the two academic years of the advanced course. The number enrolled may vary from year to year and may be dependent upon a quota allotted annually.

An officer-type uniform is furnished to the student which becomes his personal property upon successful completion of the advanced course. Each student receives during the two-year period a monthly monetary allowance at a daily rate equal to the value of the commuted ration, as announced by the Department of the Army. Students attending the summer camp receive pay at the rate of $78 per month, railroad fare to and from camp, quarters, clothing, uniforms, meals, and medical services. Acceptance by the student of any of the monetary allowances listed above will make completion of the advanced course a prerequisite to graduating from the University, unless he is excused from this requirement by authority of the Secretary of the Army.

Successful completion of the advanced course, R.O.T.C., and requirements for a bachelor's degree (actual award of the degree may be waived in exceptional circumstances) qualifies the student for appointment and commission by the President as a second lieutenant in the United States Army Reserve.

Based upon the needs of the service and the professional training, aptitude, and preference of the individual, the graduate is commissioned in one of the branches of the Army. During the second year of the advanced course each student is asked to choose the arm or service, giving alternate choices, in which he desires to be commissioned. All choices are reviewed by a faculty
board, composed of both civilian and military personnel, which submits its recommendations to the Department of the Army.

Those students who have successfully completed the first year of the advanced R.O.T.C. course and who have been selected by the Professor of Military Science and Tactics and the Chancellor at Berkeley for scholastic excellence and outstanding qualities of leadership may be designated "Distinguished Military Students." Such Distinguished Students may be further designated "Distinguished Military Graduates" upon graduation and, upon application, may be considered for direct commission in the Regular Army.

For further information about the Reserve Officers' Training Corps, consult the Professor of Military Science and Tactics in 149 Harmon Gymnasium.

131A. Military Science III. (3) I. The Staff (Mr. Escola in charge)
Prerequisite: courses 21A and 21B, or the equivalent.
Leadership; military teaching methods; organization, functions, and missions of the branches of the Army; leadership, drill and command; one all-day field trip.

131B. Military Science III. (3) II. The Staff (Mr. Escola in charge)
Prerequisite: courses 21A and 21B or the equivalent.
Small-unit tactics and communications; leadership, drill and command; one all-day field trip.

141A. Military Science IV. (3) I. The Staff (Mr. Houlson in charge)
Prerequisite: courses 131A and 131B.
Command and staff; estimate of situation and combat orders; military intelligence; military team; training management; leadership, drill and command.

141B. Military Science IV. (3) II. The Staff (Mr. Houlson in charge)
Prerequisite: courses 131A and 131B.
Supply and evacuation; troop movements; motor transportation; military justice; military administration; service orientation; leadership, drill and command.

**MUSIC**

(Department Office, 104 Morrison Hall)

David D. Boyden, M.A., Mus.D. (h.c.), Professor of Music (Chairman of the Department).
Charles C. Cushing, M.A., Professor of Music.
William D. Denny, M.A., Professor of Music.
Vincent H. Duckles, Ph.D., Professor of Music.
Arnold Elston, Ph.D., Professor of Music.
*Andrew W. Imbrie, M.A., Professor of Music.
Joseph W. Kerman, Ph.D., Professor of Music.
Edward B. Lawton, Jr., A.B., Professor of Music.
Edward E. Lowinsky, Ph.D., Professor of Music.
Joaquin Nin-Culmell, Diplôme de fin d'Etudes, Schola Cantorum; Premier Accessit de Composition Musicales, Conservatoire National, Paris, Professor of Music.
Edgar H. Sparks, Ph.D., Professor of Music.
Albert I. Elkus, M.L., L.L.D., Professor of Music, Emeritus.
Lawrence H. Moe, Ph.D., Associate Professor of Music and University Organist.
Seymour J. Shifrin, M.A., Associate Professor of Music.
Daniel Heartz, Ph.D., Assistant Professor of Music.

Music

Alan Curtis, M.M., Instructor in Music.
Margaret E. Cartwright, A.B., Associate in Music for the spring semester.
Jacqueline R. Clark, A.B., Associate in Music.
Margaret A. Donovan, M.A., Associate in Music.
Mary Groom Jones, Associate in Music.
George H. Kyme, Ph.D., Associate in Music and Supervisor of the Teaching of Music.
John L. Mortarotti, M.A., Associate in Music for the spring semester.
Abe Sherman, A.B., Associate in Music.
E. Rollin Silfies, M.A., Associate in Music.
John M. Swackhamer, A.B., Associate in Music.

The Griller Quartet of the University of California:

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses; a total of not more than 8 units from courses 42, 43, 46, 48, 142, 143, 146, and 148 will be accepted as Letters and Science credit. For regulations governing this list, see page 11. An advisory examination in piano playing will be given during registration week for entering students. Those who are deficient will be advised concerning further studies (see courses 405A, 405B, 405C, 405D). Students are urged to study at least one other instrument (see courses 430A-430B). Undergraduate students transferring from other colleges should consult with the adviser for music majors before enrolling in any music course.

Adviser for Music Majors: Mr. Denny.

The Major in Music.—The courses applicable to the major are arranged in three groups. The Theory courses provide an introduction to the materials of musical composition through analysis of representative musical works and practical exercises in the technique. The History and Literature courses provide a study of musical literature and the chief periods of its development. The Performance courses provide an opportunity to gain familiarity with musical literature through group performance.

First Year: Required: I: Courses A, 2A, 3A; II: Courses B, 2B, 3B.
Second Year: Required: I: Courses C, 2C, 3C; II: Courses D, 2D, 3D.
Third and Fourth Years: Required:
   a. Theory: Course 101A–101B.
   b. History and Literature: Course 121A–121B, and one additional course from this group.
   c. Performance: Two semester courses in the 100 series from this group.
   d. Additional courses from any of the three groups to complete a total of 24 units in the 100 series.
   e. Ability in piano playing comparable to that achieved in course 405D.

Students should acquire facility in reading French, German, or Italian. In addition, the department recommends as supplementary choices among free electives: History 130, Philosophy 136A–136B and other related courses in
the fields of anthropology, architecture, art, English, history, philosophy, speech, and foreign literatures.

The department does not offer individual vocal or instrumental instruction. However, it will consider recommending to the Dean a reduction of the minimum unit load for those students who wish to continue intensive private study and to take longer than the usual four years to obtain the A.B. degree. See section concerning study-list regulations in the Circular of Information.

Teacher-Training.—Adviser: Mr. Sparks. Candidates for the general secondary credential, after receiving the A.B. degree, must spend two graduate semesters at this University. The teaching major, normally completed by the end of this period, specifically requires: (a) the courses in Theory and History and Literature required for the music major; (b) courses 108, 111, 112A–112B; (c) 4 units chosen from 140, 141, 142, 143, 144, 145, 146, 148, 149, 2 units of which must be in 144. Only 1 unit of 148 may apply; (d) ability in piano equivalent to that attained in course 405D, and competence in either voice or one orchestral or band instrument, and 9 units from 328A, 328B, 329A, 329B, 329C, 329D, 329E. At the discretion of the adviser, portions of this work may be waived. Students without previous experience in playing an orchestral or band instrument are urged to undertake work in the 329 courses as soon as possible, preferably in the lower division. Credit of 3 to 5 units in the teaching methods courses will satisfy the requirement of elective units in education.

The candidate for practice teaching in instrumental music must demonstrate ability in performance on strings, brass, and woodwinds equivalent to that which he would attain from two semesters of course 329A and one semester each of courses 329B, 329C, 329D. For further information, including grade-point requirements, see the Announcement of the School of Education.

Honor Students.—Students in the honors group who have completed the major in music with distinction may receive honors at graduation.

Adviser for Music Education Majors: Mr. Sparks.

Major in Music Education.—This curriculum leads to the A.B. degree in four years and to a general secondary credential in five years, or a special credential in four and one-half years. The curriculum coordinates (1) the State requirements for the general secondary and special credentials; (2) the general requirements of the University; and (3) training in music, embodying (a) the main requirements of the music major, including group performance, (b) instrumental and vocal methods, (c) conducting and orchestration, and (d) instruction in individual instruments or the voice.

Required: Course A–B, C–D, 2A–2B, 2C–2D, and Psychology 1A. (Courses 2A–2B, 2C–2D may be taken in the sophomore and junior years.) Course 101A–101B, 108, 112A–112B, 121A–121B, two semesters of 144, and two other courses selected from the series 140–149; Education 100A–100B. The program also allows the student substantially to complete a teaching minor of 20 units before graduation.

Required: Major instrument or voice: Course 429A–429B, 429C–429D. Minor instrument or voice: minor piano, course 405A–405B, 405C–405D (required of all students except piano majors); or other minor instrument, course 430A–430B, 430C–430D; or the minor in voice, course 328A–328B. The foregoing courses should be completed in the freshman and sophomore years. Instrumental and vocal methods: course 328A–328B, 4 to 6 units of course 329A, 329B, 329C, 329D, 329E, and 330. A limited number of methods courses may be deferred until the graduate year at the discretion of the adviser.

The Graduate Year.—In addition to required courses in education, the student will normally take 12 units of courses in the fields of the teaching major and the teaching minor.
Higher Degrees.—See the Announcement of the Graduate Division, Northern Section, and the special announcements issued by the department concerning the M.A. and Ph.D. degrees. The department requires a reading knowledge of French, German, and Latin for the Ph.D. degree; the student should acquire such knowledge as early as possible in his graduate years.

GROUP I

Groups open to all students in the University

LOWER DIVISION COURSES

10. Basic Musicianship. (2) I and II. The Staff (Mr. Sparks in charge)
Fundamentals of music, with singing, ear training, harmonization of melodies, and conducting.

Mr. Commanday, Mr. Heartz
Two lectures and one section meeting per week. Course 27A or consent of the instructor is prerequisite to course 27B.
Lectures, illustrations, and readings designed to furnish a general appreciation of music. Weekly section meetings for listening, discussion, and written work.

Performance

Audition for enrollment in any performance course will be required during the period of registration. Further information may be obtained at the departmental office.
All courses in this group may be repeated once without duplication of credit.

40. Opera Workshop. (2) I and II.
Miss Donovan

41. University Symphony Orchestra. (2) I and II.
Mr. Griller
Two two-hour rehearsals per week.

42. University Chamber Band. (1) I.
Mr. Berdahl
One two-hour rehearsal per week.

43. University Concert Band. (2) II.
Mr. Berdahl
Two hour-and-a-half rehearsals and one section hour per week.

44. University Chorus. (2) I and II.
Mr. Lawton
Two hour-and-a-half rehearsals and one section hour per week.
Primarily concerned with major works for chorus and orchestra.

46. Chamber Music Ensemble. (1 or 2) I and II.
The Griller Quartet (Mr. Hampton in charge)
Two to four class hours per week.
Study and interpretation of chamber music for strings and for strings, winds, and piano.

48. Piano Ensemble. (1) I and II.
Mrs. Petray
Two class hours per week.
Study and interpretation of four- and eight-hand piano literature.

UPPER DIVISION COURSES

110. Basic Musicianship. (2) II.
Prerequisite: course 10 or consent of the instructor.
A continuation of course 10 for general students who wish to attain additional facility.

*127A. Introduction to Opera. (3) II. Mr. Kerman
Prerequisite: course 27A or consent of the instructor.
Critical study of seven operas, such as Dido and Aeneas, Gluck’s Orfeo, Don Giovanni, Fidelio, Tristan, Otello, Pelléas, and Wozzeck, emphasizing the contributions of music to a total dramatic effect.

127B. The Symphonies of Beethoven. (3) II. Mr. Elston
Prerequisite: course 27A or consent of the instructor.
Study of the nine symphonies, showing the development of Beethoven’s style. Lectures, listening, and reference to selected nonsymphonic works.

127C. Introduction to Contemporary Music. (3) I. Mr. Elston
Prerequisite: course 27A or consent of the instructor.
Study of representative works of the twentieth century; lectures, guided listening, and reading assignments.

127D. Bach and Handel. (3) II. Mr. Curtis
Prerequisite: course 27A or consent of the instructor.

Performance

For particulars, see lower division performance courses.
All courses in this group may be repeated once without duplication of credit.

140. Opera Workshop. (2) I and II. Miss Donovan
Prerequisite: consent of the instructor.

141. Advanced University Symphony Orchestra. (2) I and II. Mr. Griller
Prerequisite: consent of the instructor.

142. University Chamber Band. (1) I. Mr. Berdahl
Prerequisite: consent of the instructor.

143. Advanced University Concert Band. (2) II. Mr. Berdahl
Prerequisite: consent of the instructor.

144. Advanced University Chorus. (2) I and II. Mr. Lawton
Prerequisite: 4 units in course 44.

145. Repertory Chorus. (2) I and II. Mr. Moe
Prerequisite: consent of the instructor.
Primarily concerned with lesser-known significant choral literature.

146. Advanced Chamber Music Ensemble. (1 or 2) I and II.
The Griller Quartet (Mr. Hampton in charge)
Prerequisite: consent of the instructor.

148. Advanced Piano Ensemble. (1) I and II. Mrs. Petray

*149. Collegium Musicum. (1 or 2) I and II. Mr. Kerman
Performance of rarely heard ensemble music.

GROUP II

Courses primarily for students whose major subject is music

LOWER DIVISION COURSES

A-B. Musicianship. (2-2) Yr. The Staff (Mrs. Petray in charge)
Elements of music, with ear training, sight singing, and dictation.

C-D. Musicianship. (1-1) Yr. Mrs. Petray, Mr. Sherman
Prerequisite: course A-B or consent of the instructor.
A continuation of course A-B, which is prerequisite.

2A-2B. The Masterworks of Music. (1-1) Yr. Mr. Curtis
Prerequisite: the ability to read music or consent of the instructor.
Guided listening and discussion.

2C-2D. The Masterworks of Music. (2-2) Yr. Mr. Sparks
Prerequisite: courses 2A-2B and 3A-3B, or consent of the instructor.
A continuation of course 2A-2B.

3A-3B. Elementary Harmony. (3-3) Yr.
Mr. Cushing (in charge), Mr. Curtis, Mr. Denny, Mr. Heartz
Prerequisite: courses A-B and 2A-2B (may be taken concurrently), or consent of the instructor.
Exercises in writing and at the keyboard.

3C-3D. Intermediate Harmony. (3-3) Yr.
Mr. Lawton (in charge), Mr. Kerman, Mr. Nin-Culmell
A continuation of course 3A-3B, which is prerequisite.

UPPER DIVISION COURSES

Theory

101A-101B. Counterpoint. (3-3) Yr. Mr. Cushing, Mr. Elston
Prerequisite: course 3D.
The first semester will be devoted to modal, the second semester to tonal counterpoint.

102A. Keyboard Harmony. (2) I. Mr. Curtis
Prerequisite: course 3D.

102B. Score Reading. (2) II. Mr. Nin-Culmell
Prerequisite: course 3D.

105A-105B. Principles of Composition. (3-3) Yr. Mr. Shifrin
Prerequisite: course 101B.

106A-106B. Canon and Fugue. (3-3) Yr. Mr. Denny
Prerequisite: course 101B.

107A-107B. Studies in Musical Analysis. (3-3) Yr. Mr. Shifrin
Prerequisite: course 3D.
Structure in relation to harmonic, polyphonic, rhythmic, and thematic treatment.

108. Instrumentation. (3) I. Mr. Nin-Culmell
Prerequisite: course 3D. Teacher-training students are advised to take this course in their junior year.
A study of the instruments of the orchestra, leading to practice in scoring for instrumental combinations.
### Music

**109. Orchestration.** (3) II.
Prerequisite: course 108.
Mr. Denny

**111. Band Instrumentation.** (2) II.
Prerequisite: course 108.
A study of the instruments of the band; practice in scoring for selected wind instruments and for concert band.
Mr. Berdahl

**112A-112B. Conducting.** (2-2) Yr.
Prerequisite: course 108 (may be taken concurrently).
112A: Choral Conducting.
112B: Instrumental Conducting.
Mr. Lawton

### History and Literature

**Survey of Western Music**

**121A—121B. History and Literature of Music.** (3-3) Yr.
Prerequisite: course 2D and 3D, or consent of the instructor.
A study of the development of music from antiquity to the present; lectures, listening, technical analysis, and written reports.
Mr. Moe

### Historical Periods

Courses in this group will be given in rotation. Prerequisite: course 2D and 3D, or consent of the instructor.

**114A. Survey of Medieval Music (to 1430).** (3) I.
Mr. Lowinsky

**115A. Survey of Renaissance Music (1430-1600).** (3) II.
Mr. Lowinsky

**Baroque Period (1600-1750)**

**116A. Survey of Baroque Music.** (3) I.
Mr. Boyden
A survey of musical literature from Monteverdi to Handel and J. S. Bach.

**116E. The Performance of Baroque Music.** (3) II.
Prerequisite: experience in playing an instrument or in singing, and a reading knowledge of French, German, or Italian.
Mr. Boyden

**116F. The Music of Johann Sebastian Bach.** (3) II.
Mr. Kerman

**Classic Period (1730—1827)**

**117A. Survey of Classic Music.** (3) I.
Mr. Kerman
The music of the early classic schools and of Haydn, Mozart, and Beethoven.

**117B. The Operas of Mozart.** (3) II.
Mr. Heartz

**117C. The String Quartets of Beethoven.** (3) II.
Mr. Sparks

**Romantic Period (1820—1900)**

**118A. Survey of Romantic Music.** (3) II.
Mr. Elston
From Weber and Schubert to the end of the nineteenth century.

**118C. The Songs of Schubert.** (3) I.
Mr. Kerman
Study of the songs will be related to Schubert's work as a whole and to the development of song composition from Mozart to Strauss and Debussy.

**118D. Wagner's Ring of the Nibelung.** (3) II.
Mr. Shifrin

* Not to be given, 1960-1961.
Modern Period (1900–)

*119A. Survey of Modern Music. (3) I. Mr. Imbrie

*119B. Selected Modern Works. (3) II. Mr. Cushing

*119C. Modern French Music. (3) II. Mr. Cushing
   Critical and analytical studies of selected works of French composers from 1870 to the present, with special reference to Fauré, Debussy, and Ravel.

*119D. Chamber Music of the Twentieth Century. (3) I. Mr. Imbrie
   A critical and analytical study of works by Milhaud, Stravinsky, Bartók, Sessions, and Schöenberg.

Forms and Mediums

*120A. Choral Literature: Josquin des Prez to Handel. (3) I. Mr. Lawton

*120B. Choral Literature: Bach to the Present Day. (3) II. Mr. Lawton

National Schools

130. The Music of Spain. (3) II. Mr. Nin-Culmell
   From the Middle Ages to the present.

Special Study Courses

198. Group Special Study for Advanced Undergraduates. (2 or 3) I and II.
   The Staff (Mr. Lawton in charge)

199. Special Study for Advanced Undergraduates. (1–3) I and II.
   The Staff (Mr. Denny in charge)

Graduate Courses

Consent of the instructor must be obtained before enrollment in any graduate course. For further conditions concerning admission to graduate courses, see page 18.

200A–200B. Introduction to Musical Scholarship. (3–3) Yr. Mr. Duckles
   Bibliography; individual research projects and a class problem.

202. Seminar: Contemporary Music. (2) II. Mr. Shifrin
   The topic for 1960–1961 is Moses and Aaron.

203. Seminar in Composition. Mr. Cushing, Mr. Nin-Culmell
   203A. Technical Projects. (2) I and II. Mr. Nin-Culmell
   203B. Free Composition. (2) I and II. Mr. Cushing
   Prerequisite: courses 105B and 106B, or the equivalent. Students taking the course for the first time shall enroll in both 203A and 203B, unless expressly excused by consent of both instructors.

*205. Seminar in Choral Scoring. (2) II. Mr. Lawton

210A–210B. Seminar in Mensural Notation. (3–3) Yr. Mr. Duckles, Mr. Sparks

213A–*213B. Seminar: Music of the Renaissance. (3–3) Yr. Mr. Kerman

214A-*214B. Seminar: The Sonata in the Nineteenth Century. (3-3) Yr. Mr. Sparks

*215A–215B. Seminar: Research in Music History. (3–3) Yr. Mr. Boyden

220. Seminar: Problems in Criticism. (3) II. Mr. Kerman
Analysis of important critical writings in and out of the field of music, in order to clarify the role of criticism beside aesthetics, musicology, analysis, and reportage. Critical study of selected compositions.

*230. Studies in Musical Source Materials. (3) II. Mr. Duckies
Problems in paleography, analysis, description, and editing of manuscripts and early prints in the University of California Library.

250. Seminar in the Technique of Musicological Research. (2–4) I and II. Prerequisite: courses 200A–200B and 210A–210B. Mr. Lowinsky

298. Special Studies. (2–4) I and II. The Staff (Mr. Boyden in charge)
Open to properly qualified graduate students for research or creative work. Such work shall not serve in lieu of regular courses of instruction.

TEACHING METHODS COURSES†

328A–328B. Vocal Technique and Methods of Teaching Voice. (2–2) Yr. Mrs. Jones
Prerequisite: some ability at the piano. May be repeated once without duplication of credit.
Principles of vocal and choral technique; voice-testing; care of adolescent voices; transposition; evaluation of teaching materials.

329. Instrumental Methods. Mr. Berdahl, Mr. Kyme, Mr. Lord, Mr. Mortarotti, Mr. Sifilés

329A. Stringed Instruments. (1) I and II. Mr. Kyme, Mr. Mortarotti

329B. Brass Instruments. (1) I. Mr. Lord

329C. Woodwind Instruments. (1) II. Mr. Berdahl

329D. Percussion Instruments. (1) I. Mr. Sifilés

329E. Ensemble: Literature for School Orchestra and Band. (1) II. Mr. Lord
Methods of teaching orchestra and band instruments; repertory and program planning for secondary schools. Each course may be repeated once without duplication of credit.

330. Choral Repertory. (1) II. Miss Cartwright
Prerequisite: consent of the instructor.
A study of choral literature, with special reference to repertory suitable for the secondary schools. Problems of performance; editorial techniques. Students will conduct the works studied.

PROFESSIONAL COURSES

405A–405B. Elementary Piano. (1–1) Yr. Beginning each semester. Mr. Sparks (in charge)
Open to music majors, music education majors, and candidates for the General Secondary Credential with a minor in music, with consent of the instructor in charge.

† See the ANNOUNCEMENT OF THE SCHOOL OF EDUCATION.
405C–405D. **Elementary Piano.** (1–1) Yr. Beginning each semester.  
Mr. Sparks (in charge)  
Prerequisite: course 405B.  
Open to music majors, music education majors, and candidates for the General Secondary Credential with a minor in music, with consent of the instructor in charge.

429A–429B. **Advanced Instruments and Voice.** (1–1) Yr. Beginning each semester.  
Mr. Moe (in charge), Mr. Griller, Mrs. Jones, Mr. Berdahl  
Section I: Advanced piano and organ; Section II: Advanced strings; Section III: Advanced voice; Section IV: Advanced wood-wind and brass. Open to intending majors and majors in music education, with consent of the instructor in charge.

429C–429D. **Advanced Instruments and Voice.** (1–1) Yr. Beginning each semester.  
Mr. Moe (in charge), Mr. Griller, Mrs. Jones, Mr. Berdahl  
Prerequisite: course 429B.  
Section I: Advanced piano and organ; Section II: Advanced strings; Section III: Advanced voice; Section IV: Advanced wood-wind and brass. Open to intending majors and majors in music education, with consent of the instructor in charge.

430A–430B. **Minor Instrument.** (1–1) Yr. Beginning each semester.  
Mr. Moe (in charge), Mr. Griller, Mr. Berdahl  
Section I: Elementary organ; Section II: Elementary strings; Section III: Elementary wood-wind and brass. Open to intending majors and majors in music education, with consent of the instructor in charge.

430C–430D. **Minor Instrument.** (1–1) Yr. Beginning each semester.  
Mr. Moe (in charge), Mr. Griller, Mr. Berdahl  
Prerequisite: course 430B.  
Section I: Elementary organ; Section II: Elementary strings; Section III: Elementary wood-wind and brass. Open to intending majors and majors in music education, with consent of the instructor in charge.

**NATURAL RESOURCES AND SOCIETY**

The following is a partial list of courses that relate physical resources to social and technological change. Students of both the social and natural sciences may find in this list courses that will help them to appreciate the relations between these two in the field of conservation and development of natural resources. For the more specialized aspects of resource use and management, see offerings of individual departments.

Agricultural Economics 25. Comparative World Agriculture.  
208. Seminar in Natural Resources Policies.  
270A–270B. Natural Resource Economics Research.  
Economics *126. Economics of Extractive Industries.  
*188. Population and Migration.

Engineering  
Civil Engineering 159. Water Institutions and Economics.  
Forestry 132. Forest Policy.  
Geography 153. Natural Resources and Their Exploitation.  
176. The Relations between Nature and Culture.

Political Science *185A. Public Policy and Administration of Natural Resources.

Sociology and Social Institutions 135. Social Change in Underdeveloped Countries.
Zoology 113. Natural History of the Vertebrates.
116. Introduction to Wildlife and Fisheries Management.

**NAVAL SCIENCE**
(Department Office, 47 Harmon Gymnasium)

William C. Meyer, Captain, U.S.N., Professor of Naval Science (Chairman of the Department).
Clarence J. Busick, Major, U.S.M.C., Associate Professor of Naval Science.
William B. Fields, Lieutenant, U.S.N., Assistant Professor of Naval Science.
James P. Miller, Lieutenant, U.S.N., Assistant Professor of Naval Science.
Jack E. Russ, Lieutenant, U.S.N., Assistant Professor of Naval Science.
Robert P. Soens, Lieutenant (S.C.), U.S.N., Assistant Professor of Naval Science.

Courses in this department are designed for students who are regularly enrolled members of the Naval Reserve Officers' Training Corps. Details concerning enrollment are available in 47 Harmon Gymnasium, office of the Department of Naval Science. Candidates must be able to complete all requirements of the Naval R.O.T.C. curriculum, without serious interference from or with other academic work which is required for the bachelor's degree.

All students enrolled in the Naval Reserve Officers' Training Corps are required to engage in drill or practical exercises two hours per week.

**Note.**—Second-year N.R.O.T.C. students are required to take Psychology 33.

**LOWER DIVISION COURSES**

1A. Naval Orientation. (3) I. Mr. Russ
Enrollment limited to freshman N.R.O.T.C. students.
Introduction to: the naval service; elements of naval leadership; basic seamanship; characteristics of naval ships; naval justice; fundamentals of national defense organization; naval communications; fundamental concepts of seapower; naval discipline; naval logistics.

1B. Evolution of Sea Power. (3) II. Mr. Russ
Enrollment limited to freshman N.R.O.T.C. students.
Evolution of seapower and its influence upon global history; basic elements of naval strategy and tactics; evolution of amphibious doctrine; basic geopolitics as applied to naval warfare; history of the U.S. Navy; indoctrination for active sea duty.

2A. Naval Weapons. (3) I and II. Mr. Fields
Study of basic weapons systems, their capabilities and limitation, including gun systems, antisubmarine warfare systems, guided missiles, nuclear weapons and space technology.

101A. Naval Engineering. (3) I.
Principles of nuclear propulsion, steam turbine propulsion, diesel engine propulsion, electrical systems, auxiliary machinery, refrigeration, distilling plants, ship construction, ship stability and control of damage, shipboard atomic defense.
101B. Navigation. (3) II.
Terrestrial navigation (navigation instruments and equipment; dead reckoning; piloting; Loran); celestial navigation (the theory and technique of surface navigation).

102A. Naval Operations. (3) I.
Fundamentals of naval operations, including tactical communications and tactical instructions; maneuvering board; rules of the nautical road; meteorology.

102B. Naval Leadership. (3) II.
Prerequisite: Psychology 33.

103M. Evolution of the Art of War. (3) I.
Survey of the historical development of weapons, tactics, and material; and illustrates the classic principles of war by a study of selected battles and campaigns.

104M. Basic Strategy and Tactics. (3) II.
Designed to survey modern strategical and tactical principles, using contemporary historical events as illustrative material.

105M. Amphibious Warfare. (3) I.
Open to members of the Armed Forces only.
Broad introduction to the specialized field of amphibious warfare by a limited treatment of the factors pertaining to its planning and execution.

106M. Amphibious Warfare and Naval Officer Orientation. (3) II.
Examination of certain amphibious operations of World War II. The last half of this course is designed to prepare the student for his first active duty and includes naval justice and leadership.

107S. Navy Supply System. (3) I.
Open to junior students only.
Organization for national security; policy, military, management and technical controls over Navy logistic organizations, naval finance and accounting systems, controls and reports.

108S. Supply Management Afloat. (3) II.
Prerequisite: course 107S.
The organization, management and control of logistics afloat, management analysis and controls of accounting system afloat.

109S. Retail and Cost Management. (3) I.
Open to senior students only.
Navy Supply Corps programs in retail and cost management operations; requirements planning and analysis of controls. Case studies and literature serve to aid in implementation of managerial objectives.

110S. Supply Administration and Management. (3) II.
Prerequisite: course 109S.
Overview of naval supply echelons, systems and managerial techniques. Principles in naval justice and leadership.
NEAR EASTERN LANGUAGES
(Department Office, 1229 Dwinelle Hall)

Denzel Carr, Ph.D., Professor of Oriental Languages (Acting Chairman of the Department).
Walter J. Fischel, Ph.D., Professor of Semitic Languages and Literature.
Henry L. F. Lutz, Ph.D., D.D., LL.D., Professor of Egyptology and Assyriology, Emeritus.
William Popper, Ph.D., LL.D., Professor of Semitic Languages, Emeritus.
Jacob J. Finkelstein, Ph.D., Associate Professor of Assyriology.
Klaus Baer, Ph.D., Assistant Professor of Egyptology.
*William M. Brinner, Ph.D., Assistant Professor of Near Eastern Languages.
John J. Gumperz, Ph.D., Assistant Professor of South Asian Languages.
Gene M. Schramm, Ph.D., Assistant Professor of Semitic Languages.
Muhammad A. Sha‘bân, Ph.D., Instructor in Persian.
Reuben W. Smith, M.A., Instructor in Arabic.

Letters and Science List.—All undergraduate courses in this department are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: The Ancient Near East: Mr. Finkelstein and Mr. Schramm; Arabic and Islamic Studies: Mr. Fischel; South Asian Languages: Mr. Gumperz.

The Major.—A student may elect a major emphasizing the Ancient Near East, Arabic and Islamic Studies, or South Asian Languages. Major students in this department are strongly urged to take at least 12 units of French, German, or Russian.


LOWER DIVISION COURSES

Elective courses not requiring a knowledge of any Near Eastern Language.

1. Languages and Cultures of the Near East. (2) II. Mr. Smith
A survey of the growth, structure and differentiation of ethnic, religious and linguistic groups in the Arab countries, in Israel, Turkey and Iran, throughout the ages.

12. Great Books of Hebrew Literature. (1) I and II. Mr. Fischel
A survey of Hebrew Classics, covering postbiblical, medieval, and modern literature in various centers of the Orient and Europe.

15A–15B. Hebrew Civilization. (2–2) Yr. Mr. Schramm
(Course 15A formerly numbered 129; 15B formerly numbered 130.)
A survey of the development of Hebrew civilization from its origin through
the European Renaissance.
15A. Ancient Israel, from the Patriarchal Age to the Roman Period.
15B. From the Roman Period to the European Renaissance.
Course 15A is not prerequisite to 15B.

25. Great Books of Islamic Literature. (1) II. Mr. Fischel
(Formerly numbered 111.)
A survey of the major political, historical, and philosophical masterpieces
of Arabic, Persian, and Turkish literature from the rise of Islam until modern
times.

Language Courses

10A–10B. Elementary Hebrew. (4–4) Yr. Mr. Schramm
An introduction to the grammar of literary Hebrew.

20A–20B. Elementary Arabic. (4–4) Yr. Mr. Smith
(Formerly numbered 131A–131B.)
Classical Arabic grammar and reading.

30A–30B. Elementary Modern Persian. (4–4) Yr. Mr. Sha’bān
(Formerly numbered 140A–140B.)
Grammar and reading.

40A–40B. Elementary Spoken Hindi (Hindustani). (4–4) Yr.
(Formerly numbered 155A–155B.) Mr. Gumperz
Two lectures and 5 practice sessions per week.
An elementary course in the spoken idiom for students intending to spe­cialize in either Hindi or Urdu.

45A–45B. Elementary Telugu. (4–4) Yr.
An elementary course in modern literary Telugu.

Upper Division Language Courses

100A–100B. Elementary Egyptian. (3–3) Yr. Mr. Baer
(Formerly numbered 161A–161B.)
Middle Egyptian grammar and texts.

102A–102B. Elementary Coptic. (3–3) Yr. Mr. Baer
(Formerly numbered 171A–171B.)
Prerequisite: 6 units of Greek.

103A–103B. Elementary Akkadian. (3–3) Yr. Mr. Finkelstein
(Formerly numbered 151A–151B.)
Elementary Akkadian (Assyro-Babylonian).

104A–104B. Akkadian Letters and Legal Documents. (2–2) Yr.
Prerequisite: course 103A–103B. Mr. Finkelstein
Reading of various groups of royal and private correspondence and legal
records, illustrating the diplomatic and political activity, as well as the social
and economic milieu in Mesopotamia and adjacent regions in the second mil­lenium B.C. May be repeated for credit.

105A–105B. Elementary Sumerian. (2–2) Yr. Mr. Finkelstein
(Formerly numbered 152A–152B.)
Prerequisite: course 103A–103B.
Near Eastern Languages

110A–110B. Intermediate Hebrew. (2–2) Yr. Mr. Fischel
Prerequisite: course 10A–10B or the equivalent.

111A–111B. Readings in Hebrew. (1–1) Yr. Mr. Schramm
Prerequisite: course 110A–110B.

*112A–112B. Modern Hebrew. (2–2) Yr. (Formerly numbered 122A–122B.)
Prerequisite: course 10A–10B or the equivalent.
Reading and grammatical study of modern Hebrew literature.

115A–115B. The Dead Sea Scrolls in Hebrew. (2–2) Yr. Mr. Fischel
(Formerly numbered 190A–190B.)
Prerequisite: course 110A–110B or the equivalent. 115A is not prerequisite to 115B.
Readings of the original texts (Book of Habakkuk, Manual of Discipline, Damascus fragments, etc.) with interpretations and special assignments.

*116A–116B. Elementary Syriac (Aramaic). (2–2) Yr. Mr. Schramm
(Formerly numbered 141A–141B.)
Prerequisite: course 10A–10B or the equivalent.
Elements of biblical Aramaic or classical Syriac designed to meet the needs of major students.

120A–120B. Intermediate Arabic. (2–2) Yr. Mr. Smith
(Formerly numbered 132A–132B.)
Prerequisite: course 20A–20B.
Reading of selected materials from Arabic literature.

121A–121B. Readings in Arabic. (1–1) Yr. Mr. Smith
Prerequisite: course 120A–120B or the equivalent.
Selected readings from important writers and various periods of Arabic literature. May be repeated without duplication of credit.

130A–130B. Intermediate Persian. (2–2) Yr. Mr. Sha’bān
Prerequisite: course 30A–30B.
Grammar and reading.

140A–140B. Readings in Hindi. (4–4) Yr. Mr. Gumperz
Prerequisite: course 40A–40B or a knowledge of conversational Hindi or Urdu.
Graded readings in modern Hindi prose.

141A–141B. Advanced Readings in Hindi. (1–1) Yr. Mr. Gumperz
Prerequisite: course 140A–140B or the equivalent.
Selected readings from Hindi literature. May be repeated without duplication of credit.

142A–142B. Readings in Urdu. (4–4) Yr. Mr. Gumperz
Prerequisite: course 40A–40B, or a knowledge of conversational Hindi or Urdu.
Graded readings in modern Urdu prose.

143A–143B. Advanced Readings in Urdu. (1–1) Yr. Mr. Gumperz
Selected readings from Urdu literature. May be repeated without duplication of credit.

Near Eastern Languages

161. Semitic Linguistic Structures. (2) II.  Mr. Schramm
(Formerly numbered 116.)
Prerequisite: A working knowledge of at least one Semitic language or Linguistics 130 and 140 or 145.
A structural analysis of the Semitic languages with emphasis on one or more of the classical idioms.

Upper Division Lecture Courses

163A–163B. History of Persian Literature. (2–2) Yr.  Mr. Sha’bān
163A: Classical Persian literature from Firdawsi to the beginning of the Safavid era.
163B: Modern Persian literature.
163A is not prerequisite to 163B.

170. Religion and Cosmology of Ancient Mesopotamia. (2) I.  Mr. Finkelstein
Original sources bearing on the religious beliefs and practices of the ancient Mesopotamians will be read in translation with a view towards elucidating the world views current among them.

171. Ancient Western Asia. (3) II.  Mr. Finkelstein
The development of civilization in Mesopotamia and adjacent regions from its origins to the period of the Persian Empire.

172A–172B. History and Culture of Ancient Egypt. (3–3) Yr.  Mr. Baer
The political, social, and cultural history of ancient Egypt from the rise of Egyptian civilization to the Hellenistic age.

180A–180B. Islamic Civilization. (2–2) Yr.  Mr. Fischel
(Formerly numbered 125.)
180A. Rise and spread of Islam from the time of Muhammad to the height of the Ottoman Empire.
180B. Islamic Institutions. The origin and development of distinctive aspects of Islamic society and institutions, including the Caliphate, jurisprudence, mysticism and philosophy.
180A is not prerequisite to 180B.

190. Modern South Asian Literatures. (2) II.
A survey of modern literatures of India, Pakistan, and Ceylon in translation.

199. Special Study for Advanced Undergraduates. (1–5) I and II.  The Staff

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 18)

200A–200B. Bibliography and Historiography of Islamic Studies. (2–2) Yr.  Mr. Fischel
(Formerly numbered 180A–180B.)
Prerequisite: course 180A–180B.
A survey of the methods of research in Islamic studies, bibliographical tools and resources, recent literature, and so forth.

224A–224B. Advanced Biblical Hebrew. (2–2) Yr.  Mr. Schramm
Prerequisite: course 110A–110B.
Reading and grammatical analysis of prophetic or poetical books of the Bible, such as Amos, Isaiah, Jeremiah, or Psalms.

*227A–227B. Postbiblical Hebrew. (1–1) Yr.  Mr. Fischel
Prerequisite: course 110A–110B or 112A–112B.
Reading of unvocalized postbiblical texts such as the Mishnah, Midrash, Piyyutim, or modern Hebrew literature.

232A–232B. Advanced Arabic. (2–2) Yr.
Prerequisite: course 120A–120B.
Reading of the Koran, poetry, or modern literary works.

*241A–241B. Advanced Syriac (Aramaic). (2–2) Yr.  Mr. Fischel

251A–251B. Advanced Akkadian. (2–2) Yr.  Mr. Finkelstein
Attention will be paid primarily to the major literary compositions.

*252A–252B. Advanced Sumerian. (2–2) Yr.  Mr. Finkelstein
Readings in early historical texts.

275A–275B. Seminar in Linguistic Structures of South Asia. (2–2) Yr.
Prerequisite: Linguistics 100 and 130.
A typological survey of the phonological and morphological systems of
selected Indo-Aryan and non-Indo-Aryan languages of South Asia.
May be repeated without duplication of credit.

290A–290B. Special Study. Yr.  The Staff
Credit according to work accomplished.

NUTRITION AND HOME ECONOMICS
(Department Office, 117 Home Economics Building)

George M. Briggs, Ph.D., Professor of Nutrition (Chairman of the Depart-
ment).
Jessie V. Coles, Ph.D., Professor of Home Economics.
Judson T. Landis, Ph.D., Professor of Family Sociology.
Catherine Landreth, Ph.D., Professor of Home Economics and Lecturer in
Psychology.
Ruth Okey, Ph.D., Professor of Nutrition.
Helen L. Gillum, Ph.D., Professor of Nutrition, Emeritus.
Agnes Fay Morgan, Ph.D., Professor of Nutrition, Emeritus.
Bessie B. Cook, Ph.D., Associate Professor of Nutrition.
Mary Ann Morris, Ph.D., Associate Professor of Home Economics.
Barbara M. Kennedy (Barbara Kennedy Johnson), Ph.D., Assistant Profes-
sor of Nutrition.
Richard L. Lyman, Ph.D., Assistant Professor of Nutrition.
Mary Ann Williams, Ph.D., Assistant Professor of Nutrition.
Kaye Funk, M.S., Associate in Institution Management.
Agnes C. McClelland, M.A., Associate in Home Economics.
Rosemarie Ostwald, Ph.D., Associate in Nutrition.
Hannah T. Sanders, M.A., Associate in Home Economics.
Willa H. Schmidt, M.S., Associate in Home Management.

Henrietta Henderson, B.S., Cert. Diet., Lecturer in Hospital Dietetics.
Ruth L. Huenemann, D.Sc., Lecturer in Public Health Nutrition and Associate
Professor of Public Health Nutrition.
Helen V. Park, Lecturer in Home Economics.

Departmental Adviser: Miss Okey.
Curricula in Home Economics.—For details concerning these curricula
and requirements for the Bachelor of Science degree, see the College of
Agriculture section in the CIRCULAR OF INFORMATION.

HOME ECONOMICS

LOWER DIVISION COURSES

6. Introduction to Textiles. (3) II. Miss Morris
   Lectures and lab. Prerequisite: Chemistry 1A and 8.
   Study of plant, animal, and synthetic fibers used in textiles and of the
   finished textile materials.

7. Elementary Clothing Study. (3) I and II. Miss McClelland
   Lecture and laboratory. Prerequisite: Decorative Art 6A–6B.
   Practical and cultural problems in modern garment design and construction.

UPPER DIVISION COURSES

Child Development and Family Relationships

132. Child Psychology. (3) II. Miss Landreth
   Prerequisite: Psychology 1A and 5. Not open to students who are taking
   or have taken Psychology 112.
   A study of the factors concerned in the motor, sensory, language, mental,
   emotional, and social development of young children.

135. Techniques with Young Children. (3) I and II. Miss Landreth, Mrs. Sanders
   Two lectures per week, and laboratory in the nursery school two mornings
   or two afternoons per week. Prerequisite: course 132 and consent of the
   instructor.

137. Marriage and Family Relationships. (3) II. Mr. Landis
   Not open to students who have taken course 13.
   A survey of the most recent information on courtship, mate selection, hus­
   band-wife adjustments, and parent-child relationships.

138. The Contemporary American Family. (3) II. Mr. Landis
   An examination of the results of the impact of modern culture upon the
   family, with emphasis upon family types, member relationships, family
   dynamics in relation to personality, social change, and social values.

*139. Sociology of Child Development. (3) I. Mr. Landis
   An analysis of various social factors, social groupings, and social contexts
   in relation to the social development of the child.

Family Economics

140. Home Management. (3) I. Mrs. Schmidt
   Lectures and laboratory. Prerequisite: Physiology 1 and Psychology 1A.
   Use of time, energy, and equipment in the home from the viewpoint of the
   satisfaction of members of the family.

140L. Home Management Laboratory. (1–3) II. Miss Coles, Mrs. Schmidt
   Prerequisite: course 140.
   Laboratory includes home projects or living for six to eight weeks in the
   home-management house under supervision of the instructor. A two-hour
   weekly conference to be arranged.

141. Consumers and the Market. (3) I. Miss Coles
   Prerequisite: Economics 1A. Not open to students who are taking or have
   taken Agricultural Economics 130 or Business Administration 160.
   A study of the functions and structure of the market from the standpoint
   of consumers; evaluation of the guides available for consumers in buying;
   agencies aiding and protecting consumers.

Nutrition and Home Economics

142. Social Problems of Families. (3) II. Miss Coles
Prerequisite: Economics 1A–1B and either Economics 2 or Psychology 5.
Present-day problems of families as they are related to economic and social conditions.

144. Family Finance. (3) I. Miss Coles
Prerequisite: Economics 1A.
Management of personal and family finances—money income, household production, planning expenditures, credit, savings, investments, financing home ownership.

Home Furnishing

152. Home Furnishing. (3) II. Miss Park
Lecture and laboratory. Prerequisite: Decorative Art 6A–6B, 130A–130B.
130B may be taken concurrently.
A nonprofessional course designed to develop discrimination in values. A consideration of materials involved in furnishing the home, and their uses. An analysis of current trends and available materials.

Clothing and Textiles

160. Textiles. (3) I. Miss Morris
Lecture and laboratory. Prerequisite: course 6.
The chemical and physical structure of textile fibers, and its relation to fiber and fabric properties.

162. Textile Economics. (3) I. Miss Morris
Lectures and laboratory. Prerequisite: course 6; Economics 1A–1B.
Organization of the textile industry; production and consumption of textile products; and the principles involved in the maintenance of textile products.

175. Apparel Design and Construction. (3) I. Miss McClelland
Lecture and laboratory. Prerequisite: courses 6 and 7.
Wardrobe planning and problems in advanced clothing construction.

*176. Dress Design and Fashion Analysis. (3) I and II.
Lecture and laboratory. Prerequisite: course 7.
The design, draping, and construction of costumes based on the principles of design and color theory; past and current fashion trends and fashion merchandising methods.

SPECIAL STUDY COURSE APPLYING TO ALL MAJORS

199. Special Study for Advanced Undergraduates. (1–5) I and II.
The Staff (Miss Okey in charge)

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

200A–200B. Research in Home Economics. (2–6; 2–6) Yr.
The Staff (Miss Okey in charge)

232. Seminar in Psychology of Early Childhood. (2) I. Miss Landreth
Prerequisite: graduate standing in child development or psychology.

237. Seminar in Family Sociology. (2) II. Mr. Landis

242. Seminar in Family Economics. (2) II. Miss Coles

262. Seminar in Textiles. (2) II. Miss Morris
Prerequisite: graduate standing in textiles and clothing.

NUTRITION

LOWER DIVISION COURSES

1. Foods as Sources of Nutrients. (4) I. Miss Kennedy
   Lectures and laboratory. Prerequisite: Chemistry 1A, 8. (Not open to students who have credit for Nutrition 1A).
   Composition of foods; chemical and physical changes in preparation and preservation.

2. Experimental Food Study. (3) II. Miss Kennedy
   Lecture and laboratory. Prerequisite: course 1. Not open to students who have credit for Nutrition 1B.
   Chemical and physical changes involved in food preparation, preservation, and storage as they affect acceptability.

10. Elementary Nutrition. (2) II. Mrs. Cook
   A nontechnical study of the basic principles of nutrition including discussion of the principal nutrients in foods, their utilization by the body; the needs of individuals at different stages of the life span and during reproduction and lactation.

UPPER DIVISION COURSES

Food Economics and Technology

100. Food Economics. (3) I. Miss Kennedy
   Lectures and laboratory or field work. Prerequisite: course 1A–1B and Business Administration 160 or Agricultural Economics 130 or Home Economics 141 (may be taken concurrently).
   Food production and food distribution as they relate to food consumption and to nutrient values. Factors affecting price and quality. Food buying for the home and institution.

101A. Food Analysis. (3) I. Miss Kennedy
   Lecture and laboratory. Prerequisite: course 1A–1B, Chemistry 1B, 8; or Chemistry 1B and 8 with grades of at least B.
   The principles of quantitative analysis applied to food materials; chemical analysis of typical carbohydrate, fat, and protein foods.

*101B. Advanced Food Analysis. (3) II. Miss Kennedy
   Lecture and laboratory. Prerequisite: course 101A or Chemistry 5 with a grade of at least B.
   Official analytical methods and legal standards used in the chemical analysis of sugars, grain products, dairy products, fats and oils, meats, etc. Examination of foods for deterioration and adulteration.

108. Introduction to Food Research. (2) II. Miss Kennedy
   (Formerly numbered 109.)
   Prerequisite: course 101A.
   A proseminar on current research in the chemistry of food composition, preparation, and control.

108L. Introduction to Food Research Laboratory. (2) II. Miss Kennedy
   (Formerly numbered 108.)
   Prerequisite: course 108, to be taken concurrently.

Nutrition and Dietetics

111. Nutrition. (3) I. Mrs. Cook
   Prerequisite: Chemistry 1A or high school chemistry; Physiology 1. Not
   accepted as part of the major in Curriculum A of the Department of Nutrition
   and Home Economics, and not open to students who have credit for course 10.
   A brief study of the essential nutrients and their functions in nutrition;
   how to determine and satisfy the food needs of the normal individual.

112A–112B. Nutrition and Dietetics. (3–3) Yr. Mrs. Cook
   Lectures and laboratory. Prerequisite: course 1A–1B; Chemistry 1A, 8;
   Physiology 1.
   The food requirements of the normal individual and the special needs im­posed by growth, pregnancy, lactation, and disease. The planning and compu­tation of diets.

114. Laboratory Methods in Metabolism. (4) II. Miss Williams
   Lectures and laboratory. Prerequisite: course 101A or Chemistry 5; Bio­
  chemistry 102 (may be taken concurrently).
   Study of qualitative and quantitative reactions and procedures used in the
   analysis of biological materials of importance in nutrition.

115. Therapeutic Dietetics. (3) II.
   Lectures and laboratory. Prerequisite: courses 118A–118B, 118C–118D,
   (118B, 118D may be taken concurrently).
   Problems in the planning and computation of dietaries for normal and
   pathological conditions.

118A–118B. Human Nutrition. (2–2) Yr. Mr. Lyman
   Prerequisite: courses 101A, 114, and Biochemistry 102; or Biochemistry
   100A–100B and 101A–101B.
   Experimental bases for present concepts in the science of nutrition. Appli­cations of basic principles to practical feeding problems.

118C–118D. Human Nutrition Laboratory. (2–2) Yr. Mr. Lyman, Mrs. Ostwald
   Prerequisite: course 118A–118B (may be taken concurrently) or the
   equivalent.
   Quantitative laboratory techniques used in research in nutrition.

Institution Economics

121A–121B. Problems of Quantity Food Service. (4–4) Yr. Miss Funk
   Lectures and laboratory. Prerequisite: course 1A–1B. Recommended: Business
   Administration 1A or 10 and Business Administration 151 or Psych­
   ology 185.
   121A. Problems imposed by quantity preparation of food: Acceptability,
   retention of nutrients, economy.
   121B. Problems in the organization and management of quantity food
   service.

Special Study Courses Applying to All Majors

198. Directed Group Study. (1–5) I and II.
   Prerequisite: consent of instructor. The Staff (Miss Okey in charge)

199. Special Study for Advanced Undergraduates. (1–5) I and II.
   The Staff (Miss Okey in charge)
GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

201A–201B. Seminar in Recent Advances in Nutrition and Dietetics. (2–2) Yr. Miss Okey

202. Seminar in Foods and Nutrition. (2) I. Mr. Lyman, Mr. Briggs
212. Seminar in Nutrition. (2) II. Mr. Briggs, Mr. Lyman

*215. Seminar in Disorders of Nutrition. (2) I. Prerequisite: course 115 or consent of the instructor.

219. Vitamin Analysis. (3) II. Miss Williams
(Formerly numbered 119.) Lecture and laboratory.
Prerequisite: courses 118A–118B, 118C–118D; and consent of the instructor.
Chemical, physical, microbiological and biological assay methods for vitamins. Individual problems pertaining to animal tissue analysis; comparison of new methods with standard procedures.

*221. Seminar in Problems of Quantity Food Service. (2) II. Prerequisite: course 121A–121B, or consent of the instructor. Especially designed for the student in hospital dietetics.

*230. Seminar in Nutrition of Development. (2) II. Prerequisite: graduate standing in nutrition.

299. Research in Food and Nutrition. (1–9) I and II. The Staff (Miss Okey in charge)

PROFESSIONAL COURSES

*426. Hospital Problems. (2–3) I and II. Open only to selected graduate students. Supervised practice in administrative problems of the hospital dietetic service carried on during residence in Berkeley.

427. Hospital Dietetics. (6) I and II. Miss Henderson Open only to selected graduate students. Conferences and supervised practice in the dietary department of the University of California Hospital and clinics.

OCEANOGRAPHY

Marine Sciences

Courses in oceanography leading to the master’s or doctor’s degree in oceanography and certain of the marine sciences are offered for a limited number of qualified students at the Scripps Institution of Oceanography at La Jolla, California. Detailed information concerning the courses may be found in the GENERAL CATALOGUE, DEPARTMENTS AT LOS ANGELES. For further information concerning the Institution, refer to the Registrar of the University of California, 405 Hilgard Avenue, Los Angeles 24, California, or write to the Director of the Institution.

OPTOMETRY

(Department Office, 101 Optometry Building)

Meredith W. Morgan, Jr., Ph.D., Professor of Physiological Optics and Optometry (Chairman of the Department).

Kenneth B. Stoddard, Ph.D., Professor of Physiological Optics and Optometry.

Gordon L. Walls, Sc.D., Professor of Physiological Optics and Optometry.

Ralph S. Minor, Ph.D., Sc.D., Professor of Physics and Optometry, Emeritus.

Jack T. Hobson, B.S., Assistant Professor of Optometry, Emeritus.

Elwin Marg, Ph.D., Associate Professor of Physiological Optics and Optometry.

Henry B. Peters, M.A., Associate Clinical Professor of Optometry.

Merton C. Flom, Ph.D., Assistant Professor of Physiological Optics and Optometry.

Marshall B. Atkinson, M.D., Assistant Clinical Professor of Ophthalmology.

Edward Tamler, M.D., Assistant Clinical Professor of Ophthalmology.

Roy H. Brandreth, B.S., Clinical Instructor in Optometry.

James T. Crosby, Jr., B.S., Clinical Instructor in Optometry.

Ferd T. Elvin, A.B., Clinical Instructor in Optometry.

Allan N. Freid, M.Opt., Clinical Instructor in Optometry.

Robert F. Harrigan, B.S., Clinical Instructor in Optometry.

Richard M. Hill, M.Opt., Clinical Instructor in Optometry.

Monroe J. Hirsch, Ph.D., Clinical Instructor in Optometry.

Frank V. Johnson, Jr., M.Opt., Clinical Instructor in Optometry.

Kermit Kors, M.Opt., Clinical Instructor in Optometry.

Robert W. Lester, A.B., Clinical Instructor in Optometry.

Niles Roth, M.Opt., Clinical Instructor in Optometry.

Morton D. Sarver, B.S., Clinical Instructor in Optometry.

Gerald Westheimer, Ph.D., Visiting Associate Professor of Physiological Optics and Optometry.

Letters and Science List.—Physiological Optics 105A–105B and 106A–106B are included in the Letters and Science List of Courses. For regulations governing this list see page 11.

Upper Division Courses

Prerequisite.—Physics 2A–2B, 3A–3B, Chemistry 1A, 8, Mathematics 3A, Bacteriology 2 and 4 or 1 and 4, Physiology 1, 1L†, Psychology 1A, 33‡, together with all prerequisite courses in the Department of Optometry.

101. Advanced Geometrical Optics. (3) II. Mr. Westheimer

Prerequisite: Physics 108A–108B.

The mathematical development of the paraxial laws of optical image formation, employing the methods of Gauss. Application to the optical devices used to evaluate and aid the functions of vision. Classroom computation of marginally corrected lenses, iseikonic lenses, and contact lenses.

† Physiology 1, 1L, is the usual biological science sequence in the preoptometry program, this requirement may be satisfied for admission purposes by one of the following alternative sequences:

- Zoology 1A—Zoology 1B
- Zoology 1A—Comparative Anatomy
- Zoology 1A—Human Anatomy.

Unless a course in human anatomy, which is the full equivalent of Anatomy 25 at the University of California, is offered in one of the above sequences, Anatomy 25 must be included in the junior year program of the School of Optometry.

‡ Psychology 1B may be substituted for Psychology 33.
102A–102B. Elementary Theoretical Optometry. (3–4) Yr.
Mr. Johnson, Mr. Stoddard, Mr. Westheimer

One unit of laboratory will be given in the second semester.

A study of the states of refraction of the eye, and correlated visual sensations, effects upon visual functions, optical methods of correction, and instruments used to detect and measure anomalous states of refraction.

103A–103B. Advanced Theoretical Optometry. (3–3) Yr.
Prerequisite: course 102A–102B.
Mr. Marg, Mr. Morgan

Extension of the principles discussed in course 102A–102B to the functions of the eyes in binocular vision. Stereoscopic vision, physical and physiological aspects of the fusion movements, binocular accommodation and convergence, strabismus and other anomalies of binocular vision, and ocular paralyses.

**Professional Courses**

401A–401B. Ophthalmic Optics. (2–2) Yr. Mr. Peters, Mr. Brandreth

Lectures and laboratory.

Lectures: history of the development of lenses and spectacles; the optical properties of different glasses; the theory of the design of spectacle lenses. Laboratory: lens surfacing, edging, beveling, mounting, neutralization, and frame fitting.

404A–404B. Practical Optometry. (3–3) Yr. Mr. Harrigan, Mr. Morgan

Prerequisite: courses 102A–102B and 401A–401B.

Lectures and problems dealing with physical eye examinations. A study of instruments and the techniques for their use, interpretation of examination data and prescribing of lenses, and orthoptic training.

406A–406B. Optometry Clinic. (2–2) Yr.

The Staff (Mr. Harrigan in charge)

Prerequisite: courses 102A–102B and 401A–401B, Physiology 115.

Complete physical eye examinations with clinic patients. The adaptation of lenses to the defective eye and the study of abnormal visual conditions.

407A–407B. Pathology of the Eye. (1–2) Yr. Mr. Atkinson, Mr. Stoddard

Prerequisite: Physiology 115.

Lectures and demonstrations dealing with the identification of pathological conditions in the eye, and the manifestation of systemic disease as indicated by the eye.

499. Special Study for Advanced Undergraduates. (1–4) I and II.
The Staff (Mr. Morgan in charge)

**Graduate Professional Courses**

(Concerning conditions for admission to graduate courses, see page 18)

The Bachelor of Science degree in the School of Optometry, or its equivalent, is a prerequisite to all optometry courses of the graduate year.

209A–209B. Clinical Practice. (6–6) Yr.
The Staff (Mr. Stoddard in charge)

The examination and treatment, with lenses or orthoptic training, of patients with visual anomalies.

212A–212B. Advanced Clinical Procedures. (3–3) Yr.
Mr. Morgan, Mr. Peters, Mr. Lester

Lectures and class assignments on the orthoptics of strabismus and other binocular anomalies, aniseikonia, subnormal vision, telescopic spectacles, contact lens fitting, and allied subjects.
214A–214B. Seminar in Clinical Problems. (2–2) Yr.

Mr. Flom, Mr. Stoddard

A discussion of the various phases of optometry associated with problems arising from clinical cases.

216A–216B. Advanced Pathology of the Eye. (2–2) Yr. Mr. Tamler

An advanced consideration of topics covered in course 407A–407B, with particular reference to the application of this knowledge to the determination of diseases of the visual system in clinic patients.

217. Optometric Law and Economics. (1) II. Mr. Sarver

A consideration of the laws governing the practice of optometry, and the problems associated with the establishing of a professional optometric practice.

**PHYSIOLOGICAL OPTICS**

**UPPER DIVISION COURSES**

105A–105B. Physiological Optics. (3–3) Yr. Mr. Walls, Mr. Marg

Prerequisite: course 105A, consent of the instructor; 105B, Physics 108A–108B and Physiology 115.

Lectures on the physics, physiology and psychology of vision. 105A: The psychophysics and physiologic psychology of the light, form, and color senses, and the elements of visual perception. 105B: The visual pathways, the visual field, the pupil and accommodative mechanisms, the interaction between radiation and ocular tissue, the aberrations of the eye, illumination, and allied phenomena.

106A–106B. Physiological Optics. (1–1) Yr. Mr. Walls, Mr. Marg

Laboratory experiments in physiological optics to accompany course 105A–105B.

109. Physiological Optics. (3) I. Mr. Walls

Lectures on the physics, physiology, and psychology of vision for students in electrical engineering whose option is illumination engineering.

**GRADUATE COURSES**

(Concerning conditions for admission to graduate courses, see page 18)

201A–201B. Seminar in Advanced Physiological Optics. (2–2) Yr.

Mr. Walls, Mr. Marg, Mr. Westheimer

A discussion of selected topics and current research literature in the various fields associated with vision.

203. Binocular Vision and Space Perception. (2) I. Mr. Morgan

A consideration of the precise nature of binocular vision and monocular and binocular space perception.

205. The Evolution of the Visual System. (1) II. Mr. Walls

The structure and the functional properties of the human eye, its orbital accessories, and the central-nervous connections and adnexa, interpreted in the light of their evolutionary development.

299. Research. (2–8) I and II. The Staff (Mr. Morgan in charge)
Related Courses in Other Departments

Morphology and Physiology of the Visual System (Physiology 115).
Mammalian Physiology (Physiology 110A–110B).
Human Anatomy (Anatomy 25).

Oriental Languages

(Department Office, 102 Durant Hall)

Peter A. Boodberg, Ph.D., Agassiz Professor of Oriental Languages and Literature (Acting Chairman of the Department).
Denzel Carr, Ph.D., Professor of Oriental Languages.
Shih-Hsiang Chen, B.Litt., Professor of Chinese.
*Edward H. Schafer, Ph.D., Professor of Oriental Languages.
Yuen Ren Chao, Ph.D., Litt.D., Agassiz Professor of Oriental Languages and Literature, Emeritus.
Ferdinand D. Lessing, Ph.D., LL.D., Agassiz Professor of Oriental Languages and Literature, Emeritus.
Michael C. Rogers, Ph.D., Associate Professor of Oriental Languages.
*Donald H. Shively, Ph.D., Associate Professor of Oriental Languages.
Cyril Birch, Ph.D., Assistant Professor of Oriental Languages.

Elizabeth Huff, Ph.D., Lecturer in Oriental Languages.
Helen C. McCullough, Ph.D., Lecturer in Oriental Languages.
Susumu W. Nakamura, M.A., Lecturer in Oriental Languages.

Letters and Science List.—All undergraduate courses in this department are included in the Letters and Science List of Courses. For regulations governing this list see page 11.

Departmental Major Advisers: Mr. Chen (Chinese); Mr. Nakamura (Japanese).

The Major.—Required: (1) 16 units of lower division language courses; (2) course 100 (2 units), and 22 other units of upper division language courses, of which at least 18 units must be in one language. With the consent of the adviser, 3 of these units may be in lecture courses; (3) 6 units, either lower or upper division, in an Oriental language other than the one emphasized in (2); these units may count towards requirements (1) or (2).

Recommended: (1) A reading knowledge of French, German, or Russian.
(2) The attention of students is drawn to courses in other departments such as the following: Anthropology 103 (Culture Growth), 115 (People of the Philippines and Indonesia), 120 (Language and Culture), 186 (Ethnology of Japan); Art 1D (History of Oriental Art), 160A–160B (History of Early Chinese Art), 161 (History of Later Chinese Art), 162 (The Art of Japan), 164 (The Art of Greater Iran); Geography 125A (Geography of Southeast Asia); 125B (Geography of East Asia); History 19A–19B (Introduction to the History of Asia), 191A–191B (Social History of Asia), 194A–194B (History of China) 195A–195B (History of Japan), 190C (Historical Problems in Asian Interrelationships), 193C (Chinese Civilization of the Middle Dynasties), 194C (Problems in the Intellectual History of Modern China), 195C (Problems in Japanese Intellectual History); Linguistics 35 (Language and Linguistics), 130 (Phonetics and Phonemics), 140 (Linguistic Analysis), 145 (Types of Linguistic Structure); Sociology 166 (Oriental Societies), 167 (Nomadic Societies).

Undergraduate students expecting to proceed to the M.A. or Ph.D. in Oriental Languages with emphasis on Chinese must take courses 104 and 104E (at least 3 units), and 133A–133B in their senior year.

Honors Program.—An undergraduate student who has completed 16 units of language courses in the Department, and has an overall grade-point average of 3.0, may apply to the departmental chairman for admission as a candidate for honors with the bachelor's degree. If accepted, his curriculum will then differ from that of other candidates for the A.B. in that he will be permitted to take from 1 to 6 units of Oriental Languages H195 (Honors course) which will count towards the major, in lieu of other language courses that he might offer for the degree. While enrolled in this course he will do independent and advanced work under the guidance of appropriate members of the staff. At the same time he will prepare himself to take a comprehensive examination in the last semester of his senior year. If he completes his assignments in H195 and the comprehensive examination with distinction he will be recommended for Honors, High Honors, or Highest Honors at graduation, in accordance with the degree of distinction.

**Lower Division Courses**

1. **Elementary Mandarin.** (4) I. 
   Class meets five hours a week. 
   Mr. Chao, Mr. Chen

2. **Elementary Mandarin (continued).** (4) II. 
   Class meets five hours a week. Prerequisite: course 1. 
   Mr. Chao, Mr. Chen

3. **Elementary Classical Chinese.** (4) I. 
   Class meets five hours a week. 
   Mr. Boodberg

4. **Elementary Classical Chinese (continued).** (4) II. 
   Class meets five hours a week. Prerequisite: course 3. 
   Mr. Boodberg

5. **Mandarin Texts.** (4) I and II. 
   Class meets five hours a week. Prerequisite: course 2. 
   Instruction in the reading of Modern Mandarin (National Language) at an intermediate level. 
   Mr. Birch

6A–7B. **Elementary Korean.** (3–3) Yr. 
   Mr. Rogers

8. **Indonesian.** (3) I. 
   Mr. Carr 
   An introduction to the official language of Indonesia and Peninsular Malay, a foundation for the study of Malayo-Polynesian languages in general or Classical Malay and Indonesian literature.

9. **Elementary Modern Japanese.** (4) I. 
   Mr. Nakamura, Mrs. McCullough 
   Class meets five hours a week.

18. **Readings in Indonesian.** (2) II. 
   Prerequisite: course 8, or the equivalent. 
   Mr. Carr

19. **Elementary Modern Japanese (continued).** (4) II. 
   Mr. Nakamura, Mrs. McCullough 
   Class meets five hours a week. Prerequisite: course 9 or the equivalent.

23. **Introduction to Chinese Philology.** (2) I. 
   Mr. Boodberg 
   Prerequisite: course 4. 
   Basic conceptions of philology and textual criticism for students of Classical Chinese.

39. **Intermediate Modern Japanese.** (4) I. 
   Mr. Nakamura 
   Prerequisite: course 19, or the equivalent.
COURSES IN WHICH NO KNOWLEDGE OF ORIENTAL LANGUAGES IS REQUIRED

*22. Indonesian Civilization. (2) I. Mr. Carr
A survey of Indonesian civilization and the effects of contacts with Indian, Islamic, and Western cultures. Emphasis on Hinduism, Buddhism, and Islam.

*32. Japanese Civilization. (2) II. Mr. Shively
A broad survey of Japanese civilization dealing with cultural, literary, religious, and social developments, and giving attention to the influence of Chinese and Western cultures.

38A–38B. Great Books of Eastern Asia. (1–1) Yr. Mr. Boodberg
Lectures and assigned readings on the great classics of Eastern Asia, in English translation. Course 38A is not prerequisite to 38B.

UPPER DIVISION COURSES

Sixteen units of lower division language courses are prerequisite to all upper division language courses.

100. Languages of Eastern Asia. (2) II. Mr. Carr
A survey course on the nature and distribution of the main languages of Eastern Asia.

*103. Chinese Narrative Prose. (3) I. Mr. Schafer
Prerequisite: course 4.

104. Studies in Ancient Chinese Literature: Philological Analysis of Texts. (2) II. Mr. Boodberg
Prerequisite: course 23. To be taken concurrently with course 104E. May be repeated without duplication of credit. A student who has successfully completed course 117 or 173 may not receive credit for the same subject matter in course 104.
Topics and texts will vary from semester to semester. Subjects for 1960–1961: Life and Times of Confucius (II).

106. Contemporary Chinese Writers. (3) II. Mr. Birch
Prerequisite: course 6.
Readings in all genres of Chinese literature since 1917.

107. Intermediate Korean. (2) I and II. Mr. Rogers
Prerequisite: course 7A–7B or the equivalent.
May be repeated without duplication of credit.

*113. Chinese Classics. (3) I. Mr. Schafer
Prerequisite: course 103, or 104, or 143.

*118. Introduction to Malayo-Polynesian Linguistics. (2) II. Mr. Carr
Prerequisite: course 8, an equivalent knowledge of one Malayo-Polynesian language, or Linguistics 130 or 145.

119. Advanced Japanese. (4) II. Mr. Nakamura
Prerequisite: course 39 or the equivalent.

*123. Chinese Grammar. (3) I. Mr. Chao
Prerequisite: Linguistics 35.

Oriental Languages

124A–124B. Readings in Modern Chinese. (3–2) Yr. Mr. Chen, Mr. Birch
(Formerly numbered 124.)
124A. Mr. Birch; 124B. Mr. Chen.
Prerequisite: course 6. Course 124A is not prerequisite to 124B.
124A. Readings in Modern Chinese texts on social and political topics.
124B. Readings in Modern Chinese texts of literary and philosophical
interest.

*128. Classical Malay Literature. (2) II. Mr. Carr
Prerequisite: course 18.
Reading of Sejarah Melayu and other standard texts in Roman and Arabic
characters.

Prerequisite: course 119. Mr. Shively
Mrs. McCullough
Prerequisite: course 119; 129A–129B is not prerequisite to 129C–129D.

133A–133B. Chinese Bibliography. (2–2) Yr. Miss Huff
Prerequisite: course 103, or 104, or 143.
Open to seniors.

134A–134B. Cantonese. (2–2) Yr. Mr. Chao
Not open to students with previous experience in standard Cantonese.

135. Phonology of Ancient Chinese. (3) I. Mr. Chao

139. Japanese Grammar. (2) I. Mr. Carr
Prerequisite: course 119.

*143. Readings in Medieval Chinese. (3) I. Mr. Schafer
Prerequisite: course 4.

149A–149B. Advanced Colloquial Japanese. (2–2) Yr. Mr. Nakamura
Three laboratory hours per week.
Course 149A is not prerequisite to 149B.
An intensive course, open only to students specializing in Oriental lan-
guages, to provide training in the active use of colloquial Japanese.
In the second semester, one hour per week will be devoted to lectures in
Japanese on elements of Japanese culture.

154. Mongolian. (2) I and II. Mr. Rogers
May be repeated without duplication of credit.

164. Tibetan. (2) I. Mr. Nakamura
May be repeated without duplication of credit.

*187. Philological Laboratory. (2) II. Mr. Carr
Philological analysis of an Oriental language, using textual material.
The current subject is Javanese.

(2–2) Yr. Mr. Chen
Prerequisite: course 103, or 104, or 143.
191A. Verse; 191B. Belles-lettres.
Course 191A is not prerequisite to 191B.

(2–2) Yr. 
Mr. Chen

Prerequisite: course 103, or 104, or 143.
Course 191A–191B is not prerequisite to 191C. Course 191C is not prerequisite to 191D.

H195. Honors Course. (1–6) I and II. The Staff (Mr. Boodberg in charge)
Limited to senior honors candidates in Oriental Languages.

198. Preceptorial and Reading Course. (1 or 2) I and II.
Prerequisite: junior standing The Staff (Mr. Boodberg in charge)

199. Special Individual Study. (1–5) I and II. 
Mr. Boodberg in charge
Open only to majors in Oriental Languages.

LECTURE COURSES

Prerequisite: junior standing. Knowledge of an Oriental language not required.

104E. Studies in Ancient Chinese Literature: Interpretation. (1) II.
Mr. Boodberg

Prerequisite: junior standing. Knowledge of an Oriental language not required. May be repeated without duplication of credit. A student who has successfully completed course 122, or 182, or 188 may not receive credit for the same subject matter in course 104E.
Topics will vary from semester to semester. Subjects for 1960–1961: Life and Times of Confucius (II).

112. Survey of Chinese Classical Literature and Literary Criticism. (2) I.
Mr. Chen

The general characteristics, main currents, and representative authors of Chinese literature in the classical tradition. Texts and references in English translation critically analyzed.

132. History of Japanese Literature. (3) II. 
Mrs. McCullough

From the beginning to modern times, emphasizing Chinese, Buddhist, and Western influences.

*142C. Civilizations of Eastern Asia: China. (3) II. 
Mr. Schafer

Emphasis on material culture, technology, and science.

142K. Civilizations of Eastern Asia: Korea. (2) II. 
Mr. Rogers

The development of Korean civilization; emphasis on Chinese influence.

*163. Readings in Pacific Literature in English Translation. (2) II. 
Mr. Carr

A survey of literature in non-European and non-Asiatic languages (with the exception of Malay), with selections to be read in English translation. Areas: Philippines, Malaya, Indonesia, other Pacific islands.

172. Survey of Chinese Vernacular Literature. (2) I. 
Mr. Birch
Development of the novel and drama from early times to the present, with assigned readings in English translation.

GRADUATE COURSES

Graduate students should already have begun the study of French or German, and will be expected to enroll in courses in these languages continuously until they pass their qualifying examinations for advanced degrees.

206. Seminar in Chinese Fiction. (2) II. Mr. Birch
   Detailed study of a text with its literary and historical background.

*208. Malayo-Polynesian Linguistics. (2) II. Mr. Carr

212. Seminar in Chinese Literary History. (2) I and II. Mr. Chen
   Textual and aesthetic criticism.
   May be repeated without duplication of credit with consent of the instructor.

*213. Seminar in Philological Analysis of Chinese Sources of the Post-Han Period. (2) I and II. Mr. Boodberg
   May be repeated without duplication of credit with consent of the instructor.

*216A–216B. Texts on the Civilization of Medieval China. (2–2) Yr. Mr. Schafer
   Textual studies in the history of science and technology, with related materials from archaeology and folklore.
   May be repeated without duplication of credit with consent of the instructor.

217A–217B. Seminar in Philological Analysis of Koryŏ and Yi Dynasty Sources. (2–2) Yr. Mr. Rogers
   May be repeated without duplication of credit with consent of the instructor.

*219. Proseminar in Bibliography and Methods in Japanese Studies. (2) II. Mr. Shively

229. Seminar in Japanese Literature. (2) I. Mrs. McCullough

235. Seminar in Chinese Dialectology. (2) II. Mr. Chao
   May be repeated without duplication of credit.

236A–236B. Seminar in Contemporary Chinese Writings on Linguistics. (2–2) Yr. Mr. Chao

*239. Seminar in Japanese Linguistics. (2) I. Mr. Carr

250. Research. (1–4) I and II. The Staff (Mr. Boodberg in charge)

PALEONTOLOGY

(Department Office, 410B Hearst Memorial Mining Building)

J. Wyatt Durham, Ph.D., Professor of Paleontology and Curator of Invertebrate Collections in the Museum of Paleontology.
Joseph T. Gregory, Ph.D., Professor of Paleontology and Curator of Amphibians and Reptiles in the Museum of Paleontology (Chairman of the Department).

Robert M. Kleinpell, Ph.D., Professor of Paleontology and Curator of Micro-paleontological Collections in the Museum of Paleontology.

Ruben A. Stirton, Ph.D., Professor of Paleontology, Curator of Mammals, and Director of the Museum of Paleontology.

Charles L. Camp, Ph.D., Professor of Paleontology, Emeritus, and Curator of Amphibians and Reptiles in the Museum of Paleontology, Emeritus.

Ralph W. Chaney, Ph.D., Professor of Paleontology, Emeritus, and Curator of Paleobotanical Collections in the Museum of Paleontology, Emeritus.

Wayne L. Fry, Ph.D., Associate Professor of Paleontology and Curator of the Paleobotanical Collections in the Museum of Paleontology.

Donald E. Savage, Ph.D., Associate Professor of Paleontology and Curator in the Museum of Paleontology.

Zach M. Arnold, Ph.D., Assistant Professor of Paleontology and Curator in the Museum of Paleontology.

William B. N. Berry, Ph.D., Assistant Professor of Paleontology and Curator of Paleozoic Collections.

Letters and Science List.—All undergraduate courses in paleontology are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Adviser: Mr. Savage.

Graduate Adviser: Mr. Savage.

Major Program.—Two types of major programs are organized on the basis of relationships to geological sciences and to biological sciences.

Required of all majors: Paleontology 1 (3), 3 (3), 111 (4), 170 (2); Geology 1 or 5 (4); Botany 1 (5) or Zoology 1A (4); and completion of one of the following programs.

I. Paleontology and Geological Sciences.

Required: Geology 6 (4); Geology 101 (4), 103 (3); Engineering 21 (3); and one of the following options.

(a) Emphasis on invertebrate paleontology: Geology 105 (3), Paleontology 112 (3); Paleontology 114A (3) or 116 (4) or 117 (4); Paleontology 136 (5) or 137 (5) or 139 (3).

(b) Emphasis on vertebrate paleontology: Geology 105 (3), Paleontology 112 (3); Paleontology 125 (3), 126 (4), 127 (4); Zoology 1B (4).

(c) Emphasis on paleobotany: Paleontology 112 (3), 120 (3), 121 (3); Botany 108 (4).

II. Paleontology and Biological Sciences.

(a) Emphasis on invertebrate paleontology: Paleontology 112 (3); Paleontology 114A (3) or 114B (3) or 116 (4) or 117 (4); Paleontology 136 (5) or 137 (5) or 139 (3); Zoology 108 (4) or 110 (5) or 112 (6); Zoology 114 (3) or Genetics 100 (3).

(b) Emphasis on vertebrate paleontology: Paleontology 125 (3), 126 (4), 127 (4); Zoology 106 (4), 113 (4); Zoology 114 (3) or Genetics 100 (3).

(c) Emphasis on paleobotany: Paleontology 112 (3), 120 (3), 121 (3); Botany 108 (4), 110A (3), 110B (3), 151 (3).

Recommended: Chemistry 1A (5), 1B (5); French and German; Anthropology 1 (4), 152 (3) and Genetics 103A-103B (2-2) for 1b and 11b (see above); Botany 16 (3) and Forestry 114 (3) for 11c (see above).

A reading knowledge of French and German is essential for efficient advanced work and is required of candidates for the Ph.D. degree.

Honors Program.—Candidates for honors with the major in paleontology are required to complete course H195.

Lower Division Courses

1. General Paleontology. (3) I and II. Mr. Arnold, Mr. Stirton

Two lectures and one two-hour laboratory period per week; field trip.
A survey of the history and classification of plants and animals. Methods of interpretation of the fossil record; fossils as evidence of the history of life; evolution of form and structure in plants and animals; sequence of floras and faunas in the rocks.

3. Vertebrate Paleontology. (3) II.
Two lectures and one three-hour laboratory period per week. Mr. Savage
Prerequisite: course 1 or Zoology 1A or Geology 3 or Anthropology 1.
Cranial, dental, and postcranial morphology; evolution, classification, and distribution in time and space of mammals, reptiles, and amphibians.

*10. Principles of Paleontology. (2) II.
Two lectures per week; one or more field excursions half day Saturday. Enrollment limited to the size of classroom available. Not open to students who have credit in course 1.
General principles of the history of life.

UPPER DIVISION COURSES

111. Invertebrate Paleontology. (4) I.
Two lectures and two three-hour laboratory periods per week. Mr. Berry
Prerequisite: Zoology 110 or course 111, and Geology 3 or course 112. Recommended: Paleobiology, morphology, and systematics of the invertebrates.

112. Stratigraphic Paleontology. (3) II.
One lecture and two three-hour laboratory periods per week. Mr. Kleinpell, Mr. Berry
Prerequisite: course 1 or Geology 3, and Zoology 1A or course 111.
Elements of biostratigraphy and the stratigraphic sequence of fossils.

114A. Micropaleontology. (3) I.
One lecture and two three-hour laboratory periods per week. Mr. Kleinpell
Prerequisite: course 112.
Principles of biostratigraphic correlation with emphasis on the Foraminifera.

114B. Micropaleontology. (3) II.
One lecture and two three-hour laboratory periods per week. Mr. Arnold
Prerequisite: Zoology 110 or course 111, and Geology 3 or course 112. Recommended: Zoology 110 and courses 112 and 114A.
Paleobiology of microorganisms with emphasis on the Foraminifera.

*116. Paleozoic Invertebrates. (4) II.
Two lectures and two three-hour laboratory periods per week. Mr. Berry
Prerequisite: course 111 or Zoology 112 and course 1 or Geology 3.
Advanced studies in trilobites, brachiopods, graptolites, and pelmatozoans.

117. Mesozoic and Cenozoic Invertebrates. (4) II.
Two lectures and two three-hour laboratory periods per week. Mr. Durham
Prerequisite: course 111 or Zoology 108.
Advanced studies in mollusks, echinoids, corals and other invertebrates.

120. Paleobotany. (3) I.
Two lectures and one three-hour laboratory period per week. Mr. Fry
Prerequisite: consent of the instructor.
Advanced study of plants represented in the geologic record. Content to be varied in alternate years: (1) Paleobotany for students with comprehensive knowledge of the earth sciences (to be given 1960-1961); (2) Paleobotany for students with comprehensive training in botany.

* Not to be given, 1960-1961.
121. Floras of the Past. (3) II. Mr. Fry
One lecture and two three-hour laboratory periods per week.
Composition, distribution, and stratigraphic occurrence of past floras.

125. History of the Lower Vertebrates. (3) I. Mr. Gregory
Two lectures, proseminar, and two three-hour laboratory periods per week. Prerequisite: course 3 or Zoology 106.

126. Evolution and Classification of the Mammals. (4) I. Mr. Stirton
Two lectures, proseminar, and two three-hour laboratory periods per week. Prerequisite: course 3 or Zoology 106.

127. History and Paleoecology of Higher Vertebrates. (4) II. Mr. Savage
Two lectures, proseminar, and two three-hour laboratory periods per week. Prerequisite: course 126.

136. Paleozoic and Early Mesozoic of Western North America. (5) II. Mr. Berry
Three lectures and one laboratory period per week, field trips. Prerequisite: course 111.
Invertebrate paleontology and stratigraphy of the marine Paleozoic and Early Mesozoic.

137. Late Mesozoic and Cenozoic of the Pacific Coast. (5) I. Mr. Durham
Three lectures and two three-hour laboratory periods per week; field trips. Prerequisite: course 111.
Invertebrate paleontology and stratigraphy of the marine Late Mesozoic and Cenozoic of the Pacific Coast.

139. Cenozoic History of the West Coast of North America. (3) II. Mr. Kleinpell
Two lectures and one three-hour laboratory period per week. Assigned readings. Prerequisite: course 114A.
Emphasis on correlation, sequence, and relationships of West Coast foraminiferal faunas.

*170. History of Paleontology. (2) II. Mr. Gregory
Two lectures per week. Prerequisite: consent of the instructor.
Review of discoveries and development of ideas, principles, and methods, with emphasis on modern trends and theories.

H195. Honors Thesis. (5) I and II. The Staff (Mr. Savage in charge)
Restricted to candidates for honors with the bachelor's degree.
Preparation of a satisfactory report on original research. In evaluating the report emphasis will be placed on composition and style as well as scientific content.

199. Special Study for Advanced Undergraduates. (1-5) I and II. The Staff (Mr. Gregory in charge)
Restricted to senior honor students in paleontology.
Special problems or reading assignments.

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

252. Seminar in Biostratigraphy. (2) I. Mr. Berry
Current literature and general problems.

* Not to be given, 1960-1961.
Paleontology; Philosophy

253. Seminar in Micropaleontology. (2) I and II.
Current literature and general problems. Mr. Kleinpell, Mr. Arnold

254. Seminar in Mammalian Paleontology. (2) I and II.
Mr. Savage, Mr. Stirton

255. Seminar in Vertebrate Paleontology. (2) II.
Mr. Gregory

256. Seminar in Invertebrate Paleontology. (2) I and II.
Mr. Durham
Current literature and general problems.

257. Seminar in Paleobotany. (2) I and II.
Mr. Fry
Current literature and general problems.

299. Research in Paleontology. (1-6) I and II.
The Staff (Mr. Gregory in charge)

Graduate Seminar. (No credit) I and II.
The Staff (Mr. Arnold, Mr. Fry in charge)
Prerequisite: consent of the instructor for nonmajors. Graduate students in the department are expected to attend.
Review of recent literature and current research in the department.

MUSEUM OF PALEONTOLOGY

The museum was founded by the late Annie M. Alexander in 1921 to encourage and sponsor research in paleontology. Each academic member of the Department of Paleontology also has the function of curator relative to the specimens in his field of study. The museum collections are used in teaching, and in graduate and faculty research. Research institutes and departments in the University as well as other institutions of learning are served by the museum.

The primary function of the museum as a research institute is to support and sponsor research projects by the staff, the most capable of the graduate students, and visiting scientists.

The Museum has large collections of fossil vertebrates, invertebrates, and plants. The best representation of these is from western North America but there are excellent materials, many of them unique, from every continent. The growth and quality of the collections result from the continually expanding and diversified research program. The specimens are invaluable reference materials for research now in progress and they will become indispensable for the future. The collections are housed on the 4th floor of the Hearst Memorial Mining Building, and in the Campanile, Berkeley campus.

Anyone wishing to utilize the collections or facilities of the museum may address the Director.

MATTHEW MEMORIAL LIBRARY

A branch of the General Library containing an outstanding collection of books and pamphlets on paleontology and related fields of study provides service to both faculty and students.

PHILOSOPHY

(Department Office, 4401 Dwinelle Hall)

Karl Aschenbrenner, Ph.D., Professor of Philosophy (Chairman of the Department).

William R. Dennes, D.Phil., LL.D., Mills Professor of Intellectual and Moral Philosophy and Civil Polity.
Lewis S. Feuer, Ph.D., Professor of Philosophy and Social Science.
Benson Mates, Ph.D., Professor of Philosophy.
Edward W. Strong, Ph.D., Professor of Philosophy.
George P. Adams, Ph.D., LL.D., Mills Professor of Intellectual and Moral
Philosophy and Civil Polity, Emeritus.
Jacob Loewenberg, Ph.D., Professor of Philosophy, Emeritus.
Stephen C. Pepper, Ph.D., L.H.D., LL.D., Mills Professor of Intellectual and
Moral Philosophy and Civil Polity, Emeritus.
Paul K. Feyerabend, Ph.D., Associate Professor of Philosophy.
Thomas S. Kuhn, Ph.D., Associate Professor of the History of Science.
Wallace I. Matson, Ph.D., Associate Professor of Philosophy (Vice-Chairman
of the Department).
Celestine J. Sullivan, Ph.D., Associate Professor of Philosophy.
Ernest W. Adams, Ph.D., Assistant Professor of Philosophy.
Stanley L. Cavell, A.B., Assistant Professor of Philosophy.
Price Charlson, Ph.D., Assistant Professor of Philosophy.
Thompson E. Clarke, M.A., Acting Assistant Professor of Philosophy.
John R. Searle, D.Phil., Assistant Professor of Philosophy.
David S. Shwayder, D.Phil., Assistant Professor of Philosophy.

Letters and Science List.—All undergraduate courses in this department
are included in the Letters and Science List of Courses. For regulations
governing this list, see page 11.

Departmental Major Adviser: Mr. E. W. Adams.
The Major.—A total of 33 units is required in the major program. The
following courses are required for a major program in the department:
20A–20B, 12A, 104, 114, and 18 additional units selected by the student from
other upper division courses in accordance with the rule that at least two
courses in each of the Groups A, B, and C, must be completed. The two re­quired upper division courses 104 and 114 in Groups A and B, respectively,
will satisfy the A and B requirements in part but may not be counted toward
satisfaction of the 18-unit requirement.

For students in residence prior to September, 1958, the requirements of
the major are similar, with the exception of the requirement of courses
104 and 114. The following will in this case be required: 20A–20B, and 12A
as preparation for the major, 6 units in each of the Groups A, B, and C,
and 6 additional units chosen from any group.

With the approval of the departmental adviser 3 units of the major may be
taken in another department, provided the course selected is regarded as
relevant to the major.

Honors Program in the Major.—Students who have achieved honors stand­ing
at the end of the junior year will be permitted to enter the departmental
honors program in the senior year. This program demands completion with a
grade of B or better of one of the following three options: 1) Philosophy
H195, Philosophy Tutorial; 2) Philosophy H197, Senior Colloquium; 3) a
graduate seminar—with the approval of the Departmental Honors Committee
and the instructor in charge, the student will be permitted to enroll in a
seminar, approval being based on the adequacy of the student's preparation
and the likelihood of his profiting from such study. In addition the student
will submit an acceptable thesis for which no unit credit will be assigned.
Option 2) above, Senior Colloquium, will not be offered before the academic

1 In residence fall semester only, 1960–1961.
2 In residence spring semester only, 1960–1961.
LOWER DIVISION COURSES

6A–6B. Introduction to Philosophy. (3–3) Yr. Beginning each semester.
Mr. Aschenbrenner, Mr. Cavell, Mr. Charlson,
Mr. Clarke, Mr. Feyerabend, Mr. Matson,
Mr. Searle, Mr. Shwayder, Mr. Strong
Two lectures and one weekly section meeting for discussion and written work.
Course 6A is not prerequisite to 6B.
6A: Emphasis on moral, social, and political philosophy.
6B: Emphasis on metaphysics and the theory of knowledge.

SOPHOMORE COURSES

12A–12B. Introduction to Logic. (3–3) Yr. Beginning each semester.
Mr. E. W. Adams, Mr. Clarke, Mr. Mates
Two lectures and one weekly section meeting for discussion and written work.

20A–20B. History of Philosophy. (3–3) Yr. Beginning each semester.
Mr. Aschenbrenner, Mr. Dennes, Mr. Matson, Mr. Sullivan
Two lectures and one weekly section meeting for discussion and written work.
Course 20A is not prerequisite to 20B.
20A. From the Pre-Socratics to Plotinus: Mr. Dennes, I; Mr. Matson, II.
20B. From the Scholastics to Kant: Mr. Sullivan, I; Mr. Aschenbrenner, II.

UPPER DIVISION COURSES

General Prerequisites.—Students enrolling in any restricted upper division course must have completed 6 units in courses 6A–6B or 20A–20B, or have completed under conditions specified below, course 101. Additional prerequisites are indicated in certain courses.
Prerequisites in philosophy are waived for courses in the history of science, History 105A–105B, and History 127A–127B.

Unrestricted Course

101. Philosophical Theories. (3) I.
A study of fundamental problems in metaphysics and the theory of knowledge. Careful reading and discussion of selected texts of Plato, Hume, Kant, and recent authors.
Course 101 is open to juniors and seniors who are not majors in philosophy and who have not taken courses 6A, 6B, 20A, or 20B, or their equivalent. It will be accepted as prerequisite for other upper division courses in the department in lieu of courses 6A–6B or 20A–20B.

Restricted Courses

GROUP A

Courses concerned with a critical analysis and appraisal of specific human interests such as art, literature, morality, religion, science, and society.

104. Ethics. (3) I.
Moral values: a study and analysis of the concepts of good and right and of the criteria of conduct.
**Philosophy**

*108. Social Philosophy. (3) I.  Mr. Dennes
An examination of the fundamental notions involved in the explanation and evaluation of social structures and processes. Basic problems of human personality and values in relation to their social matrix.

112. Philosophy of Religion. (3) II.  Mr. Cavell
The nature and the validity of religious ideas.

*125. Theory of Value. (3) II.  Mr. Shwayder
A study of the principles of evaluation in relation to both individual and social problems.

*128. Political Philosophy. (3) I.  Mr. Feuer
Analysis of political obligation and related problems.

136A–136B. Aesthetics. (3–3) Yr.  Mr. Charlson
Course 136A is not prerequisite to 136B.
A study of the nature of the aesthetic experience and of the work of art with detailed applications to the visual arts, music, and literature.
At the discretion of the instructor, the general prerequisite for upper division courses in philosophy may be waived for major students in literature or in the fine arts.

137. Aesthetic Theories. (3) II.  Mr. Aschenbrenner
A study of aesthetic theories based on historical and recent materials.

140. Philosophy of Law. (3) II.  ———
A study of philosophical problems arising in the legal context.

146A–*146B. Philosophy in Literature. (3–3) Yr.  Mr. Sullivan
At the discretion of the instructor, the general prerequisite may be waived for major students in literature or in the fine arts.
A study of certain basic philosophical issues as expressed in poetry, drama, and the novel.

*147. Theory of Historical Inquiry. (3) I.  Mr. Strong

GROUP B

Courses dealing with the methods of reflective thinking and the more general features of experience.

111. Metaphysics. (3) I.  Mr. Pepper

113A–113B. Logic. (3–3) Yr.  Mr. Mates, ———
Prerequisite: course 12A or the equivalent.

114. Theory of Knowledge. (3) I and II.  Mr. Searle, Mr. Shwayder

120A–120B. Scientific Method. (3–3) Yr.  Mr. Feyerabend
Methodology of the mathematical, the natural, and the social sciences.

124. Philosophy of Science. (3) I.  Mr. E. W. Adams
Prerequisite: course 12A–12B.
Central topic: Axiomatic analysis of concepts of geometry (theoretical and applied), physics, and unobservables in behavioral science.

133A–133B. Philosophy of Language. (3–3) Yr.  Mr. Searle, Mr. Shwayder

135A–135B. Contemporary Philosophy. (3–3) Yr.  Mr. Cavell, Mr. Searle

**Philosophy**

*142. Semantics of Formal Systems. (3) I.*
Prerequisite: course 12A and one upper division course in logic, or consent of the instructor.
Application of logical techniques to the analysis of such key semantical concepts as meaning, validity, and truth.

144. Historical Development of the Theory of Knowledge. (3) I.
Mr. Feyerabend
Historical treatment of the theory of knowledge in connection with the development of science.

**GROUP C**
Courses dealing with individual thinkers and epochs in the history of ideas. Course 20A–20B or its equivalent is prerequisite to courses in this group.

*103. Philosophy of the Nineteenth Century. (3) I.*

105. Kant. (3) I. Mr. Aschenbrenner
115. Medieval and Early-Modern Thought. (3) II. Mr. Strong
116. Plato. (3) I. Mr. Matson
117. Aristotle. (3) II. Mr. Charlson
*118. Spinoza. (3) II. Mr. Sullivan
*121. Hobbes. (3) I. Mr. Matson

History of Scientific Thought and Technique (History 105A–105B). (3-3) Yr. Mr. Kuhn
Topics in the History of Physical Science. (History 127A*-127B). (3-3) Yr. Mr. Kuhn

*129. Leibniz. (3) II. Mr. Aschenbrenner

130. Materialism and Naturalism. (3) II. Mr. Matson
Historical and critical studies of the chief philosophical materialists from Democritus to Dewey.

132. Descartes. (3) II. Mr. Clarke

*145. American Philosophy. (3) I.*

*171. Greek Philosophy from Thales to Democritus. (3) II. Mr. Matson
Prerequisite: course 20A.
A study of the emergence, from a mythological background, of Greek philosophical thought in the sixth century B.C. The philosophies of the Milesians, Heraclitus, the Pythagoreans, Parmenides, the Pluralists, and the Atomists.

*183. Locke. (3) I. Mr. Shwayder
184. Berkeley. (3) II. Mr. E. W. Adams
185. Hume. (3) II. Mr. Dennes

*188. Post-Kantian Idealism. (3) II.*
The Philosophy of Fichte, Hegel, and Schelling.

*Not to be given, 1960–1961.*
H196. Philosophy Tutorial. (3) I and II. 
The Staff (Mr. Matson in charge)
Restricted to senior honor students majoring in philosophy.
The department will designate a tutor, with whom the student will meet once a week, submitting written work on topics designated by the tutor.

*H197. Senior Colloquium. (3) I. 
The Staff (Mr. Matson in charge)
Restricted to senior honor students majoring in philosophy.
A seminar course for a group of honor students on a topic to be announced. The colloquium will meet once or twice a week. Emphasis on the writing of papers and discussion of them in the colloquium.

199. Special Study for Advanced Undergraduates. (1–4) I and II. 
The Staff (Mr. Matson in charge)

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 18)

204. Seminar in Ethics. (3) II. 
Mr. Dennes

210A–210B. Seminar in the History of Philosophy. (3–3) Yr. 
Mr. Charlson, Mr. Sullivan

*211. Seminar in Metaphysics. (3) I. 
Mr. Sullivan

213A–213B. Seminar in Logic. (3–3) Yr. 

214. Seminar in the Theory of Knowledge. (3) I and II. 
Mr. Searle, Mr. Clarke

*218A–218B. Seminar in Semantics. (3–3) Yr. 
Mr. Mates

Seminar in the History of Science (History 204). (3) II. 
Mr. Kuhn

220. Historical Relations of Science and Philosophy. (3) I. 
Mr. Kuhn

221. Metaphysics and Philosophical Analysis. (3) II. 
Mr. Matson

222. Seminar in the Philosophy of Mind. (3) I. 
Mr. Clarke, Mr. Mates

224A–224B. Axiomatic Method in Science. (3–3) Yr. Mr. E. W. Adams
Prerequisite: course 12A–12B; elementary calculus.
Axiomatic systems and interpretations in social and physical science.

*225. Seminar in Theory of Value. (3) II. 
Mr. Cavell

228. Seminar in Political Philosophy. (3) II. 

229. Philosophy of the Social Sciences. (3) II. 
Mr. Feuer

231. The Philosophy of Santayana. (3) I. 
Mr. Sullivan

233. Seminar in the Philosophy of Language. (3) I. 
Mr. Shwayder

235. Seminar in Contemporary Philosophy. (3) II. 
Mr. Cavell

236. Seminar in Aesthetics. (3) I. 
Mr. Cavell

§241. Space and Time. (3) II. 
Mr. E. W. Adams, Mr. Shwayder
Examination will be made of common sense and scientific conceptions of space and time and of the relations between them.

§ To be offered one semester only, 1960–1961.
Philosophy; Physical Education

242. History of Logic. (3) II. Mr. Mates

*247. Theories of History. (3) I. Mr. Strong

248A-248B. Seminar in the Philosophy of Science. (3-3) Yr. Mr. Feyerabend

250. Special Studies. (1-6) I and II. The Staff (Mr. Matson in charge)

Enrollment is ordinarily restricted to students who have been admitted to candidacy for the doctor's degree.

PHYSICAL EDUCATION

(Department Office, 103 Harmon Gymnasium)

Anna S. Espenschade, Ph.D., Professor of Physical Education (Vice-Chairman of the Division for Women).

Franklin M. Henry, Ph.D., Professor of Physical Education.

Pauline Hodgson, Ph.D., Professor of Physical Education.

Carl L. Nordly, Ph.D., Professor of Physical Education (Chairman of the Department).

Sarah R. Davis, A.B., Assistant Professor of Physical Education, Emeritus.

Louise S. Cobb, Ph.D., Supervisor of Physical Education, Emeritus.

Lucile K. Czarnowski, M.S., Supervisor of Physical Education, Emeritus.

Marie H. Glass, A.B., Supervisor of Physical Education, Emeritus.

Eleanor E. Bartlett, A.B., Associate Supervisor of Physical Education, Emeritus.

David H. Clarke, Ph.D., Assistant Professor of Physical Education.

Jean Grutzmacher, M.A., Acting Assistant Professor of Physical Education.

Joseph Royce, Ph.D., Assistant Professor of Physical Education.

Charles J. Keeney, A.B., Supervisor of Physical Education.

Rafel D. Miller, M.A., Supervisor of Physical Education.

Heber A. Newsom, M.A., Supervisor of Physical Education for Men and Supervisor of Teaching of Physical Education for Boys.

Charles A. Pease, A.B., Supervisor of Physical Education.

Frederica Bernhard, M.S., Associate Supervisor of Physical Education.

Lance Flanagan, M.A., Associate Supervisor of Physical Education.

Kooman Boycheff, Ph.D., Associate Supervisor of Physical Education.

Edgar Nemir, A.B., LL.B., Associate Supervisor of Physical Education.

Frances A. Bloland, M.S., Assistant Supervisor of Physical Education.

Harold J. Frey, M.S., Assistant Supervisor of Physical Education.

Rose Marie Meyer, M.S., Assistant Supervisor of Physical Education.

Chester W. Murphy, M.S., Assistant Supervisor of Physical Education.

Robert J. Park, M.A., Assistant Supervisor of Physical Education.

William H. Phillips, Jr., M.A., Assistant Supervisor of Physical Education.

William A. Tomaras, Ed.D., Assistant Supervisor of Physical Education.

Dorothy M. Wendt, M.S., Assistant Supervisor of Physical Education.

Doris White, M.A., Assistant Supervisor of Physical Education.

Thomas S. Yukie, Ed.D., Assistant Supervisor of Physical Education and Coordinator of Recreation.

June Day, M.S., Junior Supervisor of Physical Education.

Joanna R. Gewertz, M.A., Junior Supervisor of Physical Education.

Alfred Mathews, Jr., M.A., Junior Supervisor of Physical Education.

George Wolfman, A.B., Lecturer in Physical Education.


Letters and Science List.—Course 105 is included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: for women, Miss Espenschade, Miss Hodgson; for men, Mr. Nordly, Mr. Clarke, Mr. Henry, Mr. Keeney, Mr. Miller, Mr. Royce.

The Major.—High school chemistry or the equivalent, Anatomy 25, Public Health 5A, Psychology 1A, Zoology 1A or 10, Nutrition 10, Physical Education 20; for men, Physical Education 1; for women, Physical Education 26 and 35.

Physical Education 101, 105, 110, 130, 135A, 140 and 120 or 135B; plus six units selected from the following: Anthropology 118, 119, 162, Education 100A, Physiology 102, 103, 104, 107, Psychology 111, 113N, Public Health 106, Sociology 148.

Honors Program.—Physical Education H195, or H195 and 200—4 units; Physical Education H196—2 units. One course in the major will be waived with the approval of the adviser.

Teacher Education.—Men consult Mr. Clarke (fall semester); Mr. Flanagan (spring semester); women consult Miss Hodgson; see also the Announcement of the School of Education.

Higher degrees.—Men consult Mr. Nordly or Mr. Henry; women consult Miss Espenschade; see also the Announcement of the Graduate Division, Northern Section, and the Announcement of the School of Education.

The incidental fee payable by all students at the time of registration entitles students to the use of gymnasiums, swimming pools, showers, towels, lockers, tennis courts, and the athletic fields; also to the use of costumes for certain physical education activities, including swimming.

Fees.—The fee for ice skating is $8.50; for bowling, $8.

Fines.—Fines are imposed for each formal transaction necessitated by failure of the student to comply with the regulations of the department: (a) failure to return equipment or clothing on or before the date posted for such return at the end of each semester, or at the end of each special session of the University, or failure to return athletic supplies (balls, bats, etc.) on the date of issue, $1 for each twenty-four hours until the full purchase price of the article has been reached; (b) failure to meet the appointment for the physical education orientation meetings, $4; (c) overnight use of dressing locker, $2; (d) failure to empty locker within designated time, $5.

Lower Division Courses for Men

1. Physical Education Activities. (i) I and II.

The Staff (Mr. Nordly in charge)

Sports Activity Classes: Most sections meet twice weekly at various hours.

Classes in the following sports activities are open to men in acceptable physical condition: apparatus, badminton, basketball, bodybuilding, bowling, boxing, diving, golf, gymnastics, handball, judo, officiating, squash rackets, swimming, lifesaving, skin diving, tumbling, trampoline, tennis, weight lifting, and wrestling.

Sports Teams: Advanced instruction and coaching for intercollegiate competition in the following sports is open to men accepted by the intercollegiate team coach and the Student Health Service: baseball, basketball, boxing, crew, cross country, gymnastics, football, rugby, swimming, soccer, tennis, track and field, waterpolo, and wrestling.

Lower Division Courses for Women

26. Physical Education Activities. (i) I and II.

The Staff (Miss Espenschade in charge)

Sections meet twice weekly at various hours.
The following activities are offered in elementary, intermediate, and advanced grades for women who are in good physical condition.

**Sports:** badminton, basketball, bowling, diving, fencing, field hockey, field sports, golf, lifesaving, tennis, swimming, and officiating.

**General Exercise:** tumbling, trampoline, and conditioning exercises.

**Individual Exercise:** group exercises adapted to individual needs.

### LOWER DIVISION COURSES FOR MEN AND WOMEN

**5A. First Aid.** (1) I and II.
Miss Wendt
(Formerly numbered 85A.)
Standard and advanced course. Sections meet two hours per week.
Upon successful completion of the course, a Red Cross certificate is awarded.

**12. Physical Education Activities.** (½) I and II.
The Staff (Miss White, Mr. Keeney in charge)

**Sports:** archery, badminton, bowling, fencing, figure skating, golf, tennis, and sailing.

**Dance:** modern, folk, and social.

**Elementary School Activities:** dance and games.

**20. Introduction to Physical Education.** (1) I and II.
Miss Hodgson, Mr. Nordly
An interpretation of the field designated to give the prospective major student an understanding of its scope.

**35. Rhythmic Basis of Dance and Allied Arts.** (2) I.
Mrs. Bloland
(Formerly numbered 54.)
Prerequisite: 2 semesters of experience in dance, or consent of the instructor.
This course is planned for students interested in dance, music, and art. Consideration given to nature and function of rhythm, rhythmic analysis and notation, rhythmic form in the temporal and spatial arts.

### UPPER DIVISION COURSE FOR MEN

**171. Conditioning of Athletes and Care of Injuries.** (2) II.
Mr. Royce
(Formerly numbered 318.)
Lectures and a three-hour laboratory period per week. Prerequisite: course 5A, Physiology I or Anatomy 25.
Modern principles and practice in conditioning and care of athletes; individual variation and needs as to sleep, diet, health, and activity habits; care of injuries, with special emphasis on therapy, taping, and protective equipment.

### UPPER DIVISION COURSES FOR WOMEN

**160A–160B. Theory of Dance.** (3–3) Yr.
Mrs. Bloland, Miss Gewertz
160A, II; 160B, I.
Lectures and laboratory. Prerequisite: course 35 and Psychology 1A.

**165A. Theory of Group Athletics.** (3) I.
Miss Park
Lectures and laboratory. Recommended: course 101. Prerequisite: experience in the activities included.

**165B. Theory of Gymnastics.** (2) I.
Miss Meyer
Lectures and laboratory. Recommended: course 101. 165A is not prerequisite to 165B.

† To be given if a sufficient number of students enroll.
166. Theory of Individual Athletics. (2) II. Miss White, Miss Day, Miss Wendt
Prerequisite: a working knowledge of the activities included.

**UPPER DIVISION COURSES FOR MEN AND WOMEN**

101. Kinesiology and Body Mechanics. (3) I. Mr. Royce
Lectures and laboratory. Prerequisite: Physiology 1, 1L; Anatomy 25.
The study and application of physical structure and muscular movements
in various physical education activities. Description and application of cer­
tain anatomical concepts and physical laws to joint and muscular action.

102. Corrective Physical Education. (3) II. Miss Grutzmacher
Prerequisite: course 101.
Development of programs for those individuals whom the physician has
diagnosed as functionally deficient; particular attention to poor circula­
tion, spinal deviations, etc. Analysis of causes underlying these conditions
and direction of students into activities suitable to their needs.

105. Physiological Hygiene. (4) II. Mr. Henry
Lectures and laboratory. Prerequisite: high school chemistry; Nutrition
10; Physiology 1, 1L; Public Health 5A.
The physiology of exercise; diet, ventilation, training, fatigue, and
health in relation to physical activity. Individual differences in cardio­
vascular and respiratory function.

110. Psychologic Bases of Physical Activity. (2) I. Mr. Henry
Prerequisite: Psychology 1A.
Perception, motivation, learning, and emotion in relation to physical ac­
tivity; reaction time and coordination. Personal adjustment and social be­
behavior as observed in play. The psychology of competition.

*120. Sports in American Society. (2) I. Mr. Flanagan
Open to all upper division students.
An examination of the interrelationships of sports and physical recreation
with other aspects of American culture: industrialization and urbanization,
communication and transportation, war and peace. Sports and American edu­
cation. The influence of ideas, ideals, traditions, and democratic concepts.

130. History and Theories of Physical Education. (3) II. Miss Hodgson
Prerequisite: course 20; Psychology 1A.
History of American and foreign physical education. Its cultural back­
ground: political, social, educational. Comparative physical education. De­
signed to develop critical judgment regarding the purposes and significance
of physical education in modern life and education on the basis of perti­
nent cultural and scientific factors.

131. Organization and Administration of Physical Education. (2) I.
(Formerly numbered 131A.) Mr. Clarke
Prerequisite: course 130.
Principles, policies, and administrative procedures pertaining to depart­
mental organization, personnel, facilities, equipment and supplies, finance,
health and safety, public relations and legal aspects.

132. Curriculum in Physical Education. (2) II.
(Formerly numbered 131B.) Mr. Clarke, Miss Hodgson
Prerequisite: course 130.

* Not to be given, 1960—1961.
† To be given if a sufficient number of students enroll.
Physical Education

Principles of curriculum development applied to physical education including the instructional program, intramural sports and interscholastic athletics.

135A-135B. Measurement and Evaluation in Physical Education. (2-2) Yr. 135A. II; 135B. I. Miss Espenschade
Historical background of measurement in physical education; statistical techniques used in scoring tests; construction and use of tests and other forms of appraisal of individuals; evaluative criteria and procedures for facilities, personnel, and program; interpretation of results; analysis of selected research studies.

140. Community Recreation. (2) I. Mr. Miller
Prerequisite: upper division standing. Course 140 is not open to students who have taken course 143A or 143B.
Nature, scope, and significance of recreation in the social and economic life of the American people. Meaning and nature of play. History, purpose, function, organizational patterns, and interrelationships of groups, agencies, and institutions which serve the recreational needs of the community.

199. Special Study for Advanced Undergraduates. (1-5) I and II. The Staff (Mr. Nordly in charge)
Prerequisite: senior standing and consent of the department. Only specially qualified students will be admitted.

Methods Courses for Men

340. The Theory and Teaching of Aquatics. (1) I and II. Mr. Flanagan
Prerequisite: successful completion of course 1. Students desiring Water Safety Instructor Certificate must complete senior lifesaving in addition to course 1 (aquatics).
Swimming, diving, water polo, lifesaving and water safety.

341. The Theory and Teaching of Gymnastics and Individual Adapted Activities. (1) I. Mr. Frey, Mr. Keeney, Mr. Pease
Prerequisite: course 1 (gymnastics).
Stunts, tumbling, apparatus, calisthenics, weightlifting, bodybuilding.

342. The Theory and Teaching of Combative Activities. (1) II. Mr. Clarke, Mr. Nemir, Mr. Tomaras
Prerequisite: course 1 (combative skills).
Boxing, wrestling, combative games.

344. The Theory and Teaching of Field Sports. (2) II. Mr. Keeney, Mr. Mathews, Mr. Newsom, Mr. Wolfman
Prerequisite: course 1 (field sports).
Baseball, American football, soccer, softball, touch football, track and field.

345. The Theory and Teaching of Court Sports. (2) I. Mr. Flanagan, Mr. Miller, Mr. Murphy, Mr. Newsom
Prerequisite: course 1 (court sports).
Badminton, basketball, handball, tennis, volleyball.

Methods Course for Men and Women

343. The Theory and Teaching of Social Recreational Activities. (1) II. Miss Day, Mr. Pease
Folk and social dance, games and relays including social recreational activities.
GRADUATE COURSES FOR MEN AND WOMEN

200. Seminar in Physical Education. (2) I and II. Mr. Henry, Miss Hodgson

The meaning, methods, and techniques of research procedure as applied to physical education; a critical review of selected studies, literature, practices, and procedures in the field; application of this training to a particular problem in the field.

201. Seminar in Movement and Body Mechanics. (2) II. Mr. Royce

Application of neurophysiological concepts, physical laws, and kinesiology to analysis of human movement.

205. Seminar in Physiological Hygiene. (2) II. Mr. Henry, Mr. Clarke

Immediate and long-range adaptations of the body to exercise. Physiological limits and work capacities in relation to age, sex, diet, environmental factors, and nature of activity.

210. Seminar in Psychologic Bases of Physical Activity. (2) I. Miss Espenschade

Critical review of current literature on motor learning, coordination, kinesthesis, and reaction time. Consideration of sensory-motor perception, motivation and personality factors in relation to physical activities.

230. Seminar in Cultural and Historical Foundations of Physical Education. (2) I. Miss Hodgson

A critical analysis of the interrelations of physical education and culture within the historical perspective of school and society.

231. Administration of Physical Education. (2) II. Mr. Nordly

†231. Administration of Physical Education. (2) II. Mr. Nordly

Miss Espenschade, Mr. Henry, Miss Hodgson, Mr. Nordly, Mr. Royce

PHYSICS

(Department Office, 366 LeConte Hall)

Luis W. Alvarez, Ph.D., Professor of Physics.
Robert B. Brode, Ph.D., Sc.D., Professor of Physics.
Owen Chamberlain, Ph.D., Professor of Physics.
Geoffrey F. Chew, Ph.D., Professor of Physics.
*William B. Fretter, Ph.D., Professor of Physics.
Donald A. Glaser, Ph.D., Professor of Physics.
August C. Helmholtz, Ph.D., Professor of Physics (Chairman of the Department).
Francis A. Jenkins, Ph.D., Professor of Physics.
*Robert Karplus, Ph.D., Professor of Physics.
Arthur F. Kip, Ph.D., Professor of Physics.
†Charles Kittel, Ph.D., Professor of Physics.
Edwin M. McMillan, Ph.D., Professor of Physics and Director of the Lawrence Radiation Laboratory, Berkeley.
Burton J. Moyer, Ph.D., Professor of Physics.
*William A. Nierenberg, Ph.D., Professor of Physics.
Wilson M. Powell, Ph.D., Professor of Physics.
*Malvin A. Ruderman, Ph.D., Professor of Physics.

† To be given if a sufficient number of students enroll.
Physics

Emilio G. Segrè, Ph.D., Professor of Physics.
*Edward Teller, Ph.D., Sc.D., Professor of Physics.
Robert L. Thornton, Ph.D., Professor of Physics.
*Kenneth M. Watson, Ph.D., Professor of Physics.
Harvey E. White, Ph.D., Professor of Physics and Director of the Lawrence Hall of Science.
*Herbert F. York, Ph.D., Professor of Physics.
Raymond T. Birge, Ph.D., LL.D., Professor of Physics, Emeritus.
Victor F. Lenzen, Ph.D., Professor of Physics, Emeritus.
Leonard B. Loeb, Ph.D., Professor of Physics, Emeritus.
Ralph S. Minor, Ph.D., Professor of Physics and Optometry, Emeritus.
Hiram W. Edwards, Ph.D., Associate Professor of Physics, Emeritus.
Robert R. Brown, Ph.D., Associate Professor of Physics.
Frank S. Crawford, Ph.D., Associate Professor of Physics.
Kenneth M. Crowe, Ph.D., Associate Professor of Physics.
Gerson Goldhaber, Ph.D., Associate Professor of Physics.
Erwin L. Hahn, Ph.D., Associate Professor of Physics.
†Carson D. Jeffries, Associate Professor of Physics.
†Walter D. Knight, Ph.D., Associate Professor of Physics.
Alan M. Portis, Ph.D., Associate Professor of Physics.
†John H. Reynolds, Ph.D., Associate Professor of Physics.
Arthur H. Rosenfeld, Ph.D., Associate Professor of Physics.
M. Lynn Stevenson, Ph.D., Associate Professor of Physics.
†Michael Tinkham, Ph.D., Associate Professor of Physics.
Thomas J. Ypsilantis, Ph.D., Associate Professor of Physics.
Sumner P. Davis, Ph.D., Assistant Professor of Physics.
Charles L. Schwartz, Ph.D., Assistant Professor of Physics.
Howard A. Shugart, Ph.D., Assistant Professor of Physics.
Eyvind Wichmann, Ph.D., Assistant Professor of Physics.
Charles Zemach, Ph.D., Assistant Professor of Physics.
Norris E. Bradbury, Ph.D., Professor of Physics, Los Alamos Laboratory.
William A. Butler, Ph.D., Visiting Associate Professor of Physics.
Roger Elliott, Ph.D., Visiting Professor of Physics for the spring semester.
David L. Judd, Ph.D., Lecturer in Physics.
Allan Kaufman, Ph.D., Lecturer in Physics.
Wulf B. Kunkel, Ph.D., Lecturer in Physics.
Joseph V. Lepore, Ph.D., Lecturer in Physics.
Samuel Silver, Ph.D., Professor of Engineering Science.
John M. Stone, Ph.D., Lecturer in Physics.
Harry Suhl, Ph.D., Lecturer in Physics.

MEDICAL PHYSICS

John W. Gofman, M.D., Ph.D., Professor of Medical Physics.
Hardin B. Jones, Ph.D., Professor of Medical Physics and Physiology and Assistant Director of the Donner Laboratory.
John H. Lawrence, M.D., Professor of Medical Physics and Director of the Donner Laboratory.
Cornelius A. Tobias, Ph.D., Professor of Medical Physics.

† Appointment in the Miller Institute for Basic Research in Science for the spring semester, 1961.
¶ In residence fall semester only, 1960–1961.
† In residence spring semester only, 1960–1961.
Letters and Science List.—All undergraduate courses in physics except 126, 126L, 131, are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Chamberlain, Mr. Hahn, Mr. Jeffries, Mr. Kip, Mr. Shugart, Mr. Ypsilantis.

The Major.—In his first four semesters the student ordinarily will take courses in elementary physics, differential and integral calculus, and elementary chemistry. In each of these areas more than one sequence of courses is available, and the student is advised to consult, if necessary, with the departmental adviser concerning the several possibilities. The following sequences are desirable: Physics 4A, 4B, 4C; Mathematics 1A, 1B, 2A, 2B (which includes differential equations, a prerequisite for several of the upper division courses in physics); and Chemistry 1A, 1B. The minimum preparation for all upper division courses ordinarily will be Physics 4A, 4B, 4C; Mathematics 1A, 1B, 2A or Mathematics 3A, 3B, 4A, 4B. When differential equations is listed as a prerequisite to upper division physics courses this is taken to mean Mathematics 2B, or Mathematics 119, or equivalent.

The major must include courses 105A–105B, 108B, 110A–110B, 110C or 110D, 115, and 121. Recommended: Physics 112; Mathematics 119 for those who have taken 3A, 3B, 4A, 4B), 185; and a reading knowledge of two of the three languages, French, German, and Russian.

Mathematics 2B will be counted as upper division units for majors in physics.

Honors Program.—Students with a grade-point average of 3.0 or better may be graduated with Honors in Physics upon completion of the required major, at least two semesters of Physics H197, and the recommendation of the departmental advisers. Special research work which may be taken as Physics 199 may be substituted for one semester of Physics H197.

Physics and Biology.—An individual group major may be arranged for students who wish to obtain a broad introduction to the physical sciences and to their application to biology. Advisers: Mr. Tobias, Mr. Lawrence.

Engineering Physics.—The College of Engineering with the cooperation of the Department of Physics offers a curriculum in engineering physics leading to the degree of Bachelor of Science. Major Adviser: Mr. Portis. (See section on Program of Study in Engineering Physics in the Circular of Information.)

Lower Division Courses

Courses 4A, 4B, 4C are fundamental and are designed to meet the needs of students whose major is physics and of students preparing for applications of physics in the Colleges of Engineering and Chemistry.

All students planning to take lower division courses except course 10 should have completed trigonometry.

2A-2B. General Physics Lectures. (3-3) Yr. Beginning each semester.  
Mr. White, Mr. Shugart, Mr. Friesen, Mr. Butler  
Three lectures and one discussion section per week. Elective in the College of Letters and Science. Required for premedical students and students in architecture.  
Mechanics, properties of matter, heat, sound, light, electricity and magnetism, atomic and nuclear physics.

3A-3B. General Physics Laboratory. (1-1) Yr. Beginning each semester.  
Mr. Shugart  
Required for premedical students. Recommended for all students who elect course 2A-2B.  
Mechanics, properties of matter, heat, sound, light, electricity and magnetism, atomic and nuclear physics. Experimental work planned to accompany the lectures in course 2A-2B.

4A. General Physics. (4) I and II.  
Mr. Alvarez, Mr. Ypsilantis, --------, --------  
Three lectures and one three-hour laboratory period per week. Prerequisite: One semester of calculus. Open to students in all colleges. Together with course 4B, 4C, required for students in the College of Letters and Science whose major subject is physics, and for students in engineering and chemistry.  
Mechanics, properties of matter, wave motion, sound.

4B. General Physics. (4) I and II.  
Mr. Kip, Mr. Anderson, --------, --------, --------  
Three lectures and one three-hour laboratory section per week, with an additional one-hour discussion group per week. Prerequisite: course 4A and two semesters of calculus. Open to students in all colleges. Required for students in the College of Letters and Science whose major subject is physics, and for students in engineering and chemistry.  
Electricity and magnetism.

4C. General Physics. (4) I and II.  
Mr. Davis, --------  
Three lectures and one three-hour laboratory period per week. Prerequisite: courses 4A and 4B. Open to students in all colleges. Required for students in the College of Letters and Science whose major subject is physics, and for students in engineering and chemistry.  
Heat, light, modern physics.

10. Descriptive Introduction to Physics. (3) I and II.  
--------, Mr. Rosenfeld  
Open to students with or without high school physics, but not open to those who have credit for any of 2A, 2B, 4A, 4B, 4C, or the equivalent.  
A brief presentation of some of the more important phenomena in physics, with experimental illustrations.

49. Supplementary Work in Lower Division Physics. (1-3) I and II.  
Mr. Brown in charge  
Students with partial credit in lower division physics courses may, with the consent of the instructor, complete the credit under this heading.

Upper Division Courses

Courses 4A, 4B, 4C, and differential and integral calculus are prerequisite to all upper division courses except course 108A, I, and 108B, section I, II.

104. Vector Analysis. (3) I and II.  
Mr. Weinberg, --------  
Prerequisite: senior standing, or consent of the instructor.
Elements of vector analysis and its application to physics. Importance of an invariant formulation of physical laws. Elements of tensor analysis only in regard to general applications.

   Mr. Crawford, Mr. Helmholz, Mr. Moyer, Mr. Ypsilantis
   105A. I: Mr. Crawford, Mr. Moyer; II: ———.
   105B. I: Mr. Helmholz; II: ———.
   Prerequisite: differential equations (may be taken concurrently).
   Fundamental principles of Newtonian mechanics. Brief introduction to Lagrange's and Hamilton’s equations.

108A. Geometrical Optics. (3) I.
   Two lectures and one three-hour laboratory period per week. Prerequisite: courses 2A–2B and 3A–3B.
   Geometrical methods applied to the optics of mirrors, prisms, and lenses.

108B. Physical Optics. (3) I and II. Mr. Powell, Mr. Stone, ———, ———
   I: Mr. Stone, ———; II: Mr. Powell, Mr. Stone, ———.
   Two lectures and one three-hour laboratory period per week. Section 1 (spring semester) not open to physics majors. Course 108A is not prerequisite to 108B.
   The phenomena of diffraction, interference, and polarization of light, and their applications.

110A–110B. Electricity and Magnetism. (3–3) Yr. Beginning each semester.
   Mr. Brode, Mr. Thornton, Mr. Crowe, ———
   110A. I: Mr. Brode, Mr. Thornton; II: ———, Mr. Crowe.
   110B. I: Mr. Crowe; II: Mr. Brode, Mr. Thornton.
   Prerequisite: differential equations.
   Elementary and mathematical theory of electrostatics, magnetostatics, magnetism, steady and varying currents, electron theory, and electromagnetic waves.

110C. Advanced Electrical Laboratory. (2) I and II.
   Mr. Shugart, Mr. Knight
   The use and calibration of precision electrical instruments and electronic devices.

110D. Modern Physics Laboratory. (2) I and II. Mr. Shugart, Mr. Knight
   Prerequisite: course 121.
   The experimental foundation for the theory of atomic structure.

112. Thermodynamics and Kinetic Theory. (3) I and II.
   Thermodynamics and the kinetic theory of gases, with an introduction to statistical mechanics.

115. Introduction to Quantum Mechanics. (3) I and II.
   Prerequisite: courses 105A, 121. Mr. Chamberlain, Mr. Glaser
   The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.

121. Introduction to Atomic Structure. (3) I and II.
   Mr. Brown, Mr. Jenkins, ———, ———,
   An introduction to atomic physics, treating cathode and positive rays, the electron, thermionic emission, the photoelectric effect, the structure of the atom, and the interpretation of spectra and X rays.
124. Radioactivity and Nuclear Structure. (3) I and II.
Prerequisite: course 121.
Mr. Stevenson, __________
Discovery of radioactivity, nature of radioactivity, \(\alpha\), \(\beta\), and \(\gamma\) rays, theory of successive transformations, artificial transmutations, nuclear structure.

Mr. Segre, __________
Designed to cover more thoroughly the material of course 124.
Prerequisite: course 121.
Natural and artificial radioactivity, nuclear transformations, nuclear structure, magnetic moments, nuclear radiations, mesons, high energy physics.

132. Modern Physics. (3) I.
Prerequisite: Physics 2A–2B, 3A–3B, or the equivalent, or consent of the instructor.
Not open for credit to students who have had Physics 121.
A general course in modern physics. Elements of atomic and nuclear physics. The periodic table, spectra, X rays, electron optics, solid state, nuclear physics, and nuclear energy, instrumentation, cosmic rays and fundamental particles.

140. Introduction to Solid State Physics. (3) II.
Mr. Kip
Prerequisite: course 121.
An elementary survey of the properties of solids, not intended for students planning graduate work in solid-state or resonance physics. Simple crystal structures; dielectric, thermal, and magnetic properties; metals and semiconductors; superconductivity; mechanical properties.

H197. Physics Honors Course. (2) I and II.
Mr. Chamberlain, Mr. Helmholz
A proseminar which includes study of a standard book on theoretical physics and reports on current theoretical and experimental problems. May be repeated for credit.

199. Special Study for Advanced Undergraduates. (1–2) I and II.
The Staff (Mr. Helmholz in charge)
All special work of upper division grade not included in courses announced above. Designed to introduce students to advanced topics and to the technique and methods of research. Credit value to be fixed in each case.

GRADUATE COURSES
(Concerning conditions for admission to graduate courses, see page 18)

205A. Advanced Dynamics. (3) I and II.
Mr. Wichmann, Mr. Judd
Prerequisites: course 105A–105B and 104, or equivalent.

205B. Advanced Dynamics. (3) I.
Mr. Judd
Prerequisite: course 205A.
Advanced topics in classical dynamics, including selections from: hydrodynamics, magnetohydrodynamics, theory of elasticity, mechanics of periodic structures, nonlinear mechanics, advanced perturbation theory, and computational methods.
208. Interactions of Light with Matter. (3) I and II.
Prerequisite: Physics 108B and Physics 121. Mr. Schwartz.
Emission, absorption, and propagation of light treated classically. Limits of classical theory. Transition to quantum theory through the correspondence principle.

210A: I: Mr. Kaufman; II: Mr. Hahn
210B: I: Mr. Hahn; II: Mr. Kaufman.
Prerequisite: course 110A–110B and a working knowledge of differential equations.
Classical description of the electromagnetic field, including special relativity and electron theory.

219. Thermodynamics and Statistical Mechanics. (3) I and II.
Prerequisite: Physics 112 or equivalent, Physics 115 or equivalent.

220. Advanced Statistical Mechanics. (3) II.
Prerequisite: Physics 219 or consent of the instructor.
Phase transitions, including condensation. Description of imperfect gases. Transport theory and other nonequilibrium phenomena.

221A–221B. Quantum Mechanics. (3–3) Yr. Beginning each semester.
Prerequisite: course 115.

222. Mathematical Methods of Theoretical Physics. (3) II.
Prerequisite: Physics 219 or consent of the instructor.
The setting up and solution of differential and integro-differential equations; statistical and algebraic methods for the treatment of problems of physics.

Prerequisite: the equivalent of course 221A, and also either course 124 or 129A.
The first semester treats the quantum mechanics of atoms and molecules, using group theoretical methods. The second semester, which may be taken independently, treats solid state theory.

224A–224B. Nuclear Physics. (3–3) Yr.
Prerequisite: the equivalent of course 221A, and also either course 124 or 129A.
224A: Elements of nuclear structure, including the two-nucleon system and simple models of complex nuclei; basic theory of nuclear reactions; symmetry principles.
224B: Relativistic phenomena; introduction to field theory; weak and electromagnetic interactions; properties of pions.

227. Nuclear and Electron Resonance. (3) I. Mr. Suhl
Prerequisite: a knowledge of the elements of quantum mechanics.
Experimental methods; theory of relaxation mechanisms; paramagnetic salts; coupling of electronic and nuclear systems; cyclotron resonance.

230A—230B. Quantum Theory of Fields. (3–3) Yr. Mr. Wichmann
230A. I and II: Mr. Wichmann; 230B. II: ———.
Quantization of the electromagnetic field; formal and phenomenological meson theories with applications; general relativity.

The Staff (Mr. Fretter in charge)
Open to graduate students contemplating research in contemporary physics, chemistry, or engineering who have, in the instructor's opinion, the necessary background knowledge.
An introduction to modern experimental developments in the techniques of physical measurements. Lectures on the various measuring techniques developed in recent years will be given by a number of experts in the different fields of experimentation.

240A—240B. Solid State Physics. (3–3) Yr. Mr. Portis
Prerequisite: course 115 or equivalent. Open to advanced undergraduates.
Crystal symmetry; electromagnetic, elastic, and particle waves in periodic lattices; crystal binding; thermal properties; dielectric and magnetic susceptibilities; ferroelectricity; ferromagnetism; theory of metals and alloys; semiconductors; excitons; superconductivity; imperfections in solids. Selected topics, including electron and nuclear spin resonance.

290. Seminar. (2) I and II. The Staff (Mr. Helmholz in charge)
Advanced study in various fields of modern physics. Topics will vary from year to year. The program for 1960–1961 will probably include seminars in:
(a) Magnetohydrodynamics (I. ———; II. Watson); (b) Cosmic Rays (Brodie and Brown); (d) Spectroscopy (Jenkins, ———); (e) Nuclear Physics (to be arranged); (f) Molecular Beams (Shugart); (k) Solid State Physics (Elliott, Kip, Portis and Suhl); (r) Physics of Ionized Gases (Kunkel); (s) Nuclear Resonance (Hahn, Jeffries, Knight).

295. Research. (1–6) I and II. The Staff (Mr. Helmholz in charge)

**MEDICAL PHYSICS**

**LOWER DIVISION COURSE**

25. Atomic Radiation and Life. (2) I and II. Mr. Mel
Basic aspects of atomic radiations illustrated by examples from various biological and physical fields. To provide a framework for evaluating the complex changes associated with the atomic age in biomedical and physical sciences and society as a whole. Designed for liberal arts as well as for science students.

**UPPER DIVISION COURSES**

126. Artificial Radioactivity in the Biological Sciences. (2) I and II. Mr. Gofman, Mr. Nichols
Prerequisite: course 2A—2B, Chemistry 1A—1B, and one of the following: Zoology 1A—1B, Physiology 1, 1L, or Botany 1.
The theory, methods, and interpretation of the use of artificial radioactive elements for research in the biological sciences. Special emphasis is placed upon the role of radioactive tracers for the interpretation of the dynamic aspects of metabolic phenomena in biological systems.

126L. Artificial Radioactivity in the Biological Sciences. (1) I and II.
Laboratory work to accompany course 126. Mr. Gofman, Mr. Hayes

128A–128B. Nuclear and Radiation Physics in Biology. (3–3) Yr.
Mr. Mortimer, Mr. Wallace
128A: Two lectures and one 3-hour laboratory period per week.
128B: Three lectures (no laboratory) per week.
Prerequisite: course 4A–4B–4C, or the equivalent, calculus.

131. Biological Effects of Radiation. (3) II.
Mr. Mortimer
One lecture and two 3-hour laboratory periods per week. Prerequisite: course 2A–2B, lower division biology, and consent of instructor. Recommended: Physiology 108, Medical Physics 126–126L, or 128A–128B.
Actions of ionizing radiations and ultraviolet light on biological systems. Illustration of various types of radiation damage, including lethal and genetic effects, and dependence of this damage on modification of physical and biological parameters.

133A*–133B. Physics of Biological Systems. (3–3) Yr.
*133A: Mr. Mel; 133B: Mr. Tobias
Prerequisite: Physics 4A–4B–4C, or the equivalent, and differential equations. Course 133A is not prerequisite to 133B.
Aspects of physics important for the understanding of living phenomena. 133A: Biological rate processes and thermodynamics of closed and open systems; electrokinetic phenomena; active transport. 133B: Biophysics of sensory systems; information theory and replication; quantum biology, bioelectricity.

198. Special Study in Medical Physics for Undergraduates. (1–3) I and II.
The Staff (Mr. Jones in charge)
Advanced upper division work in medical physics and biophysics. Designed to introduce students to advanced topics and to the technique and methods of research. Credit value to be fixed in each case.

GRADUATE COURSES

225A–225B. Isotopes in Experimental Medicine. (2–2) Yr.
Mr. Rosenthal, Mr. Lawrence
One lecture and one three-hour demonstration per week. Prerequisite: graduate standing in one of the biological or medical sciences.

290. Seminar. (1–3) I and II.
The Staff (Mr. Lawrence in charge)
Advanced study in various fields of biophysics and medical physics. Topics will vary from year to year. The program for 1960–1961 will probably include seminars in (g) Effects of Radiation in Mammals (II, Kelly and Dobson); (j) Aging (II, Jones); (p) Progress in Biophysics (I, Tobias, Engstrom; II, Engstrom); (q) Physiology of Circulation (I, Jones and Dobson); (v) Radiation Genetics in Microorganisms (II, Mortimer).

299. Research: Medical Physics and Biophysics. (1–6) I and II.
The Staff (Mr. Jones in charge)

**Related Courses in Other Departments**

- Elastic Waves. (Geology 204A–204B.)
- Advanced Seismometry. (Geology 217.)
- Radiation Physiology. (Physiology 108.)
- Physical Biochemistry. (Biochemistry 206.)
- Principles of Geophysics. (Geology 122A–122B.)
- History of Scientific Thought and Technique. (History 105A–105B.)
- Problems in the Development of Physical Science. (Philosophy 127A–127B.)
- Seminar in the History of Science. (History 205.)
- Seminar in the Relations of Science and Philosophy. (Philosophy 220.)

**Physiology**

(Department of Anatomy and Physiology; for courses in Anatomy, see page 25.)

(Office, 2549 Life Sciences Building)

I. Lyon Chaikoff, M.D., Ph.D., Professor of Physiology *(Acting Co-Chairman for Physiology).*

‡Sherburne F. Cook, Ph.D., Professor of Physiology.

Hardin B. Jones, Ph.D., Professor of Physiology and Medical Physics.

*Nello Pace, Ph.D., Professor of Physiology.

Walter J. Freeman, M.D., Assistant Professor of Physiology.

Paola S. Timiras, M.D., Ph.D., Assistant Professor of Physiology.

Ernest L. Dobson, Ph.D., Lecturer in Physiology.

Dorothy H. Eichorn, Ph.D., Lecturer in Physiology.

Gilbert S. Gordan, Jr., Ph.D., M.D., Associate Professor of Medicine, and

Lecturer in Psychiatry.

Lola S. Kelly, Ph.D., Lecturer in Medical Physics and Biophysics.

Gordon L. Walls, Sc.D., Professor of Physiological Optics and Optometry.

**Letters and Science List.**—All undergraduate courses in physiology are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

**Departmental Major Advisers:** Mr. Freeman, Mrs. Timiras.

The Major.—Required: course 1–1L (5) or Zoology 1A–1B (8) or Biology

11A–11B (6); Physics 2A–2B (6), 3A–3B (2); Chemistry 1A–1B (10), 5

(3), 8 (3); Mathematics 3A–3B or 16A–16B. Recommended: Anatomy 25;

Chemistry 109; and a reading knowledge of French and German.

The major must include courses 100A–100B (6), 100L (2), 110A–110B

(6), 112 (3); the remaining 7 units necessary to complete the required 24

must be selected from other upper division courses in physiology.

Honors Program.—The student must:

1. Maintain a 3.0 grade point average in his over-all college work and in

the courses required for the regular major in physiology.

2. Complete the regular major in physiology, as stated in the ANNOUNCE-

MENT OF COURSES.

3. Take at least 6 units of course 199 which is designated “Special Study

for Advanced Undergraduates.” The special study involved may, at the discre-

tion of the department, consist of a reading program or elementary experi-

mental or laboratory work, or both.

4. Take one unit of course 203A or 203B. This course is the regular


Physiology

seminar required of all graduate students and is designed to give students training in formulating and delivering reports on current topics of interest.

5) Pass with a grade of C or better Chemistry 109 (Physical Chemistry) or Physics 132 (Modern Physics).

6) Submit a satisfactory thesis based upon the work performed for course Physiology 199.

LOWER DIVISION COURSES

1. Introductory Physiology. Lectures. (3) I and II.
   Prerequisite: either high school chemistry or at least 3 units of college physics or biology. Not open to entering freshmen.

1L. Introductory Physiology. Laboratory. (2) I and II.
   Prerequisite: course 1 (may be taken concurrently). The laboratory sections will be limited to 60 or 90 students, depending on availability of space.

UPPER DIVISION COURSES

100A-100B. General Physiology. (3-3) Yr. Mr. Pace
   Prerequisite: Chemistry 1A-1B, 8; Physics 2A-2B; course 1-1L, or Zoology 1A-1B, or Botany 1. Recommended: Mathematics 3A-3B or 16A-16B.
   Lectures on the chemical, mathematical, and physical characteristics of the life process, with particular reference to the cell.

100L. General Physiology Laboratory. (2) I. Mr. Pace
   Prerequisite: course 100A (may be taken concurrently).
   Experiments illustrating the physical and chemical principles underlying the life processes.

102. Physiology of Human Development. (2) I. Mrs. Timiras
   Prerequisite: course 1, or Zoology 1A-1B, or the equivalent.
   Lectures on the physiological changes occurring from conception to old age, and the role of the different organic systems in development and the aging process.

103. Human Physical Growth. (3) II. Mrs. Eichorn
   Prerequisite: course 1, or Zoology 1A-1B, or the equivalent.
   Lectures and demonstrations on the physical growth of the human from conception to maturity, including techniques of measurement and analyses of data.

104. Physiology of the Endocrines. (2) I. Mr. Chaikoff, Mr. Gordan
   Prerequisite: course 1-1L, or Zoology 1A-1B, or consent of the instructor.
   Lectures and clinical demonstrations designed to acquaint the nonmedical student with the principles of the physiology and chemistry of the endocrine glands.

*107. Environmental Physiology. (3) II. Mr. Pace, Mrs. Timiras
   Prerequisite: course 1 or Zoology 1A-1B, or consent of the instructor.
   Lectures on the physical, chemical, and biotic influences of the environment on man, and the adaptive changes in response to environment.

108. Radiation Physiology. (3) I. Mr. Jones, Mr. Dobson, Mrs. Kelly
   Prerequisite: Chemistry 1A-1B, Physics 2A-2B, and course 1-1L, or Zoology 1A-1B. Recommended: Mathematics 16A-16B, and Physics 132.
   Lectures on the physiological effects of radiation.

110A–110B. Mammalian Physiology. (3–3) Yr.
Mr. Chaikoff, Mrs. Timiras, Mr. Freeman
Prerequisite: course 1–1L or Zoology 1A–1B, Physics 2A–2B, Chemistry 1A, 8.
A comprehensive survey of mammalian physiology.

112. Mammalian Physiology. Laboratory. (3) II.
Mrs. Timiras, Mr. Freeman, ———, and Assistants
Prerequisite: course 110A–110B; 110B may be taken concurrently.

115. Morphology and Physiology of the Visual System. (4) II.
Mr. Walls, Mr. Cook
Lectures and laboratory. Prerequisite: course 1–1L or Zoology 1A. Open to students in the School of Optometry and to others with consent of the instructor.

*120A. Comparative Physiology. (3) II. Mr. Cook
Prerequisite: Chemistry 1A–1B, Physics 2A–2B, and course 1–1L or Zoology 1A–1B.
A survey of the muscular, nervous, and sensory systems of animals in general from the comparative point of view.

*120B. Comparative Physiology. (3) I. Mr. Cook
Prerequisite: the same as for 120A.
Circulation, respiration, and blood.

*120C. Comparative Physiology. (3) II. Mr. Cook
Prerequisite: the same as for 120A.
Digestion, metabolism, the endocrines, and excretion.

199. Special Study for Advanced Undergraduates. (1–4) I and II.
The Staff (Mr. Cook in charge)
Prerequisite: at least 6 units of upper division courses in physiology.

GRADUATE COURSES
(Concerning conditions for admission to graduate courses, see page 18)

200. Seminar in Cell Physiology. (1) II. Mr. Pace
Prerequisite: courses 100A–100B and Chemistry 109.
Topics will vary from year to year, and emphasis will be placed on the current literature.

201A–201B. Research. (2–8; 2–8) Yr. The Staff (Mr. Cook in charge)

203A–203B. Seminar in Physiology. (1–1) Yr. Mr. Freeman
Designed to give students an acquaintance with recent physiological literature, and practice in making reports.

204. Seminar in the Endocrines. (1–3) I. Mr. Chaikoff

205. Physiological Action of Drugs. (2) I. Mrs. Timiras
Prerequisite: courses 110A–110B, 112, 100A–100B, 100L.
Lectures and reports on the current literature. Topics will vary from year to year. Emphasis will be placed on the mode of action of drugs at the organismic and cellular levels.

206. Neurophysiology. (3) II. Mr. Freeman
Prerequisite: course 110A–110B, or consent of the instructor.
Lectures and discussion of neural structures and functions, reflex pathways, and the mammalian brain.

207. Seminar in Environmental Physiology. (1) I. Mr. Pace, Mrs. Timiras
Prerequisite: courses 107 and 110A–110B.
Topics will vary from year to year.

**PLANT BIOCHEMISTRY**

(For courses in Plant Biochemistry, see Biochemistry, page 52.)

**PLANT NEMATOLOGY**

(For courses in Plant Nematology, see Entomology and Parasitology, page 193.)

**PLANT NUTRITION**

(See Soils and Plant Nutrition, page 388.)

**PLANT PATHOLOGY**

(Department Office, 133 Giannini Hall)

Peter A. Ark, Ph.D., Professor of Plant Pathology.
John W. Oswald, Ph.D., Professor of Plant Pathology.
Thomas E. Rawlins, Ph.D., Professor of Plant Pathology.
William C. Snyder, Ph.D., Professor of Plant Pathology (Vice-Chairman of the Department).
William N. Takahashi, Ph.D., Professor of Plant Pathology.
Stephen Wilhelm, Ph.D., Professor of Plant Pathology.
Cecil E. Yarwood, Ph.D., Professor of Plant Pathology.
James T. Barrett, Ph.D., Professor of Plant Pathology, Emeritus.
Max W. Gardner, Ph.D., D.Sc., (hon.c.), Professor of Plant Pathology, Emeritus.
H. Earl Thomas, Ph.D., Professor of Plant Pathology, Emeritus.
Robert D. Raabe, Ph.D., Associate Professor of Plant Pathology.
A. Herbert Gold, Ph.D., Assistant Professor of Plant Pathology.
John R. Parmeter, Jr., Ph.D., Assistant Professor of Plant Pathology.
David E. Schlegel, Ph.D., Assistant Professor of Plant Pathology.
Tewfik A. Toussoun, Ph.D., Instructor in Plant Pathology.
Albert R. Weinhold, Ph.D., Instructor in Plant Pathology.

Robert V. Bega, Ph.D., Lecturer in Plant Pathology.
Lysle D. Leach, Professor of Plant Pathology, Davis (Chairman of the Department).
John T. Middleton, Ph.D., Professor of Plant Pathology, Riverside.

Departmental Major Adviser: Mr. Rawlins.

Preparation for the Major.—See plant science curriculum, College of Agriculture, page 83, in the Circular of Information. Bacteriology 1, Chemistry 1A, 1B, 8, and 5 or Biochemistry 102; Physics 2A, 2B; Soil Science 100 or 110; and Zoology 1A or 10 must be included.

The Major.—Required: 12 units of plant pathology in addition to Plant Pathology 120. In satisfaction of part of this 12-unit requirement, related courses approved by the adviser may be accepted.
UPPER DIVISION COURSES

100. Forest Pathology. (3) II.  Mr. Parmeter
Lectures and laboratory. Prerequisite: Botany 1. Restricted to forestry students.
Diseases of forest plants.

120. Plant Diseases. (4) I.  Mr. Raabe, Mr. Oswald
Lectures and laboratory. Prerequisite: Botany 1. Recommended: Bacteriology 1.
A general course on the nature, cause, and control of plant diseases.

122. Plant Pathology Methods. (3) II.  Mr. Schlegel
Lecture and laboratory. Prerequisite: course 120.
The laboratory methods and techniques used in the study of plant diseases.

123. Principles of Plant Pathology. (3) II.  Mr. Wilhelm
Prerequisite: course 120.
A consideration of some of the principles broadly applicable to fungus, bacterial, virus, and nutritional diseases of plants.

126. Principles and Techniques of Plant Virology. (3) II.  Mr. Gold
Lecture and laboratory. Prerequisite: course 120 or consent of the instructor.
Viruses as causal agents of plant diseases; laboratory study of techniques used in research in plant virology, such as inoculation, staining methods, virus assay, electron microscopy, serology.

127. Principles of Plant Disease Control. (3) I.  Mr. Yarwood
Lecture and laboratory. Prerequisite: course 120.
The fundamentals of plant disease control and their application; exclusion, eradication, immunization, therapy and protection; laboratory study of nature of fungicidal action, dosage relations, mechanics of application, chemotherapy, graphic methods.

199. Special Study for Advanced Undergraduates. (1-5) I and II.
Mr. Rawlins (in charge), Mr. Ark, Mr. Bega, Mr. Gold, Mr. Oswald, Mr. Parmeter, Mr. Raabe, Mr. Schlegel, Mr. Snyder, Mr. Takahashi, Mr. Toussoun, Mr. Weinhold, Mr. Wilhelm, Mr. Yarwood

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

201. Seminar in Plant Pathology. (1) I and II.
(Formerly numbered 201A–201B.)  Mr. Weinhold, Mr. Toussoun

212. The Diagnosis and Dynamics of Plant Disease. (3) I.
(Formerly numbered 125A.)  Mr. Snyder, Mr. Toussoun
Lecture and laboratory. Prerequisite: consent of the instructor.
The pathology of selected field, vegetable, ornamental, and other crops. Experience in field and laboratory diagnosis; consideration of factors influencing disease dynamics, inception, epidemiology, and disease avoidance.
Plant Pathology; Political Science

299. Research in Plant Pathology. (1-9) I and II.
(Formerly numbered 230A–230B.)
Mr. Snyder (in charge), Mr. Ark, Mr. Bega, Mr. Gold, Mr. Oswald, Mr. Parmeter, Mr. Raabe, Mr. Rawlins, Mr. Schlegel, Mr. Takahashi, Mr. Toussoun, Mr. Weinhold, Mr. Wilhelm, Mr. Yarwood

(GIVEN AT RIVERSIDE)

Graduate Courses

201. Seminar in Plant Pathology. (1) I and II.
(Formerly numbered 201A–201B.) The Staff (Mr. Middleton in charge)

299. Research in Plant Pathology. (1-6) I and II.
(Formerly numbered 230A–230B.) The Staff (Mr. Middleton in charge)

POLITICAL SCIENCE

(Department Office, 202 South Hall)

Charles Akin, LL.B., Ph.D., Professor of Political Science (Chairman of the Department).
Eric C. Bellquist, Ph.D., Professor of Political Science.
Thomas C. Blaisdell, Jr., Ph.D., Professor of Political Science and Director, Bureau of International Relations in the Institute of International Studies.
†Joseph P. Harris, Ph.D., Professor of Political Science.
‡Victor Jones, Ph.D., Professor of Political Science.
George Lenczowski, LL.M., J.S.D., Professor of Political Science.
Albert Lepawsky, Ph.D., Professor of Political Science.
Leslie Lipson, Ph.D., Professor of Political Science.
Austin F. Macdonald, Ph.D., Professor of Political Science.
Frederick C. Mosher, Ph.D., Professor of Political Science.
Peter H. Odegard, Ph.D., Professor of Political Science.
Robert A. Scalapino, Ph.D., Professor of Political Science (Vice-Chairman of the Department).
Julian Towster, J.D., Ph.D., Professor of Political Science.
C. Dwight Waldo, Ph.D., Professor of Political Science and Director, Bureau of Public Administration.
Hans Kelsen, Ph.D., Professor of Political Science, Emeritus.
Frank M. Russell, Ph.D., Professor of Political Science, Emeritus.
N. Wing Mah, Ph.D., Associate Professor of Political Science, Emeritus.
*Eugene L. Burdick, Ph.D., Associate Professor of Political Science.
*Ernst B. Hans, Ph.D., Associate Professor of Political Science.
Norman Jacobson, Ph.D., Associate Professor of Political Science.
Herbert McClosky, Ph.D., Associate Professor of Political Science.
*Guy J. Pauker, Ph.D., Associate Professor of Political Science.
Paul Seabury, Ph.D., Associate Professor of Political Science.
Sheldon S. Wolin, Ph.D., Associate Professor of Political Science.
*Richard H. Cox, Ph.D., Assistant Professor of Political Science.
D. Jay Doubleday, Ph.D., Assistant Professor of Political Science.
*Eugene C. Lee, Ph.D., Assistant Professor of Political Science and Assistant Director, Bureau of Public Administration.

† Appointment as Research Professor in the Legislative Process to December 30, 1960; absent on leave spring semester, 1960–1961.
‡ In residence fall semester only, 1960–1961.
Political Science

Harvey C. Mansfield, Jr., M.A., Acting Assistant Professor of Political Science.
Ralph H. Retzlaff, Ph.D., Assistant Professor of Political Science.
Yosal Rogat, Ph.D., Assistant Professor of Political Science.
Carl G. Rosberg, Jr., Ph.D., Assistant Professor of Political Science.
John H. Schaar, Ph.D., Assistant Professor of Political Science.

Joan Bondurant, Ph.D., Lecturer in Political Science.
Conrad Brandt, Ph.D., Lecturer in Political Science.
Hugh M. Clokie, Ph.D., Lecturer in Political Science.
Margaret Fisher, Ph.D., Lecturer in Political Science.
Walter Galenson, Ph.D., Professor of Industrial Relations and Lecturer in Political Science.
William H. Gardner, M.A., Lecturer in Political Science.
Boynton S. Kaiser, A.B., Lecturer in Political Science.
Joseph W. Krutch, Ph.D., Visiting Research Professor of Governmental Affairs.
Leo Rosten, Ph.D., Visiting Research Professor of Governmental Affairs.

Letters and Science List.—All undergraduate courses in political science except course 183 are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

The American Institutions Requirement.—This requirement may no longer be satisfied by completing an approved course, but must be met by passing an examination. See page 35 of the Circular of Information.

Departmental Major Advisers: Mr. Aikin, Mr. Bellquist, Mr. Cox, Mr. Doubleday, Mr. Jones, Mr. Lepawsky, Mr. Macdonald, Mr. Mosher, Mr. Odegard, Mr. Seabury, Mr. Towster.

The Major.—Students majoring in Political Science will be required to complete the following courses or their equivalents: Political Science 1 and 2, Economics 1A–1B, and one of the following History courses: 4A–4B, 17A–17B. Students whose major field of undergraduate concentration will be in Group VI (Parties, Pressure Groups, and Public Opinion) or Group VII (Public Administration and Public Policy), or who wish to take a graduate degree will be required to take a course in statistics approved by their departmental adviser. (For Group VI, it is also recommended that students take Sociology and Social Institutions 106.) In addition, it is strongly recommended that those who major in Political Science study allied subjects in the social sciences, and to that end are advised to include in the program of their freshman and sophomore years some of the following lower division courses: Anthropology 2A–2B; Geography 5A–5B; History 8A–8B; Philosophy 6A–6B; Psychology 1A; Social Science 1A–1B; Sociology and Social Institutions 1, 2.

The major program includes 24 units in upper division Political Science courses. Students in the major will be required to complete satisfactorily Political Science 1, 2, and 110A, and to complete two of the following courses: 120A, 163, 181. The additional 15 units of upper division work will be distributed among courses in political science or related courses in the other social sciences as determined in consultation with a departmental adviser. Each student is expected to concentrate on a group by taking from 6 to 9 units (3 courses) in one of the following seven groups: I. American Government; II. Political Theory; III. International Relations; IV. Comparative

1 In residence fall semester only, 1960–1961.
2 In residence spring semester only, 1960–1961.
Government; V. Public Law and Jurisprudence; VI. Public Opinion, Parties, and Pressure Groups; VII. Public Administration and Public Policy.

Majors in the department will include in their programs, normally in the junior year, four courses (two each semester), one each from any four groups in the following list including the group emphasized:

I. 101A, 102
II. 110A, 118A, 118B
III. 130A
IV. 141A, 141B, 144A
V. 150A, 157A, 157B
VI. 162A, 163
VII. 175, 181

Program in Public Administration.—Undergraduate students interested in governmental service with local, state, national, or international agencies are advised to consider the courses listed for the field of undergraduate concentration in Public Administration and Public Policy (Group VII).

Qualified graduate students who wish to enter the public service may follow a program of studies leading to the M.A. degree under Plan II. Under this plan the department will arrange for an internship in a local, state, or federal agency. Candidates will take a comprehensive examination. For further information, see the Graduate Adviser.

LOWER DIVISION COURSES

1. Introduction to Government. (3) I and II. Mr. Schaar, Mr. Odegard
   Two lectures and two section meetings per week.
   An introduction to the principles and problems of government, with particular emphasis on national government in the United States.

2. Introduction to Government (Comparative Government). (3) I and II. Mr. Lipson
   Two lectures and two section meetings per week.
   A comparative study of constitutional principles, governmental institutions, and political problems of selected national governments.

33A–33B. American Studies. (3–3) Yr. Mr. Schaar
   Open to sophomores with consent of the instructor. Limited to fifteen students.
   An honors course in the study of American culture. The class will study significant ideas and issues, drawing on material from history, literature, political science, philosophy, and other fields. The course will emphasize discussion and the writing of essays and will include occasional joint meetings with the staff and students of the two equivalent courses (English 33A–33B and History 33A–33B).

UPPER DIVISION COURSES

Nonmajors who plan to take upper division courses in political science are strongly advised to take courses 1 and 2. Lacking these, students with satisfactory equivalents may be admitted to upper division courses other than those listed on page 13 only with consent of the instructor.

Courses which are given the same number followed by letters “A,” “B,” “C,” etc., may be taken independently unless otherwise indicated.

198A–198B. Honors Program. (3–3) Yr.
   Mr. Cox, Mr. Jacobson, Mr. Mansfield, Mr. Seabury, Mr. Wolin
   A special program of study extending through the junior and senior years for political science majors who are on the honors list. Under some circumstances, students may be admitted to the program in the second semester of the junior year. Instruction by weekly seminar meetings and tutorials.

199. Special Study for Advanced Undergraduates. (1–4) I and II.
   The Staff (Mr. Bellquist in charge)
Group I—American Government

(The following courses listed in other Groups may also be regarded as belonging to Group I to meet the requirements of concentration: 113, 128A, 128B, 157A, 157B, 158, 159, 175.)

100A. Government in the United States. (3) I. Mr. Doubleday
Not open to students who have taken course 1 or 151 (as formerly numbered).
A survey of the powers, structure, and operations of government at national, state, and local levels.

101A. Basic Factors in American Politics. (3) II. Mr. Jones
The constitutional-legal background of American political action; historical, social, and ideological factors affecting American politics; the politics of economic interests and geographical areas; emergent political patterns in the two-party system.

102. State Government and Administration. (3) II. Mr. Macdonald
Organization of state government; federal-state relations; elections and politics; the courts; county government; current administrative problems, such as state finance, the merit system, regulation of business, and state and labor, conservation of natural resources, health, welfare, correction.

103A. Municipal Government and Administration. (3) I. Mr. Macdonald
How cities are organized and what they are doing; municipal politics; relations of city and state; problems and activities of modern cities; traffic regulation, city and regional planning, zoning, police and fire protection, budget making; the war against crime.

104A. State and Local Government in California. (3) I. Mr. Lee
An examination of the constitution; legislative, administrative, judicial and electoral system of California; parties and interest groups; city and county government; California in national politics.

105A. The Legislative Process. (3) II. Mr. Doubleday
A study of the organization and functioning of the legislative bodies, with particular attention to Congress and state legislatures, functions; membership; committee system; executive-legislative relations; pressure groups; lobbying; movement for reform.

Group II—Political Theory

110A. Contemporary Issues and Political Theory. (3) I and II.
Mr. de Jouvenel, Mr. Cox
Introductory inquiry into some of the main concepts of political philosophy and their relevance to modern society. Emphasis on such concepts as: nature and purpose of the political community; justice, freedom, equality, political obligation, power. Alternative solutions offered by communism, liberalism, utopianism.

*111A. Principles of Political Theory. (3) I. Mr. Wolin
An analytical approach to problems of citizenship and authority from the standpoint of the individual, the group, and the state.

*113. American Political Theory. (3) I. Mr. Jacobson
Basic problems of political theory as viewed within the context of American history and institutions.

*115A. Development of Political Thought in Asia. (3) II.
Mr. Scalapino, Miss Bondurant
Analysis of the political thought of South and Southeast Asia and the Far East, with particular attention to China, Japan, and India; a historical survey of traditional and modern thought in Asia, leading to a discussion of contemporary issues. Emphasis: the Western impact, nationalist movements, current ideological trends.

116A. Soviet Political Theory. (3) I.
Mr. Towster

118A–118B. History of Political Theory. (3–3) Yr.
Mr. Wolin
Major political theories from the Greeks to the modern period.
118A: Classical and Medieval theories; Machiavelli and the beginnings of modern political theory.
118B: Political thought during the Reformation; the emergence of liberalism, conservatism, and revolutionary theories.

Group III—International Relations

120A–120B. Elements of International Relations. (3–3) Yr.
120A: The International Society. I and II.
Mr. Seabury
Analysis of ideological, legal, military, and economic factors creating harmony and hostility among nations. Development of international institutions reflecting and molding such factors. Not open to students who have had course 123 or 124.
120B: National Foreign Policies. II.
Mr. Seabury
Factors—political, economic, cultural, and geographic—shaping the foreign policies of nation-states, with emphasis on the Great Powers.

121. International Organization. (3) II.
Conditioning factors; development of nineteenth-century unions and commissions; survey and evaluation of the experience of the League of Nations and the United Nations, especially with respect to security and peaceful change; specialized agencies.

122. Principles of International Law. (3) I.
Mr. Riesenfeld
Nature, sources, function and evolution of international law; principal law-making and adjudicatory agencies; international legal personality; jurisdiction over places and persons. Diplomatic and consular intercourse; treaties and executive agreements; pacific settlement; war and neutrality.

128A. Concepts in American Foreign Policy. (3) I.
Mr. Seabury
Analysis of competing concepts of the American “national interest” operative since World War I: Wilsonianism, isolationism, the Open Door, the Monroe Doctrine, and the Good Neighbor Policy; continentalism; national security, containment and liberation; their relation to substantive policies, and the character of American democracy.

128B. The Conduct of American Foreign Relations. (3) II.
Mr. Bellquist
Diplomacy and the conduct and control of foreign relations. The Department of State and the Foreign Service. Case studies in recent diplomacy to illustrate policy formation and execution. Some comparative materials will be introduced but emphasis will be placed upon the United States.

131A. Soviet Foreign Policy. (3) II. Mr. Towster

134. The American Role in the Far East. (3) I. Mr. Scalapino, Mr. Johnson
A survey of the role which the United States has played in the Far East through the examination of such topics as America’s role in Asiatic Westernization, United States–Far Eastern foreign policy. Oriental attitudes toward America. Evaluation of present-day problems.

*135. South Asia in World Affairs. (3) I.
Politics of the South Asian countries in relation to each other and to other countries in Asia; as members of the Commonwealth, and of the United Nations. Their relations with the United States and with other powers.

136A. Latin America in World Affairs. (3) II. Mr. Macdonald
Relations of Latin America with the United States and other world powers. Pan-Americanism and its relation to world organization. The future of Latin America in the community of nations.

137A-137B. International Relations in the Middle East. (3-3) Yr.
137A: National Policies. Mr. Lenczowski
Policies and diplomacy of eleven independent states in the Middle East. Emphasis is laid on the interrelation of foreign and domestic politics.
137B: Regional Problems.
The Middle East in world strategy; policies of major powers; supranational political movements; regional security arrangements; role of international agencies.

138A*-138B. International Relations in the Far East. (3-3) Yr.
*138A: A general survey to provide an essential background for the understanding of contemporary political events and developments in the area.
138B: An analysis of political issues of world significance and ramifications posed by the competition and conflict of interests of the powers in the area.

*139A. International Relations of Western Europe and the Atlantic Region. (3) I. Mr. Haas
Analysis of the foreign policy aims of significant Western European groups and parties, and their impact on the emergence of a United Europe. Influence of American and Soviet policy on European events and the integration of the Atlantic Area.

Group IV—Comparative Government.

141A–141B. Government in the Soviet Union. (3–3) Yr. Mr. Towster
Demographic, historical, and ideological bases of Soviet rule. The social and governmental structure. Nationalities and federalism. The Party. Trade unions and cooperatives. The church; army; courts, prosecutors and organs of police. Statics and dynamics of power in the U. S. S. R.

141C. Government and Politics of Eastern Europe. (3) I. Mr. Drachkovitch
The origins and nature of the present social and ethnic structures, governmental systems, and international position of the East European satellites. Primary emphasis upon the political evolution and status of the Soviet satellites.

142A–142B. Government and Politics in the Middle East. (3–3) Yr.
Mr. Lenezowski

142A: A study of political institutions, traditions, and mores of the peoples of the Middle East in their geographical and cultural setting.
142B: (Formerly numbered 142F.) Evolution and revolution in the Middle East: transformation of the traditional Moslem state into a modern state; impact of foreign ideologies on political institutions; current trends in Islam; reformist and revolutionary experiments.

143A*–143B. Government and Politics in East Asia. (3–3) Yr.

This course will present an integral study of the political institutions and ideas of the major East Asian societies. It will also emphasize the cultural context in which modern political institutions have developed.

The first semester will deal with the political societies of Northeast Asia, and the second semester, with Southeast Asia.

144A–144B. Government and Politics in Great Britain and the British Commonwealth. (3–3) Yr. Mr. Mansfield, Mr. Clokie

144A. II: A study of the democratic process in Britain, as it operates through party politics and the machinery of government; the nature of the cabinet system; the functions undertaken by the state; and the gradualist blending of tradition and change.
144B. I: The evolution of the British Commonwealth and changing status of its members; the internal politics of Australia, Canada, South Africa, and New Zealand: their similarities and differences.

(Formerly numbered 142B and 142C.) Mr. Retzlaff

145A: The development of political ideas and institutions in India and Pakistan, with some attention to Ceylon and Nepal. Emphasis will be given to traditional political thought, the growth of nationalism, and to selected problems.
145B: Recent political development in India, Pakistan, Ceylon, and Nepal. Constitutional development, political parties, legislation, administration, economic planning.

146A*–146B. Political Institutions in Africa South of the Sahara. (3–3) Yr.
(Formerly numbered 142D–142E.)

*146A: Survey and analysis of indigenous African political institutions and of the problems of the Africans in tribes, villages, towns, and cities. European influence on African ways of life examined.
146B: British statecraft in Africa: nation-building, economic development, social progress, Dominion-colony relations, and international questions. Comparison with French, Portuguese, and South African colonial statecraft.

147A*–147B. Government and Politics in Western Europe. (3–3) Yr.
Mr. Lipson

*147A: Germany and Italy. An analysis of the evolution and contemporary nature of German and Italian political institutions, with special emphasis on conditions of constitutional stability, parliamentary responsibility, and party systems.
147B. II: France and Switzerland. A comparative treatment of the politics of two western communities; the problem of attaining national unity through uniformity or diversity, through a unitary or federal state; the nature of party groupings; the problem of achieving a stable constitutional regime.

148. Governments of Latin America. (3) I. Mr. Macdonald
Latin-American parties and politics; governmental activities and problems; the structure of government. Emphasis is placed on political realities rather than formal constitutional provisions.

Group V—Public Law and Jurisprudence

*150A. The Foundations of Legal Institutions. (2) I. Mr. Rogat
The development and agencies of legal growth since primitive times and the interrelations between law and government. The early legal institutions of Europe and their influence on the modern juridical systems.

*150B. Elements of Jurisprudence. (3) II. Mr. Rogat
Fundamental legal principles, especially from the analytical, historical, philosophical, and sociological points of view. Particular attention will be given to modern theories of the function of law.

*151A—151B. Legal Order of a Communist State. (3-2) Yr. Mr. Rogat

156. Administrative Law. (3) II. Mr. Aikin
A study of the position of the executive branch of government in the American constitutional system, of the foundation of administrative power, of the area of judicial supervision of administration, and of the liability of public offices and of the state based on misuse of administrative power.

*157A—157B. Constitutional Law of the United States. (3-3) Yr. Mr. Aikin
157A: The federal system.
157B: Civil liberties.

158. Government and Business. (3) I. Mr. Aikin
A study of the basis of national and state control of industry and agriculture, and the extent to which government may control competition, maintain prices, protect home industries, prevent waste, establish quality standards, regulate conditions of labor, etc.

*159. American Judicial Administration. (3) I. Mr. Rogat
The organization and operation of American courts. Problems of jurisdiction, staffing, civil and criminal procedure.

Group VI—Parties, Pressure Groups, and Public Opinion

160A—160B. Pressure Groups and Political Power. (3-3) Yr. Mr. Schaar
An examination of the internal government and politics of the private association. Materials will be drawn from trade unions, the church, agricultural, business, professional, and other organizations. Special attention will be paid to the concepts of majoritarianism, constitutionalism, oligarchy, and constituency.

*160B: Private Power and Public Policy. Mr. Schaar
The nature and sources, strategy and tactics of group power within the context of the American institutional setting. Business, agriculture, labor, religion, the professions as organized power. Ramifications for a democratic society.

161A–161B. Political Behavior. (3–3) Yr. Mr. McClosky
The individual and group aspects of political behavior; social and psychological factors in politics; consideration of available research on voting behavior, ideology, extreme belief and affiliation, leadership, participation, personality factors, public opinion, and group influence processes.

162A. Public Opinion. (3) I. Mr. Bellquist
An analysis of the nature of public opinion and propaganda in modern society. Major attention given to basic principles of communication and group behavior, with emphasis on their political implications at home and abroad.

163. Political Parties. (3) I and II. Mr. Odegard, ———
Nature and functions of political parties; their origin, development, structure, economic and social composition, internal management and control; relation of parties and pressure groups to legislation and administration; analysis of pressure politics as distinguished from party politics.

164A*–164B. Problems in Analysis of Political Behavior. (3–3) Yr. Mr. Burdick
Analyses of voting behavior and other manifestations of public participation in politics. The conceptual tools and the techniques of research used in political studies. Problems in design and execution of research projects including instruction in the use of punched-card equipment.

*165. Soviet Propaganda. (3) II. Mr. Towster
A critical analysis of the content and role of Soviet propaganda. Government control of the press, radio, and other media of communication. The nature of public opinion in the U.S.S.R. The main themes and stereotypes of internal and external propaganda.

Group VII—Public Administration and Public Policy

175. National Administration of the United States. (3) II. Mr. Lepawsky
Not open to students who have completed formerly given course 176.
The processes of policy formulation and administrative management in relation to economic, resource, welfare, strategic, and other governmental affairs, emphasizing long-range and current trends in the national administration of the United States.

*180. Administrative Theory: Bureaucracy and Democracy. (3) II. Mr. Waldo
The nature and role of public administration in modern society; the executive and its relations with other organs of government at all levels; problems of organization, management, communication, stimulus and control; citizen participation. The treatment will be comparative.

181. Elements of Public Administration. (3) I and II. Mr. Mosher, ———
The role of public administration in modern society; principles of organization, budgeting, management techniques, the public service, and the control of administration.

183. Public Personnel Administration. (3) I.
A survey of public personnel administration, including the history of civil service, the personnel agency, classification, recruitment, examination techniques, promotion, service ratings, training, discipline, employee organizations, and retirement.

185A. Public Policy and Administration of Natural Resources. (3) II.
Programs and policies for the conservation, development, and administration of natural resources.

185B. Economic and Social Planning and Development. (3) II.
An analysis of governmental agencies which conduct research and disseminate information concerning our physical, economic, and human resources, and stimulate, regulate, or control their use through an orderly program of national, regional, local, and international development directed toward optimum utilization and social stability in peace and mobilization for defense.

186. Government Organization and Management. (3) II.
An analytical examination through case studies of public administration organization, and the techniques and processes of public management; the growth and significance of the management movement; the organization of administrative authority; the relation of organization to operational processes.

GRADUATE INSTRUCTION

Admission to graduate courses or seminars is at the discretion of the instructor. Admission to graduate work is limited to graduate students who have adequate undergraduate course preparation to participate in and benefit from such work.

Properly qualified undergraduates may be admitted to graduate courses or seminars with special permission of the instructor.

Unless otherwise stated, the first half (A) of any course or seminar is not prerequisite to the second half (B).

*201. Concepts of Political Philosophy. (3) II.
A review of philosophical method as it bears on the study of politics. Scientific method in the social sciences, nature of proof, value systems will be studied.

202A–202B. Comparative Politics. (3–3) Yr.
202A. II: The Comparative Study of Government. (Formerly numbered 243.)
An inquiry at an advanced level into the comparative study of politics and institutions, with emphasis upon the economic, geographic, cultural, and historical context within which the state operates.

202B. II: Comparative Party Systems. (Formerly numbered 226.)
The origin of political parties, with special reference to Britain; significance of party for constitutional and democratic government; experience with single-party dictatorship and coalitions; the peculiarities of the two-party system, past and present; trends in political thought about party government.

203A. International Relations. (3) I.
The bases of international relations in conflicting ideologies and philosophies. Special problems; imperialism, demagogy, economic relations, regionalism, military, and geographic factors.

204A–204B. Public Administration. (3–3) Yr. Mr. Mosher
An advanced study of the theory and practice of public administration.

209A–*209B. European Political Thought in the Nineteenth Century.
(3–3) Yr. Mr. Mansfield
An examination of the principal themes of political thought in England and on the Continent from the French Revolution to World War I. Special emphasis will be placed on the development of modern conservative thought.

210. Recent Indian Political Thought. (3) I. Miss Bondurant
A study of contemporary trends in Indian political thought, with reference to traditional and European influences, and to the contributions of Indian leaders. Attention will be given to nationalism, Marxist theory, Hindu polity, indigenous "socialism," liberal and humanist elements.

215A*–215B. Government and Politics in China. (3–3) Yr. Mr. Brandt
215A: China as a nation in the Oriental world; impact of the Occident and its repercussions; internal and external aspects of the struggle for the creation of a modern democratic state; China in world politics.
215B: China from Monarchy to Republic. China's republican experiment, its problems, failures, and successes. China's internal politics and external relations under Communist rule.

*216. Government and Politics in Japan. (3) II. Mr. Scalapino
How Japan is governed, with consideration of major changes in her basic political structure and policies under Allied military occupation.

218. Government and Politics of the Northern European Countries.
(3) II. Mr. Bellquist
Constitutionalism and parliamentarianism in the countries of Northern Europe—Denmark, Finland, Iceland, Norway, and Sweden. Their constitutional history and present governmental systems. Social legislation in Scandinavia; foreign policies; inter-Scandinavian cooperation.

220. Theories of International Relations. (3) I. __________
Historical development and present range of political thought on relations between nations; origins and implications of the idea of sovereignty; the theory of an international community; theories of imperialism; Christian, Communist, and Fascist ideas; geopolitical theories.

*221. Nationalism and Imperialism. (3) II. Mr. Haas, Mr. Pauker
The growth of national consciousness in selected European countries. Ideological content of various national belief systems and their development into imperialism. Colonial rule and the growth of new nationalisms as the older doctrines diminish in intensity.

228. National Security and Foreign Policy. (3) I. Mr. Blaisdell
Development of strategic concepts; utilization of manpower resources; impact of major weapons, i.e., tank, battleship, airplane, electronic and nuclear weapons; economic potential in relation to national power; international trade and autarchy; place of propaganda and diplomacy.

*229. International Relations of the Southeast Asian Region. (3) I. Mr. Pauker
A study of the regional and international relations of the Southeast Asian societies; emphasis will be placed on twentieth-century developments with such topics as neutralism, policy toward other Asian communities, and relations with the United States receiving special attention.

235A–235B. Municipal Administration. (3–3) Yr. Mr. Gardner, Mr. Lee
Techniques of municipal administration, with emphasis on the function, tools, and skills of management. Consideration of factors influencing the administrative process. Synthesis of theory and practice.

GRADUATE SEMINARS

240A–240B. Comparative Government. (2–2) Yr. Mr. Bellquist

240C. Research in Comparative Government. (2) II.


242A–242B. Major Problems of the Middle East. (2–2) Yr. Mr. Lenczowski
A study of selected problems in politics, international relations, political theory and institutions of Moslem and non-Moslem states in the area.

243A–243B. Contemporary Problems of Far Eastern Politics. (2–2) Yr. Mr. Scalapino
A study of basic social, economic, and cultural problems of the contemporary Far East area.

243C–243D. Political Problems of Southeast Asia. (2–2) Yr. Mr. Towster
An advanced study of special socio-political problems of the key Southeast Asia countries, with emphasis upon the institutional structures, ideological patterns, and shifting socio-economic conditions of these societies.

245A–245B. Problems of South Asia. (2–2) Yr. Mr. Retzlaff
245A: Advanced study of constitutional, political and administrative problems of contemporary South Asia. Research on selected topics.
245B. Advanced study of the evolution of the political systems of South Asia. Interrelationship between ideology and institutional development. Emphasis on India and Pakistan. Research on selected topics.

*246. African Political Institutions. (2) I and II. Mr. Rosberg

248A–248B. Governments and International Relations of Latin America. (2–2) Yr. Mr. Macdonald

*250. Bibliography and Research Methods. (2) I.
Governmental research as a focal point in the formulation of public policy and the utilization of existing information through the various social science disciplines.

251. Research in American Government. (2) I and II. Mr. Odegard

252. Legislative Process. (2) II. Mr. Jones
A comparative study of selected problems of the legislative process in Congress, American state legislatures, and abroad.

253A–253B. Political Behavior. (2–2) Yr. Mr. McClosky
Intensive examination of major theories and research in political behavior; consideration of both procedural and substantive aspects of the most significant studies in the field.

*256. Jurisprudence. (3) II. Mr. Rogat
The emphasis will be mainly on the analysis of legal concepts such as rights, duties, and other fundamental legal conceptions, personality, ownership, possession, and the various types of obligation.

257A-257B. Constitutional and Administrative Law. (2-2) Yr.
Mr. Aikin
Fundamental principles of constitutional law; leading cases; judicial decisions affecting the liabilities, rights, duties, and procedures of governmental officers and agencies.

*258. Private Power and Public Policy. (2) I.
Mr. Schaar
Research into the nature and sources, strategy and tactics of group power in the United States. Economic, religious, and professional associations as organized power and its relationship to public policy.

259A-259B. American Politics. (2-2) Yr.
Mr. Odegard

260. International Relations. (2) II.
Research seminar on selected topics, with emphasis chiefly upon contemporary approaches to the study of international relations.

*261. International Organization. (2) II.
Mr. Haas
Analytical studies of the ideologies and attitudes of political parties, pressure groups, and elites with respect to the evolution of a consensus toward organization above the state level. The impact of organization on consensus is considered. Emphasis is placed on regional rather than universal trends.

262. Seminar in International Law. (2) II.
Mr. Riesenfeld
Selected problems in modern international law.

263A-263B. American Foreign Policy. (2-2) Yr.
Mr. Blaisdell
American military, economic, social, and political policies toward various parts of the world. Normally, North Atlantic and South American countries are considered during the first semester and Asian and African countries during the second semester.

264A*-264B. International Relations of the Far East and Pacific Area. (2-2) Yr.
Mr. Brandt

*265A-265B. Dependent Peoples and Trusteeships. (2-2) Yr.
Mr. Haas, Mr. Clokie
Colonial societies, their political, economic, and social problems, and their relationship to international organization. Comparisons between colonial administration with and without international supervision. The future status of dependent areas.

*270A—270B. Federal Administration. (2-2) Yr.
Mr. Jones
Special studies in problems of federal administration.

270C. Federal and Intergovernmental Administration. (2) II.
Mr. Jones
Seminar in American federalism and intergovernmental relations, including fiscal relations, administrative relations in field offices, and relations in the course of legislative or executive decision-making, and of quasi-governmentally sponsored inquiries.

*271. Comparative National Administration. (2) II.
Mr. Mosher
Comparative studies of national administration in relation to constitutional structures, economic systems, historical traditions, and cultural patterns.

*272. State Administration. (2) I.
Mr. Jones

273. Public Personnel Administration. (2) II.
Mr. Kaiser
Techniques and problems in the field of public personnel administration, with special reference to federal, state, and local agencies.

274. Financial Administration and Budgeting. (2) II. Mr. Mosher
Role of the budget system in the determination of public policy, in adminis­trative planning and management, in control of government operations, in intergovernmental relation, and in relation to the private economy. Emphasis upon the administrative aspects of budgeting.

*275. Social Security Administration. (2) II. Mr. Mosher
Unemployment, disability, old-age and survivors insurance, workmen’s compensation, public assistance. Coordination of interrelated programs; adminis­trative relations at three levels of government; interest group representation; jurisdic­tional disputes; intergovernmental relations; influence of administra­tive structure and procedure upon policy; comparative administrative evolution.

280A-280B. Administrative Theory. (2-2) Yr. Mr. Waldo

*282. Governmental Problems of Metropolitan Areas. (2) II. Mr. Waldo
(Formerly numbered 263.) A consideration of the governmental, economic, social and physical organization of metropolitan areas, with special attention to the San Francisco Bay region; and an evaluation of their governmental structure and problems, and techniques used to solve or lessen area-wide difficulties.

285A–285B. Regional Planning and Resources Management. (2–2) Yr. Mr. Lepawsky

*286. Public Enterprise: Its Forms, Methods, and Directions. (2) II. Mr. Lepawsky

290A–290B. Scope and Method of Political Science. (2–2) Yr. Mr. Jacobson
290A. Science as an ideology: the contributions of philosophies and theories, methods, and results in the natural and social sciences to a science of politics. 290B. Individual research in selected topics in scope and methods.

*291. American Political Theory. (2) II. Mr. Jacobson
Basic problems of political theory will be examined within the context of American political development.

292A–292B. European Political Theory. (2–2) Yr. Mr. de Jouvenel
292A: Examination of the elements of socialist thought; theories of “mass society”; rise of modern totalitarian thought. 292B: Study of emergent political thought; relevant aspects of psychoanalysis, the political novel, sociology; the theory of totalitarianism.

293. Problems in Political Theory: Politics and Ethics. (2) II. Mr. Mansfield
Critical examination of basic value patterns in the Western political tradition, preliminary to contemporary interpretations of power and morals. Ethical relativity and “neutrality,” means and ends, and obligations and rights will be explored in relation to the valuational base of contemporary democracy.

400A–400B. Field Work in the Legislative Process. (4–4) Yr.
Mr. Harris, Mr. Doubleday, Mr. Jones

Prerequisite: enrollment limited to persons appointed as Legislative Interns.
Supervised full-time research and other work with the California Legislature. Course includes a seminar on the legislative process, under the direction of faculty supervisor.

COURSES COMMON TO ALL GROUPS

298. Individual Study. (1–4) I and II. The Staff (Mr. Lipson in charge)

RELATED COURSES IN OTHER DEPARTMENTS
Introduction to Social Science. (Social Science 1A–1B.)
Freedom of Speech. (Speech 123.)

BUREAU OF PUBLIC ADMINISTRATION

The Bureau of Public Administration has as its purpose the development of increased understanding of public affairs, both through the marshaling and dissemination of existing information and through a research program designed to add to present knowledge. These activities are organized around a special library of public affairs materials—an extraordinarily rich and broad collection of documents, periodicals, and pamphlets that are indexed in a detailed subject catalog.

The bureau has a staff of professional analysts who are specialists in various aspects of public administration, political affairs, public law, public finance, planning, and urban problems. Furthermore, several professors participate in the bureau functions through the device of joint departmental-bureau appointments.

In the fulfillment of its informational and research functions, the bureau publishes a wide range of materials, from books through booklets and pamphlets to monthly checklists and digests. Public officials and agencies, private organizations, and individual citizens make use of the bureau’s library and research facilities.

The Bureau of Public Administration participates in the University’s teaching function both through its library facilities and through training advanced students in public affairs analysis. Additionally, the bureau serves as headquarters for two organizations active in governmental research and improvement: (1) the Western Governmental Research Association and (2) the San Francisco Bay Area Chapter of the American Society for Public Administration.

For further information concerning the activities of the Bureau of Public Administration, write to the Director, Room 346, Library.

POULTRY HUSBANDRY

(Department Office, 100 Poultry Husbandry Laboratory)

Fredric W. Hill, Ph.D., Professor of Poultry Husbandry, Davis (Chairman of the Department).
Samuel Lepkovsky, Ph.D., Professor of Poultry Husbandry.
Lewis W. Taylor, Ph.D., Professor of Poultry Husbandry.

O. Michael Lerner, Ph.D., Professor of Genetics.

The Major.—For details, see the animal science curriculum, College of Agriculture on page 80, of the Circular of Information.

Major Adviser: Mr. Taylor.
UPPER DIVISION COURSES

102. Experimental Incubation. (3) II. Mr. Taylor
Lectures and laboratory. Prerequisite: Zoology 100 or the equivalent, Chemistry 8.
Problems of embryonic development, causes of embryonic mortality in poultry, and principles of artificial incubation.

198. Directed Group Study. (1–2) II. Mr. Taylor
Prerequisite: senior standing and consent of the instructor.
Group study of methods employed in poultry production and management.

199. Special Study for Advanced Undergraduates. (1–5) I and II.
The Staff (Mr. Taylor in charge)
Prerequisite: course 1§, courses basic to the problems elected, and consent of the instructor.
Problems may be elected relating to the nutrition, breeding, incubation, physiology, or egg and meat quality of chickens.

GRADUATE COURSE
(Concerning conditions for admission to graduate courses, see page 18)

200A–200B. Research in Poultry Husbandry. (1–6; 1–6) Yr.
Mr. Lepkovsky, Mr. Lerner, Mr. Taylor

PSYCHOLOGY
(Department Office, 1023 Life Sciences Building)

Frank A. Beach, Jr., Ph.D., Professor of Psychology.
Clarence W. Brown, Ph.D., Professor of Psychology (Acting Chairman of the Department).
Richard S. Crutchfield, Ph.D., Professor of Psychology.
Edwin E. Ghiselli, Ph.D., Professor of Psychology.
Harrison G. Gough, Ph.D., Professor of Psychology.
Mason Haire, Ph.D., Professor of Psychology.
David Kreck, Ph.D., Professor of Psychology.
Richard S. Lazarus, Ph.D., Professor of Psychology.
Jean Walker Macfarlane, Ph.D., Professor of Psychology.
Donald W. MacKinnon, Ph.D., Professor of Psychology.
Leo J. Postman, Ph.D., Professor of Psychology (Chairman of the Department).
Mark R. Rosenzweig, Ph.D., Professor of Psychology.
R. Nevitt Sanford, Ph.D., Professor of Psychology.
Theodore R. Sarbin, Ph.D., Professor of Psychology.
Alex C. Sherriffs, Ph.D., Professor of Psychology.
M. Brewster Smith, Ph.D., Professor of Psychology.
Read D. Tuddenham, Ph.D., Professor of Psychology.
Robert Choate Tryon, Ph.D., Professor of Psychology.
Olga L. Bridgman, M.D., Ph.D., Sc.D., Professor of Psychology, Emeritus.
Egerton L. Ballachey, Ph.D., Associate Professor of Psychology.
Jack Block, Ph.D., Associate Professor of Psychology.

§ Poultry Husbandry 1 is offered only on the Davis campus. See the BULLETIN OF THE COLLEGE OF AGRICULTURE, also known as the PROSPECTUS OF THE COLLEGE OF AGRICULTURE.
1 In residence fall semester only, 1960–1961.
2 In residence spring semester only, 1960–1961.
Rheem F. Jarrett, Ph.D., Associate Professor of Psychology.
*Paul H. Mussen, Ph.D., Associate Professor of Psychology.
Donald A. Riley, Ph.D., Associate Professor of Psychology.
Benbow F. Ritchie, Ph.D., Associate Professor of Psychology.
Tom N. Cornsweet, Ph.D., Assistant Professor of Psychology.
Gerald M. French, Ph.D., Assistant Professor of Psychology.
Gerald E. McClearn, Ph.D., Assistant Professor of Psychology.
John P. McKee, Ph.D., Assistant Professor of Psychology.
Gerald A. Mendelsohn, Ph.D., Assistant Professor of Psychology.
Lyman W. Porter, Ph.D., Assistant Professor of Psychology.
Edward E. Sampson, Ph.D., Assistant Professor of Psychology.
John C. Speisman, Ph.D., Assistant Professor of Psychology.

Richard Alpert, Ph.D., Visiting Assistant Professor of Psychology.
Edward N. Barnhart, Ph.D., Lecturer in Psychology and Associate Professor of Speech.
Hubert S. Coffey, Ph.D., Associate Clinical Professor of Psychology.
Robert E. Harris, Ph.D., Lecturer in Psychology and Professor of Medical Psychology.
Marjorie P. Honzik, Ph.D., Lecturer in Psychology.
Howard H. Kendler, Ph.D., Visiting Professor of Psychology.
Gregory A. Kimble, Ph.D., Visiting Professor of Psychology.
Catherine Landreth, Ph.D., Lecturer in Psychology and Professor of Home Economics.


Letters and Science List.—All undergraduate courses in this department except 104, 114, 116, 117, 184, 185, 186, and 187 are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Ballachey, Mr. Block (spring semester), Mr. Coffey, Mr. French, Mr. Ghiselli, Mr. Haire (fall semester), Mr. Speisman, Mr. Tryon.

The major program is designed to provide the student with a survey of the principles and findings of the various areas of psychology and to introduce him to its methods of controlled observation and measurement of behavior. Completion of the major does not prepare the student for professional work in psychology.

The Major.—Required: Courses 1A, 1B, 5, Physiology 1, 1L, and any one of the following four courses: Anatomy 25, Anthropology 1, Genetics 10, or Zoology 10. (Zoology 1A–1B may be substituted for Physiology 1, 1L and a choice among Anatomy 25, Anthropology 1, Genetics 10, or Zoology 10.) Second-year high school algebra is prerequisite to course 5. Courses 1A, 1B, 5, Physiology 1, 1L are not open to entering freshmen. The required courses should be completed before the beginning of the junior year and must be completed before the beginning of the senior year. Courses in English composition, mathematics, and statistics are recommended. If the student anticipates proposing certain upper division courses from other departments as part of his major program, he should attempt to complete the prerequisites to such courses.

Not less than 24 units of upper division courses must be completed, including the following: (1) 100A–100B, an advanced survey of general psychology, to be taken when possible in the junior year; (2) 6 units in one area of concentration (see below), and (3) 3 units in each of two other areas of concentration; (4) at least two courses in which controlled observation or the analysis of the actual results of such observations comprise the principal
activity (see below); (5) at least 3 units in an upper division course that stresses the measurement methods of psychology (see below). Courses selected to satisfy requirements (4) or (5) may also be used to satisfy requirements (2) or (3). Except for the completion of the requirements listed above, substitutions up to 6 of the 24 upper division units may be made, with the approval of the undergraduate adviser, from upper division courses in anthropology, education, genetics, mathematics, philosophy, physiology, speech, sociology and social institutions, or other related departments. In requesting approval for such substitutions, the student must clearly establish the relationship of the substituted courses to his major program.

Requirements (2) and (3): Required Courses in Areas of Concentration.

Animal Psychology: courses 150A, and 150B* or 151*
Abnormal Psychology: courses 160, 168
Clinical Psychology: courses 162, and 165A* or 165B*
Developmental Psychology: courses 112 and 113 or 114*
Differential Psychology: courses 146A, and 146B or 165A* or 165B* or 140*
Experimental Psychology: courses 106A*, and 130 or 131
Industrial Psychology: courses 185, and 187 or 188*
Personality: courses 148A, and 148B or 136 or 141, or 140*
Physiological Psychology: courses 108A*-108B*
Social Psychology: courses 145A and 142A* or 142B*, or 145B.

List of courses satisfying requirement (4) are: any of the courses above followed by an asterisk and 115, 117.

List of courses satisfying requirement (5): 104, 107, 146B, 186.

Honors Program.—The honors program consists of courses H101 and H102, to be taken in the junior year, and H185 to be taken in each semester of the senior year.

LOWER DIVISION COURSES

1A. General Psychology. (3) I and II. Mr. Crutchfield, Mr. Riley
Three lectures and one section meeting per week. Not open to entering freshmen.

1B. General Psychology. (3) I and II. Mr. McKee, Mr. Brown
Two lectures and one three-hour laboratory per week. Prerequisite: course 1A.
A continuation of course 1A with a detailed treatment of the application of the scientific method in the study of behavior. Basic assumptions, limitations, and advantages of the method of experiment. Intended primarily for prospective major students.

5. Introduction to Psychological Measurements. (3) I and II.
Mr. Brown, Mr. French
Three lectures and one section meeting per week. Prerequisite: second-year high school algebra or Mathematics D, and course 1A (may be taken concurrently). Open only to students whose major subject is psychology. Not open to students who are taking, or have taken, another course in statistics.
Arrays of experimental measurements, central tendencies, variability, correlation, significance of measures; elementary reliability and validity of tests.

33. Personal and Social Adjustment. (3) I and II. Mr. Sherriffs
Three lectures and one section meeting per week. Prerequisite: course 1A.
A continuation of course 1A intended primarily for students who will not major in psychology.
The dynamics of normal personality development. Family relationships, social adjustment, and factors modifying self-evaluation are emphasized.
Upper Division Courses

Unless otherwise stated, courses 1A, 1B, and junior standing are prerequisite to all upper division courses.

100A–100B. Survey of General Psychology. (3–3) Yr.

Mr. Rilev (in charge, fall semester), Mr. Kimble (in
charge, spring semester), Mr. Cornsweet, Mr. French,
Mr. Jarrett, Mr. Kendler, Mr. Kimble, Mr. Ritchie,
Mr. McClearn

Two lectures and one two-hour laboratory section per week. Prerequisite:
courses 1A, 1B, 5.

A comprehensive survey of the fundamentals of general psychology at an
advanced level. Consideration of the facts and principles of behavior which
form a common basis for the various special fields of psychology.

H101. Honors Seminar. (3) I and II.

Mr. Krech, Mr. Ritchie, Mr. McClearn, Mr. Rosenzweig

Restricted to students who are (1) either honors students in psychology or
have a similar status in some other University department, and who, in addi-
tion, (2) have been accepted by the course instructor.

An honors seminar devoted to the theoretical and experimental analysis of
problems arising in current studies of perception, motivation, learning, and
problem-solving.

H102. Honors Seminar. (3) I and II.

Mr. Lazarus, Mr. Sarbin, Mr. Block, Mr. Tryon

Restricted to students who are (1) either honors students in psychology or
have a similar status in some other University department, and who, in addi-
tion, (2) have been accepted by the course instructor.

An honors seminar devoted to the theoretical and experimental analysis of
problems arising in current studies of mental abilities, mental development,
personality, social attitudes, group behavior, and mental disorders.

*104. The Psychological Test. (3) II.

Lectures and laboratory. Prerequisite: courses 1A, 1B, 5.

Psychological and logical aspects of measurements of behavior domains;
concepts of behavior sampling and representativeness of the domains of prof-
ciency, aptitude, and conceptualized abilities; theory of attitude measure-
ment; theory underlying measurement by units and item sampling; psycho-
logical interpretation of measured performance.

*105. Psychology of Speech and Communication. (3) II.

Prerequisite: courses 1A, 1B, 5.

A broad examination of research and theories of communication including
the physical nature of speech sounds, psychophysics of perception, physio-
logical mechanisms of speech and audition, communication, development of
speech in children, and individual differences in speech.

*106A. Experimental Psychology. (3) I.

Lectures and laboratory. Prerequisite: courses 1A, 1B, and 5 or an equiva-
 lent course in statistics.

A survey with performance of typical experiments on reaction tendencies,
perception, learning, and problem-solving. Emphasis on methods of exper-
imentation.

107. Advanced Statistical Methods in Psychology. (3) I. Mr. Jarrett

Lectures and laboratory. Prerequisite: course 5 or an equivalent course in
statistics.

The nature of the probabilistic considerations involved in the interpretation of psychological data derived from controlled observation; large-sample and small-sample sampling theory frequently employed in psychological research; analysis of variance and linear regression problems in experimental psychology.

**108A–108B. Physiological Psychology. (3–3) Yr.**

Mr. French, Mr. Rosenzweig

Lectures and laboratory. Prerequisite: courses 1A, 1B, 5, and Physiology 1 and 1L or consent of the instructor.

A survey of relations between behavior and biological processes. Coordination of behavior; anatomy and physiology of the nervous system; sensory processes; perceptual dynamics; neural and hormonal processes in motivation; changes in the organization of the nervous system in maturation and learning.

**111. Child Psychology. (2) I.**

Mr. McKee

Prerequisite: course 1A, and either 1B, 5, or 33 (1B, 5, or 33 may be taken concurrently).

Behavior of normal children. Prenatal development; the period of infancy; mental, social, and personality development in childhood.

**112. Developmental Psychology. (3) I.**

Mr. Alpert

Prerequisite: courses 1A, 1B, 5. Primarily for majors in psychology; majors in closely related departments will be admitted by consent of the instructor. Not open to students who have taken course 111 or Home Economics 132.

The development of motor functions, social and emotional traits, language, and mental abilities. Individual differences in development and performance, as related to physical, social, and psychological factors.

**113. Adolescence. (2) II.**

Mr. McKee

Prerequisite: courses 1A, 1B, 5. Primarily for majors in psychology.

A survey of current research, with particular reference to the analysis and interpretation of data from growth studies.

**113N. Adolescent Psychology. (2) I.**

Prerequisite: course 1A and one other course in psychology. This course is for nonmajors; it is not open to students who have taken course 113.

A survey of adolescent development and the problems of adolescents.

**114. Laboratory in Child Psychology. (2) II.**

One hour of lecture and three hours of laboratory per week to be arranged. Prerequisite: courses 1A, 1B, 5 (with grade of A or B) and either 111, 112, Education 111, or Home Economics 132.

A survey of empirical methods of investigation used in child psychology: observation, time sampling, rating scales, standardized tests, and experimental procedures. Students will conduct investigations typical of the field and will execute an original investigation.

*115. Laboratory in Adolescent Development. (1) II.*

Three hours per week to be arranged. Prerequisite: consent of the instructor. Offered to a limited number of students also enrolled in course 113.

Individual projects and reports.

**116. Tests and Measurements of Infants and Preschool Children. (1) I.**

Prerequisite: courses 5 and 112 or Home Economics 132. Mrs. Honzik

Psychology

A survey of the standardized tests and techniques of measurement of mental, physical, motor and personality development of infants and young children. There will be class demonstrations of individual tests. Theory and empirical research, using these testing methods, will be reviewed.

117. Laboratory Tests and Measurements of Infants and Preschool Children. (2) I. Mrs. Honzik
Prerequisite: consent of the instructor.
Laboratory work at the Institute of Child Welfare, accompanying course 116.

120. Introduction to History and Systems of Psychology. (3) II. Mr. Krech
Prerequisite: course 1A and at least 12 upper division units in psychology, or graduate standing in philosophy, biology, or sociology and social institutions.
Major stages in the emergence of psychology as an independent science from its beginnings in ancient philosophy and medicine to the present. Classical nineteenth-century structuralism will be compared with such modern schools as functionalism, behaviorism, Gestalt psychology, and psychoanalysis.

*126. Contemporary Psychology. (3) I. 
Prerequisite: courses 1A, 1B, and at least 6 upper division units in psychology. Primarily for seniors.
Reading and discussion of current books and monographs, affording a survey of contemporary aims, methods, and achievements.

130. Learning. (3) I. Mr. Kendler
Survey of experimental and theoretical work in the psychology of memory and learning.

131. Perception. (3) I. Mr. Cornsweet
Lectures and demonstrations on the perception of form (Gestalt) and of objects in three-dimensional space, and on first impressions from photographs and from other reduced social contact; interaction of cognition and motivation.

134. Motivation. (3) I. Mr. Sampson
Prerequisite: courses 1A, 1B, and at least 6 upper division units in psychology. Primarily for seniors and graduates.
The nature of primary and secondary drives; the theories concerning drives found in animal, child, experimental, social, and abnormal psychology, and in philosophy.

135. Thinking. (3) II. Mr. Riley
Prerequisite: courses 1A, 1B or 33.
Survey of experimental and theoretical work on concept formation and thought processes.

136. Psychology of the Unconscious. (3) II. Mr. MacKinnon
Prerequisite: course 1A.
A consideration of the evidence for, and the nature and role of, unconscious psychological processes in behavior.

140. Personality Assessment. (3) I. Mr. Gough
Lectures and laboratory. Prerequisite: courses 1A, 1B, 5.
A systematic consideration of concepts, methods, and procedures for the diagnosis and assessment of personality.

Psychology 351

141. Personality in Society and Culture. (3) I. Mr. Sarbin
Prerequisite: courses 1A, 1B, and senior standing.
A consideration of the social and cultural determinants of personality.

142A–142B. Experimental Social Psychology. (3–3) Yr. Mr. Ballachey
Lectures and laboratory. Prerequisite: courses 1A, 5, and 145, or the equivalent. 142A is not prerequisite to 142B.
142A: Typical experiments on social factors in such phenomena as perception, motivation, suggestion, attitudes and prejudice, rumor; studies of group influences upon the behavior of the individual.
142B: Individual investigations of social behavior, utilizing laboratory or field methods.

144. Social Psychology of the Interview. (3) I. Mr. Sampson
Lectures and laboratory. Prerequisite: courses 1A and 145 or consent of the instructor.
Processes of communication in interview techniques used in the social sciences, with special reference to distortions arising from differences in psychosociological frames of reference of the participants.

145A–145B. Social Psychology. (3–3) Yr. Beginning each semester.
Prerequisite: course 1A. Mr. Smith, Mr. Sampson
145A: Survey of social psychology, including: language, communication, social interaction; social norms, roles, leadership, influence of culture and social structure on personality; social attitudes, propaganda, attitude change.
145B: Intensive consideration of selected topics in social psychology. Sections will differ in topical emphasis.

146A–146B. Differential Psychology. (3–3) Yr. Mr. Tryon
Prerequisite: courses 1A, 5 or the equivalent, and one other course in psychology, or consent of the instructor. (Course 146A may be omitted as prerequisite to 146B with consent of the instructor.)
146A: Hereditary and environmental bases of individual differences in intelligence and personality. Family, sex, class, and race differences.
146B: Continuation of 146A. An introduction to factor and cluster analysis of individual and group differences.

148A–148B. Personality. (3–3) Yr. Mr. Lazarus
Prerequisite: course 1A and either 1B or 33; 162 or 134 or 136 and senior or graduate standing.
A survey of recent thought and research in the field of personality, with emphasis on dynamic and genetic problems.

150A. Comparative Psychology. (3) I. Mr. Beach
Prerequisite: consent of the instructor.
A survey of the determinants of animal behavior at the various phyletic levels including an analysis of: the role of stimulation and neural integration, instincts and habits, and drives and incentives.

*150B. Animal Learning and Problem-Solving. (3) I.
Prerequisite: course 100B or the consent of the instructor.
A survey in the higher animals of the conditions under which habits are acquired or lost, as well as an analysis of the ways in which old habits are integrated in the solution of new problems.

*151. Experiments in Animal Psychology. (3) I.
Lectures and laboratory. Prerequisite: course 150A and consent of the instructor.

*160. Mental Deficiency. (3) I.
Prerequisite: course 1A and upper division standing.
Mental deficiency and abnormality in children, including a consideration of tests used in clinical examinations.

161. Personality Development. (3) I and II.
Mr. Speisman, Mr. Mendelsohn
Prerequisite: upper division standing; either course 111, 112, 113, 160, or Home Economics 132. Limited to nonpsychology majors. Students may not receive credit for both 161 and 162.
A survey of biosocial factors in the dynamics of normal personality development.

162. Clinical Psychology. (3) I.
Mr. Mendelsohn
Prerequisite: courses 1A, 1B, 5 or the equivalent, and either course 112, 113, 160, or 168. Limited to psychology majors. Students may not receive credit for both 161 and 162.
Dynamics of personality development, with special reference to clinical methods and problems.

165A–165B. Introduction to Clinical Methods. (3–3) Yr. Mr. Tuddham
Lectures and laboratory. Prerequisite: courses 1A, 1B, 5.
Theory and evaluation of the principal tests of ability and personality. A consideration of psychological test methods, with special reference to clinical diagnosis. Historical development of psychometrics. 165A is concerned with abilities and aptitudes; 165B, with personality.

168. Abnormal Psychology. (3) II.
Mr. Sarbin
Prerequisite: course 1A and at least 6 units of upper division psychology or, with consent of the instructor, premedical status.
The relations of psychology to the psychoneuroses and psychoses; the appearance of abnormal traits in incipient stages of mental disturbance.

*184. Psychological Problems in Industry. (3) I and II.
Intended for nonmajors. Not open to students who have taken courses 185, 187, or 188.
A survey of current theory and research in industrial psychology, including topics on personnel selection and placement, conditions of work, training, communication, leadership, formal, and informal organization.

185. Personnel and Industrial Psychology. (3) I and II.
Mr. Ghiselli, Mr. Porter
A discussion of techniques for the selection and classification of employees, the psychological aspects of study of work methods, conditions of work, training, employee motivation, and morale.

186. Theory of Mental Measurement. (3) I and II.
Mr. Ghiselli
Lectures and laboratory. Prerequisite: courses 1A, 1B, 5.
Scaling of psychological measurement, determination of the reliability and validity of tests, concepts of dimensions of psychological traits.

187. Human Relations in Industry. (3) II.
Mr. Porter
Prerequisite: course 185.
The motivation of workers, psychological aspects of worker-management relationships, factors in employee morale, the maladjusted worker, leadership.

*188. Attitudes and Perception in the Industrial Society. (3) I.
Prerequisite: courses 1A, 1B, 5.
Theoretical problems of perceptual and attitudinal organization in industrial situations, role perceptions in labor and management relations, genesis of attitudes, morale surveys, and similar problems.

H195. Special Study for Honors Candidates. (1–5) I and II. The Staff

199. Special Study for Advanced Undergraduates. (1–5) I and II.

The Staff

GRADUATE COURSES AND SEMINARS

The consent of the instructor is prerequisite to all graduate offerings. Graduate students in neighboring fields may participate in certain courses or seminars with consent of the instructor.

There will be a general colloquium of staff and graduate students which will be scheduled as the situation warrants. There will be no credit offered for these meetings.

201A–201B. Proseminar in Psychology. (3–3) Yr. Mr. Krech, Mr. Smith
Prerequisite: graduate standing.
An intensive consideration of major areas and problems in psychology.
Recommended for graduate students in their first year.

*204E. Seminar in Principles of Measurement. (2) I.

206E. Seminar in Experimental Psychology. (2) I and II.
Mr. Riley, Mr. Kendler

207. Quantitative Methods in Psychology. (3) II. Mr. Jarrett
A discussion of quantitative research methods in psychology. Principles necessary to the understanding and use of rational and empirical equations in psychology, together with problems arising in connection with some of the more common statistical hypotheses encountered in psychological research.

208E. Seminar in Physiological Psychology. (2) I. Mr. French

209E. Seminar in Individual Differences. (2) I. Mr. Tryon

*210E. Seminar in Constitutional Psychology. (2) II. Mr. Tuddenham

212E. Seminar in Developmental Psychology. (2) I and II.
Mr. Alpert, Mr. McKee

228. The Conceptual Framework of Psychology. (3) II. Mr. Kendler
Prerequisite: course 120 or any acceptable course in history or systems of psychology. Graduate students in philosophy, sociology and social institutions, biology, or physics may be admitted by consent of the instructor.
Further discussion of history and systems of psychology, with special emphasis on the philosophy of science as applied to psychology. Introspective and objective, molecular and molar, peripheral and central-distal point of view. The status of theory in modern psychology; description versus explanation, idiographic versus statistical versus nomothetic approach.

231E. Seminar in Perception. (2) II. Mr. Cornsweet

*235E. The Nature of Psychological Change. (2) II. Mr. Sherriffs

*239E. Social Perception. (2) II.

240E. Seminar in Personality Tests and Assessment Methods. (2) II.
Mr. Gough

241E. Seminar in Personality and Culture. (2) II. Mr. Sarbin

243E. The Social Psychology of Behavior Disorders. (2) I. Mr. Ballachey

245E. Seminar in Social Psychology. (2) II. Mr. Smith

246E. Perception and Personality. (2) II.

247. Advanced Group Dynamics and Group Therapy. (3) I. Mr. Coffey
Two two-hour sessions per week. Social welfare and public health students may be admitted.
Ways in which groups may be utilized in the training and therapy of the individual, survey of pertinent literature, and actual experience with group techniques, such as role playing, psychodrama, reality testing, as training and therapeutic devices.

*247E. Seminar in Group Dynamics and Group Therapy. (2) I. Mr. Coffey

248E. Seminar in Personality. (2) II. Mr. Block

*249. Experimental Psychodynamics. (3) II.
Two hours of lecture and four hours of laboratory work per week to be arranged.
A general survey of the psychodynamics of behavior, with special emphasis upon the experimental literature.

249E. Seminar in Dynamic Psychology. (2) II.

250E. Seminar in Animal Psychology. (2) I and II. Mr. McClearn, Mr. Beach

261A–261B. Clinical Methods. (3–3) Yr. Mr. Tuddenham, Mr. Coffey
Lectures and laboratory; four hours of field work per week to be arranged.
Consideration of clinical methods of measurement, interview, and observation.

263A–263B. Advanced Clinical Diagnostic Testing. (3–3) Yr.
Prerequisite: course 261B or consent of the instructor. Mr. Mendelsohn Theory and practice of personality testing. Administration, scoring, and interpretation of diagnostic tests used in clinical settings. Emphasis on the Rorschach method, the Thematic Apperception Test, and Minnesota Multiphasic Personality Inventory, and other established techniques.

264E–264F. Seminar in Case History. (2–2) Yr.
Prerequisite: course 261B. Mrs. Macfarlane, Mr. Coffey

265E–265F. Advanced Seminar in Case History. (2–2) Yr. Mr. Speisman Prerequisite: course 264F.

266E. Seminar in Theories of Therapy. (2) II. Mr. Speisman

*267E. Seminar in Medical Psychology. (2) II.

*268E. Seminar in Abnormal Psychology. (2) I.

269E. Seminar in Clinical Research Methods. (2) II. Mrs. Macfarlane

285E. Seminar in Applied and Industrial Psychology. (2) II. Mr. Ghiselli

287E. Seminar in Psychology of Human Relations. (2) I. Mr. Haire, Mr. Porter

298. Proseminar in Research Methods. (2) II. Mr. Ballachev, Mr. Krech, Mr. Tuddenham, Mr. McClearn
Introduction to research in psychology. Problems of experimental design and analysis considered in relation to individual projects.

Research. (1-6) I and II. The Staff
Laboratory, library, or field work as the problem requires.

Seminar in the Presentation of Psychological Material. (2) I.
Sec. 1: Mr. Haire; Sec. 2: Mr. Cornsweet. Mr. Haire, Mr. Cornsweet
Critical approach to presentation of psychological material in publications,
lectures, demonstrations, etc., with emphasis on content, evidence, and sig­nificance of material, and relevant techniques of presentation.

PUBLIC HEALTH

(Department Office, 19 Earl Warren Hall)

Jessie M. Bierman, M.D., M.S.P.H., Professor of Maternal and Child Health.
Sanford S. Elberg, Ph.D., Professor of Immunology and Bacteriology.
William Griffiths, Ph.D., Professor of Public Health.
Sven Nissen-Meyer, M.D., Ph.D., Professor of Biostatistics.
William C. Reeves, Ph.D., M.P.H., Professor of Epidemiology.
Edward S. Rogers, M.D., M.P.H., Professor of Public Health and Medical Administration.
Charles Edward Smith, M.D., D.P.H., Professor of Public Health (Chairman of the Department).
William W. Stiles, M.D., M.P.H., Professor of Public Health.
Keith O. Taylor, Ph.B., M.B.A., F.A.C.H.A., Professor of Hospital Administration.
Bernard D. Tebbens, Sc.D., Professor of Industrial Hygiene Engineering.
Jacob Yerushalmi, Ph.D., Professor of Biostatistics.
Margaret Beattie, M.A., Gr.P.H., Professor of Public Health, Emeritus.
Dorothy Bird Nyswander (Dorothy Nyswander Palmer), Ph.D., Professor of Public Health Education, Emeritus.
A. Harry Bliss, M.S., M.P.H., Dr.P.A., Associate Professor of Public Health and Coordinator of Environmental Health and Safety.
Chin Long Chiang, Ph.D., Associate Professor of Biostatistics.
Nell F. Hollinger, Ph.D., Associate Professor of Public Health.
Ruth L. Huenemann, Sc.D., Associate Professor of Public Health Nutrition.
Warren J. Kaufman, Sc.D., Associate Professor of Sanitation and Sanitary Engineering and Associate Professor of Civil Engineering and Irrigation.
Edith M. Lindsay, Ed.D., Associate Professor of Public Health.
Walter S. Mangold, B.S., Associate Professor of Public Health.
William J. Oswald, Ph.D., Associate Professor of Public Health.
Beryl Roberts, M.Ed., D.P.H., Associate Professor of Public Health.
Reuel A. Stallones, M.D., M.P.H. Associate Professor of Public Health.
William Taylor, Ph.D., Associate Professor of Biostatistics.
Alan Burkhalter, M.S., Ph.D., Assistant Professor of Toxicology.
Robert C. Cooper, Ph.D., Assistant Professor of Public Health.
Leona R. Shapiro, M.S., Acting Instructor in Public Health.
John H. Austin, B.C.E., S.M., Associate in Industrial Health.
Nedra Belloe, M.A., Associate in Public Health.
Robert E. Christianson, B.S., Associate in Public Health.
Michael Granich, B.S., Associate in Public Health.
Mary C. Hampton, M.S., Associate in Public Health.
Flora J. Hanks, R.N., A.B., Associate in Public Health.
Theo M. Hawkins, M.P.H., Associate in Public Health.
Cecil V. Martin, M.P.H., Associate in Public Health.
Terry T. Masuda, M.P.H., Associate in Public Health.
Catherine Prato, M.P.H., Associate in Public Health.
James E. Quon, B.S., Associate in Public Health.
Allen Steinmetz, B.S., M.P.H., Associate in Public Health.

Rodney R. Beard, M.D., M.P.H., Clinical Professor of Occupational Health.
Mortimer A. Benioff, M.D., Lecturer in Public Health.
Charles F. Blankenship, A.B., M.D., M.P.H., Lecturer in Public Health.
Henrik L. Blum, M.D., M.P.H., Lecturer in Public Health.
Howard L. Bodily, Ph.D., Lecturer in Public Health.
Eleanor A. Boydston, M.A., Lecturer in Public Health.
Edna J. Brandt, M.S., Lecturer in Public Health.
Lester Breslow, M.D., Lecturer in Public Health.
Sylvia C. Bryson, M.A., Lecturer in Public Health.
Harold D. Chope, M.D., Dr.P.H., Lecturer in Public Health.
Elizabeth Clark, R.N., M.P.H., Lecturer in Public Health.
William H. Clark, M.D., M.P.H., Lecturer in Public Health.
Leslie Corsa, Jr., B.S., M.D., Lecturer in Public Health.
John E. Dunn, Jr., M.D., M.P.H., Lecturer in Public Health.
Robert Dyar, M.D., Dr.P.H., Lecturer in Public Health.
Seymour M. Farber, M.D., Lecturer in Public Health.
Alan Foord, M.D., M.P.H., Clinical Professor of Maternal and Child Health.
George M. Foster, Ph.D., Lecturer in Public Health and Professor of Anthropology.
Fern E. French, M.A., Dr.P.H., Lecturer in Public Health.
David Frost, B.S., M.D., M.P.H., Lecturer in Public Health.
Carl Goetsch, M.D., Lecturer in Public Health.
George L. Hall, LL.B., Lecturer in Hospital Administration.
Floyd W. Hartmann, Sc.D., Lecturer in Public Health.
Charles H. Hine, Ph.D., M.D., Associate Clinical Professor of Public Health.
Arthur C. Hollister, Jr., M.D., M.P.H., Lecturer in Public Health.
Don M. Huffines, M.P.H., Lecturer in Public Health.
Cecilia L. Johnson, A.B., M.D., Lecturer in Public Health.
Harald N. Johnson, M.A., M.D., Lecturer in Public Health.
Gerhard Klein, M.S., Lecturer in Public Health.
Andie L. Knutson, Ph.D., Lecturer in Public Health.
Edwin H. Lennette, M.D., Ph.D., Lecturer in Virology and Lecturer in Bacteriology for the spring semester.
Alvin R. Leonard, M.D., M.P.H., Clinical Professor of Public Health.
Thomas H. Llewellyn, M.D., M.P.H., Lecturer in Public Health.
Arthur F. Long, M.D., Dr.P.H., Lecturer in Public Health.
Percy H. McGauhey, M.S., Professor of Sanitary Engineering and Lecturer in Public Health.
Alfred E. Maffly, B.S., F.A.C.H.A., Lecturer in Hospital Administration.
Harold E. Mann, A.B., M.D., Lecturer in Public Health.
Malcolm H. Merrill, M.S., M.D., M.P.H., Lecturer in Public Health.
Paul R. Mico, M.P.H., Lecturer in Public Health.
Theodore A. Montgomery, M.D., M.P.H., Lecturer in Public Health.
Robert E. Mytinger, M.P.H., Lecturer in Public Health.
Emil E. Palmquist, M.P.H., M.D., Lecturer in Public Health.
Alberta Parker (Alberta Parker Horn), M.D., Lecturer in Public Health.
Beulah Parker (Beulah Parker Vaughan), M.D., Lecturer in Public Health.
Steven Polgar, Ph.D., M.P.H., Lecturer in Public Health.
Helen Stapley Ross, M.P.H., Lecturer in Public Health.
Edith P. Sappington, M.D., Dr.P.H., Lecturer in Public Health.
Ruth E. Simonson, M.P.H., Visiting Professor of Public Health.
William W. Stadel, M.D., Lecturer in Hospital Administration.
John M. Switzer, M.P.H., Lecturer in Public Health.
Helen E. Walsh, M.A., Lecturer in Public Health.
James Watt, M.D., Dr.P.H., Lecturer in Public Health.
Howard J. Weddle, M.S., M.P.H., Lecturer in Public Health.
George U. Wood, Ph.C., Lecturer in Hospital Administration.

Letters and Science List.—Courses 5A–5B, 35, 106, 160A, 160B, 163 are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

LOWER DIVISION COURSES

5A. Individual and Community Health. (3) I and II. Mr. Stiles
A survey of the entire field of public health, including field observations and a consideration of the evolution of disease prevention and control; the social, medical, and economic aspects of sickness, disability, and death.

5B. Individual and Community Health. (3) I and II. Mr. Stiles
Prerequisite: course 5A.
Continuation of course 5A.

35. Personal Health Problems. (3) I and II. Miss Lindsay
Enrollment limited to students in the lower division. Sections limited to fifty students.
A consideration of the factors which determine physical, mental, and emotional health and influence the prevention of disease. Application of these factors to the solution of individual health problems.

UPPER DIVISION COURSES

100. Introduction to Health Administration. (3) I. Miss A. Parker, Mr. Leonard
Prerequisite: course 5A–5B or consent of the instructor.
Principles of public administration and fundamentals of organization and administration in public health.

101. Introduction to Health Administration. (3) II. Mr. K. O. Taylor
Principles of hospital and medical care organization and administration.

103A–103B. Hospital Organization and Management. (3–3) Yr. Mr. K. O. Taylor
Prerequisite: Business Administration 1A–1B. Restricted to students enrolled in the hospital administration curriculum or consent of the instructor.
Consideration of the fundamentals of organization, business and financial management, personnel management, plant operation, staff organization, and community relationships as applied to hospital administration.

106. Medical Sociology. (3) I. Mr. Rogers
A consideration of the social and economic factors related to health, disease, and the receipt of medical care.

108. Advanced Problems in Public Health Administration. (1–5) I and II.
Mr. Rogers, Mr. Leonard, Miss A. Parker
109. **Advanced Problems in Medical Administration.** (1-5) I and II.  
Prerequisite: consent of the instructor. Mr. K. O. Taylor, Mr. Rogers

111. **Environmental Sanitation.** (2) I and II. Mr. Oswald  
A condensed presentation of the principles and practices of environmental sanitation for advanced public health students.

112. **Control of Vector and Reservoir Animals Affecting the Public Health.** (3) I.  
Prerequisite: consent of the instructor. Mr. Cooper  
Principles and practices governing the control of invertebrate and low vertebrate animals harboring, transmitting, and causing diseases of public health importance.

113. **Sanitary Control of Foods.** (3) II. Mr. Hartmann  
Prerequisite: consent of the instructor.  
Principles of sanitary science as related to food production, processing, and distribution, and to food-handling.

114. **Advanced Problems in Sanitation.** (1-5) I and II. Mr. Mangold

115. **Radiological Aspects of Public Health Engineering.** (2) I. Mr. Kaufman  
Lecture, one hour; laboratory, three hours and/or recitation and lecture per week. Prerequisite: consent of the instructor.  
Principles of environmental control of ionizing radiations. Theory and laboratory exercises in radiation detection, shielding design, monitoring procedures, low-level assaying of food and water, waste disposal, and water decontamination. Regulation of radiation sources.

117. **Sanitary Microbiology of Water and Sewage.** (4) I. Mr. Cooper  
Primarily for students specializing in sanitary science or sanitary engineering, but open to others with consent of the instructor.  
Principles of biology and their application to sanitary science, with emphasis on the microbiology of water and sewage.

118. **Sanitary Microbiology of Foods and Beverages.** (4) II. Mr. Cooper  
Prerequisite: Bacteriology 2 or course 117, or the consent of the instructor.  
Principles of biology and their application to sanitary science, with emphasis on the microbiology of foods and beverages.

119. **Administrative Aspects of Sanitary Science.** (2) I and II. Mr. Mangold  
Prerequisite: Civil Engineering 144 and course 113 (may be taken concurrently), or consent of the instructor.  
The administrative aspects of sanitary science as applied to the fields of communicable disease control, schools, recreation, housing, emergencies, and including organizations, laws, and personnel.

125. **Child Health.** (3) I. Miss Bierman, Mrs. Boydston  
Lectures, three hours per week: group conferences, and field observations.  
A consideration of factors pertaining to the health of children from conception to the end of puberty; community health facilities.

*131. **Health Education Laboratory.** (2) II. Mr. Griffiths  
Prerequisite: consent of the instructor.  
Emphasis will be placed on techniques of teaching health to adults through the media of radio, films, slides, posters, press, printed materials, and lectures. Research in these fields will be evaluated, and exercises in preparing and using materials will be included.

* Not to be given, 1960-1961.
132. **Group Study in Health Instruction.** (2) II. Miss Lindsay
Prerequisite: open to seniors majoring in health education and graduate students in public health.
Considerations basic to health instruction with community groups. Evaluation of objectives, methods, and resource materials.

*133. **Introduction to Group Process.** (2) II. Mr. Griffiths
Prerequisite: consent of the instructor.
Consideration of dynamics of interpersonal relationships as they affect group membership, leadership ability, and community work in the public health field.

134. **Community Health Education.** (3) II. Miss Roberts, Mr. Griffiths
Primarily for students specializing in some area of health work who have taken basic courses in biological sciences, education, and psychology.

*135. **Individual Health.** (3) I. Miss Lindsay
A consideration of fundamental physiological mechanisms and application to promotion and protection of health.

*136. **Health Programs for the School-Age Child.** (2) I. Miss Lindsay
Consideration of the community resources contributing to a health program for the school-age child; administrative and organizational principles involved.

*145. **Community Control of the Communicable Diseases.** (3) I. Mr. Blum
The epidemiology and community control of communicable diseases, including tuberculosis and the venereal infections.

*147A. **Principles of Epidemiology.** (2) I. Mr. Reeves, Mr. Smith, Mr. Stallones
Prerequisite: knowledge of medical microbiology.
Principles of epidemiology and a study of the infection chains of certain type diseases.

*147B. **Applied Epidemiology.** (2) II. Mr. Reeves, Mr. Smith, Mr. Stallones
Discussion and lecture, one hour; laboratory, three hours per week. Separate discussion hours for undergraduate and graduate students. Prerequisite: course 147A or 245 and 162A or the equivalent, or consent of the instructor.
Methods of investigating epidemics, and collection, analysis, and reporting of data.

149. **Advanced Problems in Epidemiology.** (1-5) I and II.
Mr. Reeves, Mr. Smith, Mr. Stallones
Prerequisite: consent of the instructor.

150A. **Clinical and Public Health Laboratory Procedures.** (8) I.
Miss Hollinger
Prerequisite: Biochemistry 102, Bacteriology 101, and consent of the instructor. Enrollment limited to forty students.
Basic principles and laboratory methods in clinical chemistry, hematology, and mycology, as required in clinical and public health practices.

150B. **Clinical and Public Health Laboratory Procedures.** (8) II.
Miss Hollinger
Prerequisite: Bacteriology 101 and consent of the instructor. Enrollment limited to forty students.

Laboratory identification of the etiological agents of communicable diseases and bacteriological and chemical examination of water, milk, and utensils.

154. Advanced Problems in Public Health Laboratory. (1–5) I and II.
Prerequisite: consent of the instructor.
Miss Hollinger
Special investigations of public health and clinical laboratory problems.

160A. Biometry. (3) I and II. Mr. Chiang
Lectures, two hours; laboratory, three hours per week. Prerequisite: 8 units of laboratory courses in the biological sciences or consent of the instructor. Primarily for students in the biological sciences and certain fields of public health.
Elements of statistical analysis as applied to the biological sciences. Descriptive statistics, probability, probability distributions, point and interval estimation, and hypothesis testing for large and small samples.

160B. Biometry. (3) II. Mr. Chiang
Lectures, two hours; laboratory, three hours per week. Prerequisite: course 160A or consent of the instructor.
Bivariate distributions, elementary methods of sampling, introduction to analysis of variance, special methods applicable to biological data.

161A–161B. Biostatistics. (3–3) Yr. Mr. W. Taylor
Lectures, two hours; laboratory, three hours per week. Primarily for majors in biostatistics.

162A. Public Health Statistics. (3) I and II. Mr. W. Taylor, Mr. Chiang
(Formerly numbered 162.)
Lectures, two hours; laboratory, three hours per week. Fall semester enrollment limited to graduate students; spring semester to undergraduates. Primarily for students in School of Public Health not majoring in biostatistics.
Introduction to statistical methods in the field of public health. Tabulation and graphics, vital statistics, morbidity, mortality and natality, age adjusted rates, measures of location and variability, and statistical inference.

162B. Public Health Statistics. (2) II. Mr. Nissen-Meyer
Lectures, two hours; laboratory, three hours per week. Prerequisite: course 162A or the equivalent. Primarily for graduate students in Public Health not majoring in biostatistics.
Extension of methods introduced in course 162A and their application to problems met in medicine and public health.

163. Demography. (3) II.
Lectures, two hours; laboratory, three hours per week. Prerequisite: course 161A or Sociology 133 or the equivalent.
Techniques for the measurement of fertility, mortality, migration, and mobility; analysis of population size, distribution, and composition; methods of estimation and projection.

164. Advanced Biometry. (2) I. Mr. Nissen-Meyer
Lecture, one hour; laboratory, three hours per week. Prerequisite: Mathematics 4B and Statistics 130B or the equivalent.
Extension of methods introduced in Statistics 130A–130B to methods of biological standardization, bioassay, and related topics.
Mr. Yerushalmy

Lecture, one hour; laboratory, three hours per week. Prerequisite: course 162A or the equivalent.

Methodology of evaluation; formulation of long-range and immediate objectives; indices and measures, evaluation designs, sample designs, analysis.

169. Advanced Problems in Biostatistics. (1-5) I and II. Mr. Yerushalmy
Lectures, two hours; laboratory, three hours per week. Prerequisite: consent of the instructor.

170. Introduction to Occupational Health and Industrial Hygiene.  
(3) I and II.  
Mr. Tebbens, Mr. Wilson

A survey of the field of industrial health and hygiene. Discussion of occupational hazards and their control; industrial safety; industrial health problems; and organizations concerned with industrial hygiene and health.

171. Industrial Environment Control: Sanitary Air Analysis. (2) II.  
Mr. Tebbens

Prerequisite: Chemistry 5 or Civil Engineering 146 or the equivalent; Physics 2A–2B or the equivalent.

Physical, chemical, and sanitary analysis of the condition of the air and other environmental factors affecting the health and welfare of workers in industry. Application of principles of sanitation in industry.

172. Industrial Toxicology. (2) II.  
Mr. Burkhalter

Prerequisite: Chemistry 5 and 9, Physics 2A–2B, Physiology 1–1L; or equivalent courses.

Chemical and clinical laboratory techniques applied to investigation of toxic manifestations of industrial hazards.

186. Social, Medical, and Public Health Aspects of Venereal Disease Control. (2) II.  
Mr. Koch

Discussion and field observation, two hours per week. Prerequisite: consent of the instructor.

Study of the social causes of the venereal diseases and remedial procedures; administrative control methods, etiology, epidemiology and treatment; importance of family life education and health education pertaining to their control.

189. Nutrition Problems in Public Health. (2) I and II.  
Miss Huenemann, Miss Shapiro, Miss Walsh

Study of the application of the science of nutrition to public health, emphasizing the responsibilities of public health workers in nutrition programs.

198. Directed Group Study. (1-5) I and II.  
Mr. Smith in charge

199. Special Study for Advanced Undergraduates. (1-5) I and II.  
Mr. Smith in charge

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

(3–2) Yr.  
Mr. Rogers

A systematic study of the principles of organization and administration and of their application to public health practice.

202. Special Studies in Hospital Administration. (1–5) I and II.  
Mr. K. O. Taylor

Special studies in the field of hospital administration under direction of the staff.
203A–203B. Seminar in Hospital Administration. (2–2) Yr.
  Mr. K. O. Taylor, Mrs. Inghram

206A–206B. Seminar in Medical Care Administration. (2–2) Yr.
  Mr. Rogers

  Limited to graduate students specializing in hospital or medical care administration, or by consent of the instructor.

  Detailed consideration of organization, operation, and appraisal of medical care programs.

209A–209B. Seminar in Public Health Administration. (1–1) Yr.
  Mr. Leonard, Miss A. Parker

213. Advanced Study in Sanitation. (1–5) I and II.
  Mr. Mangold, Mr. Oswald

214A–214B. Seminar in Sanitation. (2–2) Yr.
  Mr. Mangold

222. Investigative Techniques in Public Health Nursing Administration. (1–5) I and II.
  Miss Simonson

  Problem selection and formulation, research design, methodological problems, analysis and interpretation.

223. Special Studies in Public Health Nursing Administration. (1–5) I and II.
  Miss Simonson

  Special studies in the field of public health nursing administration under the direction of the staff.

224A–224B. Seminar in Public Health Nursing Administration. (2–2) Yr.
  Miss Simonson

  Consideration of organizational patterns and administrative techniques in public health nursing administration.

227. School Health Administration. (2) II.
  Mr. Foord, Miss Bierman, Miss Lindsay

  Consideration of the principles basic to organization, administration, and supervision of school health programs in elementary and secondary schools. Health services, environmental factors, communicable disease control, and hygiene of the school day. Students will undertake field studies and will furnish their own transportation.

228. Special Studies in Maternal and Child Health. (1–5) I and II.
  Miss Bierman, Mr. Foord, Miss Johnson

  Special studies undertaken by students under the direction of the staff.

229A–229B. Seminar in Maternal and Child Health. (1–1) Yr.
  Miss Bierman, Miss Johnson

231. Seminar in Mass Media Techniques of Health Education. (1) I.
  Prerequisite: consent of the instructor. Mr. Knutson, Miss Roberts

  Problems associated with the use of mass media in health education. Field experience in evaluative procedures will be undertaken and new trends in the use of mass media will be reviewed.

233. Group Work Procedures in Health Education. (2) I and II.
  Mr. Griffiths, Miss Roberts, Mrs. Ross

  Prerequisite: open only to graduate students in public health.

  A consideration of the more usual techniques of group work, together with investigations of the social and psychological factors which determine the effectiveness of group work in promoting public health activities.
234A–234B. Seminar in Community Health Education. (1–2) Yr.  
Mr. Griffiths  
Prerequisite: course 200A–200B (may be taken concurrently).  
Problems in relating the philosophy of health education to public health administration. Field observations and studies.

238. Seminar in Mental Health. (1) II.  
Miss B. Parker

239. Special Studies in Health Education. (1–5) I and II.  
Mr. Griffiths, Mr. Knutson, Miss Roberts  
Prerequisite: consent of the instructor.  
Research projects in public health education.

245A. Advanced Epidemiology. (3) I.  
Mr. Reeves, Mr. Smith, Mr. Stallones  
Prerequisite: a doctoral degree in a medical science or consent of the instructor for those with adequate background in allied medical sciences. To be taken concurrently with course 162A or its equivalent.  
Epidemiology as a research discipline is discussed, using selected diseases as examples. Emphasis is placed on recent developments and methods. A basic knowledge of the disease processes is presupposed.

245B. Advanced Epidemiology Laboratory. (3) II.  
Mr. Reeves, Mr. Stallones  
Prerequisite: courses 245A and 162A or its equivalent or consent of instructor.  
The analysis and interpretation of epidemiological data and communication of findings by written reports.

246. Seminar in the Epidemiology of Noninfectious Diseases. (1) II.  
Mr. Stallones  
Prerequisite: course 245A or consent of instructor.  
Discussion of current problems in the application of epidemiological methods to the investigation of noninfectious diseases.

248. Advanced Problems in Epidemiology. (1–5) I and II.  
Mr. Reeves, Mr. Smith, Mr. Stallones  
Prerequisite: courses 245A; 162A or 160A and 161A.

249A–249B. Seminar in Epidemiology. (1–1) Yr.  
Mr. Reeves, Mr. Smith, Mr. Stallones

254. Special Studies in Public Health Laboratory. (1–5) I and II.  
Miss Hollinger

260. Statistical Methods in Biology. (3) I.  
Mr. W. Taylor  
Lectures, two hours; laboratory, three hours per week. Prerequisite: course 164 or the equivalent.  
Underlying distribution theory related to particle counting, graded and quantal response in bioassay, and standardization of drugs. Development of probability models for the study of such phenomena as: competing risks, epidemics, and medical diagnosis.

261A–261B. Advanced Biostatistics. (3–3) Yr.  
Mr. Yerushalmy, Mr. W. Taylor, Mr. Nissen-Meyer  
Lectures, two hours; laboratory, three hours per week. Prerequisite: course 161B or the equivalent. Primarily for graduate students in biostatistics.  
Methods of epidemetic investigations; evaluation of therapy; advanced life table methods, program evaluation, design of surveys in human populations, utilization of routine records for research. Special biostatistical methods and techniques.

† To be given if a sufficient number of students enroll.
262. Selected Topics in Biostatistics. (3) II. Mr. Chiang
Lectures, two hours; laboratory, three hours per week. Prerequisite: course
261B.
Biostatistical problems associated with current research in cancer, heart
disease, tuberculosis, and other medical and public health problems.

268. Special Studies in Biostatistics. (1-5) I and II. Mr. Yerushalmy
Research projects undertaken by students under the direction of the staff.

269A–269B. Seminar in Biostatistics. (1-1) Yr. Mr. Yerushalmy

274A–274B. Seminar in Industrial Health. (1-1) Yr.
Mr. Tebbens, Mr. Wilson

278. Special Studies in Industrial Health. (1-5) I and II.
Mr. Tebbens, Mr. Wilson, Mr. Burkhalter
Research projects in industrial environment control, industrial toxicology,
sanitary air analysis, or industrial medical administration.

286. Special Studies in Public Health Nutrition. (1-5) I and II.
Prerequisite: consent of the instructor. Miss Huenemann
Special studies in the field of public health nutrition under direction of
the staff.

287. Clinical Problems in Public Health. (1-4) II.
Mr. Smith, Mr. Stallones
Deals with selected clinical subjects of major importance to public health
and presents clinical observations and discussions of the most recent advances
in diagnosis, treatment, and prevention.

289A–289B. Seminar in Public Health Nutrition. (2-2) Yr.
Miss Huenemann

298. Directed Group Study for Graduate Students. (1-5) I and II.
Mr. Smith in charge

299. Special Study for Graduate Students. (1-5) I and II.
Mr. Smith in charge

RANGE MANAGEMENT
(Office, 243 Walter Mulford Hall)

Committee in charge:
Harold H. Biswell, Ph.D., Professor of Forestry.
R. Merton Love, Ph.D., Professor of Agronomy, Davis.
Henry J. Vaux, Ph.D., Professor of Forestry (Chairman of the Committee).
Harold F. Heady, Ph.D., Associate Professor of Forestry.
William C. Weir, Ph.D., Associate Professor of Animal Husbandry, Davis.

The Major.—Instruction in range management is not organized as a single
administrative unit in the College of Agriculture of the University, but the
relevant courses are offered by a number of departments at Berkeley and
at Davis, and are coordinated by the committee in charge. See page 84 of
the CIRCULAR OF INFORMATION.

Major Adviser: Mr. Heady.
LOWER DIVISION COURSE

49. Range Management Field Practice Course. (No credit) Mr. Heady
Approximately four weeks devoted to field studies of range conditions and methods of utilization in various parts of the state.
Required of all students with a major in range management.

UPPER DIVISION COURSES

101. Introduction to Range Management. (3) I. Mr. Biswell
Basic principles of range management and development in the United States; relation to agriculture and wildland management.

102. Advanced Range Management. (3) II. Mr. Heady
Lecture and laboratory. Prerequisite: Engineering 21 or the equivalent; a course in plant ecology. Recommended: Botany 108.
Field and laboratory procedure in determination of range adequacy and quality. Special field trips will be arranged.

123. Range Forage Utilization. (3) I. Mr. Biswell
Lectures and laboratory. Prerequisite: course 49 or 101.
Principles of range forage utilization and effects; forage preference of animals; control means to obtain proper utilization. Special field trips will be arranged.

133. Grassland Ecology. (3) II. Mr. Heady
Prerequisite: Forestry 103.
Composition, structure, development, and habitat factors of the native North American grasslands. Principles of grassland management for forage production.

199. Special Study for Advanced Undergraduates. (1-5) I and II. Mr. Biswell, Mr. Heady
Prerequisite: senior standing and consent of the instructor.

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

201A–201B. Seminar in Range Management. (2-2) Yr.
201A is not prerequisite to 201B. Mr. Biswell, Mr. Heady
201A. Mr. Biswell; 201B. Mr. Heady.

299. Research in Range Management. (1-6) I and II.
(Formerly numbered 200A–200B.) Mr. Heady, Mr. Biswell

ROMANCE PHILOLOGY

Francis J. Carmody, Ph.D., Professor of French.
Yakov Malkiel, Ph.D., Professor of Romance Philology.
Manfred M. G. Sandmann, Ph.D., Professor of French and Romance Philology.
Aldo D. Scaglione, Dottore in Lettere, Associate Professor of Italian.
Ronald N. Walpole, Ph.D., Professor of French.

Graduate Adviser: Mr. Malkiel.
200. Linguistic History of the Roman Empire. (2) I. Mr. Malkiel
The external history of the spread of Latin over the Western Mediterranean area, its gradual diversification, and change into the Romance dialects, with emphasis on substrata and superstrata.

201. Late Latin Language and Literature. (2) I. Mr. Sandmann
The internal history of colloquial Latin and Late Latin, down to the Carolingian period, on the basis of original sources.

*202. General Romance Linguistics. (2) II. Mr. Malkiel
Prerequisite: graduate standing and undergraduate major in languages. Problems of methodology in historical linguistic reconstruction, applied to the major and minor Romance languages.

*203A—203B. Old Provençal. (2—2) Yr. Mr. Walpole
An introductory study of Old Provençal language and literature, with emphasis on the form and content of the different literary genres and on questions of cultural origins and influences.

204. Humanistic Literature in Latin. (1) II. Mr. Scaglione
Prerequisite: a working knowledge of Latin and consent of the instructor. A study of the growth of Humanism through the reading and interpretation of selected Latin texts, from Alcuin to Erasmus.

205. Romance Dialect Geography. (2) II. Mr. Malkiel
Methods of interpreting maps and linguistic atlases (with special reference to Romance-speaking countries) and of using them as a basis for various types of dialectological studies.

206. Medieval Latin and Romance Learning. (2) II. Mr. Carmody
Prerequisite: consent of the instructor. Interpretation of original texts in Latin, Old French, and Old Spanish, and the cultural problems involved in their transmission.

207. Peninsular Spanish Dialectology. (1) II.
Prerequisite: graduate standing and consent of the instructor. Problems and methods in the study of the Spanish linguistic areas, in diachronic and synchronic projection. Historical and structural factors determining dialectal fragmentation.

299. Special Advanced Study. (1—4) I and II.
Mr. Carmody, Mr. Malkiel, Mr. Sandmann, Mr. Scaglione, Mr. Walpole

RELATED COURSES IN OTHER DEPARTMENTS
Principles of Descriptive and Historical Linguistics (Linguistics 100).
Phonetics and Phonemics (Linguistics 130).
Introduction to Indo-European Comparative Grammar (Linguistics 150).
Gothic (German *265).
The Age of Chaucer (English 155).
Dante’s Divina Commedia (Italian 109A—109B).
A History of the Spanish Lexicon (Spanish 131).
The Ballad (Spanish *208A—208B).
Old Spanish (Spanish 212A—212B).
Historical French Grammar (French 201A—201B).
Studies in Medieval French Literature (French *202A—202B).
Reading and Interpretation of Typical Old French Texts (French 206A—206B).
The Medieval Mind (English 220A—220B).

* Not to be given, 1960—1961.
SCANDINAVIAN

(Department Office, 1218 Dwinelle Hall)

Assar Götrak Janzén, Ph.D., Professor of Scandinavian.
Håkon Hamre, C.phil., Associate Professor of Scandinavian (Chairman of the Department).
^Eric O. Johannesson, Ph.D., Assistant Professor of Scandinavian.
†Børge G. Madsen, Ph.D., Assistant Professor of Scandinavian.

Letters and Science List.—All undergraduate courses in Scandinavian are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Adviser: Mr. Janzén.

The Major.—16 units from the lower division course sequences 1A–1B, 3A–3B, 4A–4B, 11A–11B, 13A–13B, 14A–14B; or the equivalent. Twenty-four units of upper division courses, including at least 6 units made up from courses 101A–101B, 103A–103B, 104A–104B, 111, 113, 114. Six of the 24 units may be in related work in other departments.

Honors.—Students must have completed with distinction the course outlined for the major as well as two semesters of course H195. A thesis is also required. Students should consult the major adviser.

LOWER DIVISION COURSES

1A–1B. Elementary Swedish. (4–4) Yr. Beginning each semester.
1. Elementary grammar, reading of easy prose. Mr. Janzén (in charge)
2. Elementary grammar, reading, conversation, composition.

3A–3B. Elementary Norwegian. (4–4) Yr. Beginning each semester.
3. Elementary grammar, reading of easy prose. Mr. Hamre (in charge)

4A–4B. Elementary Danish. (4–4) Yr. Mr. Madsen (in charge), Mr. Hamre
4. Elementary grammar, reading of easy prose. Mr. Hamre.
5. Elementary grammar, reading, conversation, composition. Mr. Madsen.

11A–11B. Intermediate Swedish. (4–4) Yr. Mr. Johannesson, Mr. Janzén
Prerequisite: course 1A–1B or the equivalent.
Intermediate grammar, extensive reading, conversation, composition.

13A–13B. Intermediate Norwegian. (4–4) Yr. Mr. Hamre (in charge)
Prerequisite: course 3A–3B or the equivalent.
Intermediate grammar, extensive reading, conversation, composition.

14A–14B. Intermediate Danish. (4–4) Yr.
Prerequisite: course 4A–4B or the equivalent.
Intermediate grammar, extensive reading, conversation, composition.

\ In residence fall semester only, 1960–1961.
UPPER DIVISION COURSES

A. Language Courses

101A–101B. Advanced Swedish. (3–3) Yr. Mr. Janzen
Prerequisite: course 11A–11B or the equivalent.
Advanced grammar, with emphasis on syntax and phraseology, reading, conversation, composition.

103A–103B. Advanced Norwegian. (3–3) Yr. Mr. Hamre
Prerequisite: course 13A–13B or the equivalent.
Advanced grammar, with emphasis on syntax and phraseology, reading, conversation, composition.

*104A–104B. Advanced Danish. (3–3) Yr. Mr. Madsen
Prerequisite: course 14A–14B or the equivalent.
Advanced grammar, with emphasis on syntax and phraseology, reading, conversation, composition.

*111. Swedish Poets of the Nineteenth Century. (1) II. Mr. Janzen
Prerequisite: a reading knowledge of Swedish.

*113. Romanticism in Norway. (1) II. Mr. Hamre
Prerequisite: a reading knowledge of Norwegian.

*114. Holberg and Oehlenschläger. (1) II. Mr. Madsen
Prerequisite: a reading knowledge of Danish.

H195. Special Study for Honors Candidates. (1–3) I and II. The Staff
Prerequisite: at least two years of one of the Scandinavian languages.
Advanced reading and interpretation of Modern Scandinavian texts.

198. Directed Group Study for Advanced Undergraduates. (1–3) I and II. The Staff (Mr. Janzen in charge)
Prerequisite: at least two years of one of the Scandinavian languages.
Advanced reading and interpretation of Modern Scandinavian texts.

199. Special Study for Advanced Undergraduates. (1–3) I and II. The Staff (Mr. Janzen in charge)

B. Courses on Scandinavian Literature

Courses listed below require only a knowledge of English. They are open to students with at least junior standing and, with the consent of the instructor, to properly qualified students with sophomore standing.

100A–100B–*100C. History of Scandinavian Literature. Mr. Janzen, Mr. Madsen, Mr. Johannesson
Survey course: reading of selected works of Danish, Norwegian, and Swedish literature in translation; lectures.
100A. From 1300 to 1850. (3) II. Mr. Janzen
100B. From 1850 to World War I. (3) II. Mr. Madsen
*100C. From World War I to the present. (3) I. Mr. Johannesson

106. History of Scandinavian Drama up to 1900. (2) I. Mr. Hamre
Reading of Danish, Norwegian, and Swedish plays in translation; discussions; lectures on the development of the drama.

107. The Plays of Ibsen. (3) I. Mr. Janzen
Reading and discussion of Ibsen’s most important plays; lectures.

108. Strindberg and His Writings. (3) II. Mr. Janzen
Reading and discussion of the most important of Strindberg’s works in connection with his biography; lectures.

109. Scandinavian Drama of the Twentieth Century. (2) II. Mr. Hamre
Reading of modern Scandinavian dramas in translation; discussions; lectures.

120A--120B. The Novel in Scandinavia. (3--3) Yr. Mr. Johannesson
Course 120A is not prerequisite to 120B.
Reading and discussion of great Scandinavian novels; lectures on the development of the novel.

125. Masterpieces of Old Norse Literature. (3) I. Mr. Janzen
Reading and discussion of some of the sagas and representative selections from the Eddas and the Scaldic songs; lectures on Scandinavian literature in the Middle Ages.

*175. Kierkegaard. (3) II. Mr. Johannesson
Prerequisite: good background in literature or philosophy.
Analysis of Kierkegaard the man, the writer, the thinker and his influence on European writers to the present day.

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 18)
Prerequisite: for the literary courses, courses 100A--100B, 125. Compulsory courses for all graduate study: 206, and at least one semester of seminar work. For advanced study in Scandinavian literature, a general acquaintance with Scandinavian history is strongly advised. For advanced linguistic work, introductory courses to General Linguistics, Indo-European Comparative Grammar, and Germanic Linguistics are highly recommended. For doctoral study in linguistics, Gothic (German 265) is required and knowledge of German is indispensable.

A. Language Courses

*201. Old Swedish. (3) II. Mr. Janzen
Phonology, historical grammar, texts.

*203. Old Icelandic. (3) I. Mr. Beeler
Descriptive and historical phonology and grammar; texts. Some attention is given to Old Norwegian.

206A--206B. Readings of Old Icelandic Sagas. (2--2) Yr. Mr. Hamre
206A is not prerequisite to 206B.
206A: I.
206B: II.
One of the longer or two of the shorter Old Icelandic sagas will normally be read in each course.

208. The Poems of the Poetic Edda. (3) II. Mr. Hamre
Reading of some more important poems with emphasis on the mythological songs.

*215. Scandinavian Dialects. (2) II. Mr. Hamre
A survey of the Scandinavian dialects with special reference to their relation to the standard languages of the different countries.

*250. Seminar in Scandinavian Linguistics. (2) II. Mr. Hamre
Conference work on chosen or assigned topics; at least one shorter paper a semester is normally required.

* Not to be given, 1960--1961.
B. Literature Courses

*230. Scandinavian Literature, 1200–1800. (2) I.  
Mr. Madsen  
Reading and analysis of representative works; lectures.

*231. Romanticism in Scandinavia. (2) II.  
Mr. Madsen  
Reading and analysis of representative works; lectures.

(2) I.  
Mr. Johannesson  
Reading and analysis of representative works; lectures.

233. Scandinavian Literature of the 20th Century. (2) I.  
Mr. Johannesson  
Reading and analysis of representative works; lectures.

251. Seminar in Scandinavian Literature. (2) I and II.  
Mr. Johannesson, Mr. Madsen  
Prerequisite: courses 100B, 100C and at least one of the following courses: 106, 109, 125.

A. Georg Brandes and Scandinavian Literature. I. Mr. Madsen.  
B. Problems in the Twentieth-Century Scandinavian Novel. I.  
Mr. Johannesson.

C. Twentieth-Century Danish Drama. II. Mr. Madsen.  
D. Problems in the Nineteenth-Century Scandinavian Novel. II.  
Mr. Johannesson.

E. H. C. Anderson, His Life and Work. I or II. Mr. Madsen.  
F. Eighteenth-Century Literature. I or II. Mr. Johannesson.

298. Special Study for Graduate Students. (1–4) I and II.  
The Staff (Mr. Johannesson in charge)

RELATED COURSES IN OTHER DEPARTMENTS

The Symbolist Movement in European Literature (Comparative Literature 201A*-201B).

The Theater in Western Civilization (Dramatic Art *140A–140B).  
The Novel in Western Civilization (English 125B).  
British and American Drama from 1850 to the Present (English 114C).  
Early German Romanticism, 1795–1810 (German *228).  
German Realism, 1850–1900 (German *238).  
Germanic Linguistics (German *260).  
Gothic (German *265).  
Principles of Descriptive and Historical Linguistics (Linguistics 100).  
Introduction to Indo-European Comparative Grammar (Linguistics 150).

SLAVIC LANGUAGES AND LITERATURES

(Department Office, 5416 Dwinelle Hall)

Gleb Struve, A.B., Professor of Slavic Languages and Literatures.  
Francis J. Whitfield, Ph.D., Professor of Slavic Languages and Literatures (Chairman of the Department).  
Waclaw Lednicki, Ph.D., Professor of Slavic Languages and Literatures, Emeritus.  
Oleg A. Maslenikov, Ph.D., Associate Professor of Slavic Languages and Literatures.  
†Lawrence L. Thomas, Ph.D., Associate Professor of Slavic Languages and Literatures.

Slavic Languages and Literatures

Michael Samilov, Ph.D., Assistant Professor of Slavic Languages and Literatures.
Emil Kovtun, M.A., Acting Assistant Professor of Slavic Languages and Literatures.
Olga Astromoff, M.A., Associate in Russian.
Michael K. Pawlikowski, LL.M., Associate in Polish and Russian.
Harold J. Terrill, Jr., M.A., Associate in Russian.
Lottie W. Salz, M.A., Associate in Czech.

Andrew O. Jászi, Ph.D., Associate Professor of German.
Serge Kassatkin, M.A., Lecturer in Russian.
Jadwiga Maurer, Ph.D., Lecturer in Polish.
Ludmilla A. Patrick, M.A., Lecturer in Russian.

Letters and Science List.—All undergraduate courses in this department are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Adviser: Mr. Kovtun.

The Major.—Required: courses 1, 2, 130, 140 and 198; in addition, 12 units in upper division language courses (not including course 100) and 5 units in upper division lecture courses in Slavic literatures, and the passing of a comprehensive examination.

Honors.—In addition to satisfying the requirements for the major, candidates for honors must take 3 units in an upper division course in the language of specialization (not including courses 100, 105, 119, or 120) and 3 units of advanced, independent study (course 199) of the literature of specialization. Honors candidates will be required to answer special questions on the comprehensive examination.

Lower Division Courses

1. Elementary Russian. Beginners' Course. (4) I and II.
   Mr. Terrill (in charge)
   Two lectures and three recitation hours per week.
   The conversation course of corresponding level is 18A.

2. Elementary Russian (continuation of 1). (4) I and II.
   Two lectures and three recitation hours per week. Prerequisite: course 1.
   The conversation course of corresponding level is 18B.

3. Intermediate Russian. (4) I and II.
   Mr. Pawlikowski (in charge)
   Three lectures and two recitation hours per week. Prerequisite: course 2.
   Reading, composition, translation. The conversation course of corresponding level is 19.

*5A–5B. Elementary Ukrainian. (3–3) Yr. Mr. Thomas

*6A–6B. Elementary Polish. (3–3) Yr. Mr. Thomas, Mr. Whitfield

*10A–10B. Elementary Serbo-Croatian. (3–3) Yr. Mr. Samilov

*12A–12B. Elementary Bulgarian. (3–3) Yr. Mr. Whitfield

14A–14B. Elementary Czech. (3–3) Yr. Mrs. Salz

18A. Elementary Russian Conversation. (2) I and II. Mrs. Astromoff
   Open only to students who are taking course 1.

18B. Elementary Russian Conversation. (2) I and II. Mrs. Astromoff
Open only to students who are taking course 2.

19. Intermediate Russian Conversation. (2) I and II. Mr. Pawlikowski, Mrs. Patrick
Open only to students who are taking course 3.

21. Elementary Russian. Intensive Course. (8) I. Mr. Kassatkin
Classes meet for two hours, five days per week.

22. Intermediate Russian. Intensive Course. (8) II. Mr. Kassatkin
Prerequisite: course 2 or 21.
Classes meet for two hours, five days per week.

23. Elementary Polish. Intensive Course. (8) I. Mr. Whitfield, —-
Classes meet for two hours, five days per week.

24. Intermediate Polish. Intensive Course. (8) II. Mr. Whitfield, —-
Prerequisite: course 23.
Classes meet for two hours, five days per week.

25. Elementary Serbo-Croatian. Intensive Course. (8) I. Mr. Samilov
Classes meet for two hours, five days per week.

26. Intermediate Serbo-Croatian. Intensive Course. (8) II. Mr. Samilov
Prerequisite: course 25.
Classes meet for two hours, five days per week.

39. Great Writers of Russian Literature. (3) I. Mr. Maslenikov
No knowledge of Russian is required.

**Upper Division Courses**

**A. Language Courses**

100. Specialized Russian Reading. (3) I and II. (Formerly numbered 125.)
Prerequisite: course 3 or consent of the instructor.
Rapid reading of texts in the natural and social sciences.

102. Intensive Russian Reading, Grammar, and Composition. (3) II.
Prerequisite: course 3. Mr. Maslenikov
The conversation course of corresponding level is 119.

103A–103B. Advanced Russian. (3–3) Yr. Mrs. Patrick
Prerequisite: course 102.
The conversation course of corresponding level is 120.

104. Russian Composition. (3) I. Mr. Struve
Prerequisite: course 103B.

105. Written Translation from Slavic Languages. (1–3) I and II.
The Staff (Mr. Whitfield in charge)
May be taken only in combination with some other advanced course in
Slavic languages.

*107A–107B. Intensive Polish Reading, Grammar, and Composition. (3–3)
Yr.
Prerequisite: course 6B. Mr. Pawlikowski

108. Advanced Studies in Polish Grammar. (3) II. Mrs. Maurer
Prerequisite: course 107B.

*111A–111B. Intensive Serbo-Croatian Reading, Grammar, and Composition. (3–3) Yr. Mr. Samilov
Prerequisite: course 10B.

*112. Advanced Studies in Serbo-Croatian Grammar. (3) I. Mr. Samilov
Prerequisite: course 111B.

115A–115B. Intensive Czech Reading, Grammar, and Composition. (3–3) Yr. Mrs. Salz
Prerequisite: course 14B.

*116. Advanced Studies in Czech Grammar. (3) I. Mr. Kovtun
Prerequisite: course 115B.

119. Advanced Russian Conversation. (2) II. Mr. Pawlikowski
Open only to students who are taking course 102.

120. Advanced Russian Conversation (continuation of 119). (2) I. Mrs. Patrick
Open only to students who are taking course 103.

124. Advanced Russian Composition. (3) II. Mrs. Patrick
Prerequisite: course 104.

198. Group Conference and Assigned Reading. (2) I and II. The Staff (Mr. Whitfield in charge)
Intended as preparation for the comprehensive examination.

199. Special Study for Advanced Undergraduates. (1–5) I and II. The Staff (Mr. Whitfield in charge)

B. Lecture Courses on Slavic Literatures

Except where otherwise indicated, these courses are given in English and require no knowledge of any other language. They are open to all students of at least junior standing and, with the consent of the instructor, to properly qualified sophomores.

130. Introduction to Russian Literature. (3) I. Mr. Struve
Survey of Russian literature and intellectual trends.

*131. Russian Literature (1880–1917). (3) II. Mr. Maslenikov
Garshin, Chekhov, Gorky, Andreev, Bunin, Kuprin, Korolenko, the Symbolists, and others.

132. Russian Literature since 1917. (2) II. Mr. Struve

133A. Russian Novelists of the Nineteenth Century and Western European Literatures. (3) I.
Emphasis will be placed on the influence of western European literatures on the development of the Russian novel. Tolstoy and Dostoevsky are not included.

133C. Dostoevsky. (3) II. Mr. Maslenikov

133D. Tolstoy. (3) II.

133E. Turgenev. (2) I.

133F. Chekhov. (2) II.

134. Russian Folklore. (2) I. Mrs. Patrick

*135. The Russian Drama. (2) I. Mrs. Patrick
Survey of Russian drama from the seventeenth century to the twentieth.

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>140</td>
<td>Survey of Slavic Literatures. (3) II.</td>
<td>Mr. Kovtun</td>
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<tr>
<td>143</td>
<td>Introduction to Modern Slavic Literary Theory. (2) II.</td>
<td>Mr. Kovtun</td>
</tr>
<tr>
<td>151</td>
<td>Polish Literature: Sixteenth–Eighteenth Centuries. (3) II.</td>
<td>Mrs. Maurer</td>
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<tr>
<td>152</td>
<td>Polish Literature of the Nineteenth Century. (2) I.</td>
<td>Mrs. Maurer</td>
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<td>155</td>
<td>Mickiewicz. (2) I.</td>
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<tr>
<td>160</td>
<td>Survey of Czech and Slovak Literature. (2) I.</td>
<td>Mr. Kovtun</td>
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<tr>
<td>161</td>
<td>Czech and Slovak Literature of the Nineteenth Century. (2) II.</td>
<td>Mr. Kovtun</td>
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<tr>
<td>170</td>
<td>Survey of South Slavic Literatures. (2) I.</td>
<td>Mr. Samilov</td>
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<td>175–180A</td>
<td>Survey of Russian Culture. (2–2) Yr.</td>
<td>Mr. Struve</td>
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<tr>
<td>180B</td>
<td>Development of Russian material, social, and spiritual culture since the beginning of the nineteenth century and its features before and after the Revolution.</td>
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<tr>
<td>182</td>
<td>History of Polish Culture. (2) I.</td>
<td>Mrs. Maurer</td>
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<td>187</td>
<td>Russian Poetry. (2) II.</td>
<td>Mr. Struve</td>
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<td>188</td>
<td>The Slavic-Speaking World. (3) I.</td>
<td>Mr. Kovtun</td>
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**GRADUATE COURSES**

**Language Courses**

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>220</td>
<td>Seminar in Comparative Slavic Linguistics. (2) II.</td>
<td>Mr. Samilov</td>
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<td>224</td>
<td>Old Church Slavic. (3) I.</td>
<td>Mr. Whitfield</td>
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<tr>
<td>226</td>
<td>Seminar in Russian Linguistics. (2) I and II.</td>
<td>Mr. Maslenikov</td>
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Literature Courses

235. Seminar in Russian Literature. (2) I and II. Mr. Struve
Advanced studies, according to the needs of the students enrolled, in the
history of the Russian literary language, eighteenth-century Russian litera­
ture, post-Revolutionary Russian literature, and the Russian critics.

237. Seminar in Early Russian Literature. (2) II. Mr. Maslenikov

240. Seminar in Russian Poetry and Fiction, 1800–1880. (2) II.
The subject matter of the course will vary according to the needs and
interests of the students enrolled.

248. Seminar in Russian Poetry and Fiction, 1880–1917. (2) I.
Mr. Maslenikov

285. Russian Prose. (2) I.
Lecture course given in Russian.

288. Seminar in Polish Literature. (2) I.

289. Seminar in South Slavic Literature. (2) I. Mr. Samilov

290. Seminar in Czech and Slovak Literature. (2) II. Mr. Kovtun

298. Individual Work. (1–4) I and II. The Staff (Mr. Whitfield in charge)
Graduate students will be offered opportunities for independent reading
and study. Credit will be assigned according to the amount of work done.

Scientific Russian for Graduate Students. First Course. (No credit) I.
Mr. Kovtun
A course designed to prepare students for graduate reading examinations
in the sciences.

Scientific Russian for Graduate Students. Second Course. (No credit) II.
Prerequisite: first course. Mr. Whitfield
A course designed to prepare students for graduate reading examinations
in the sciences.

SOCIAL SCIENCE
(Office, 220 Wheeler Hall)

* Lewis S. Feuer, Ph.D., Professor of Philosophy and Social Science.
Eugene L. Burdick, Ph.D., Associate Professor of Political Science.
William Petersen, Ph.D., Associate Professor of Sociology and Social Insti­tu­tions.
Ralph C. Beals, M.A., Associate in Social Science.
Sam Haber, M.A., Associate in Social Science.
Arthur S. Lipow, A.B., Associate in Social Science.
Peter J. Loewenberg, M.A., Associate in Social Science.
Thomas R. Morrison, A.B., Associate in Social Science.

Cesar Grana, Ph.D., Visiting Assistant Professor of Sociology and Social
Science.

Letters and Science List.—Course 1A–1B is included in the Letters and
Science List of Courses. For regulations governing this list, see page 11.

** In residence spring semester only, 1960–1961.
1A–1B. Introduction to Social Science. (3–3) Yr.

The Staff (Mr. Feuer in charge)

Two lectures and two discussion sections per week.

Basic theories, concepts, and findings of the social sciences with reference to underlying questions of policy. Among problems to be considered are class structure, economic stability and growth, racial relations, democratic process, and cultural change among peoples of underdeveloped areas.

**SOCIAL WELFARE**

(Department Office, 222 Building T-1)

Milton Chernin, Ph.D., Professor of Social Welfare (Chairman of the Department).

†Gordon Hearn, Ph.D., Professor of Social Welfare.

*Henry S. Maas, Ph.D., Professor of Social Welfare.

Davis McEntire, Ph.D., Professor of Social Welfare.

*Maurine McKeany, Ph.D., Professor of Social Welfare.

†Gertrude Wilson, M.A., Professor of Social Welfare.

Walter Friedlander, Ph.D., Professor of Social Welfare, Emeritus.

Ruth Cooper, D.S.W., Associate Professor of Social Welfare.

George A. De Vos, Ph.D., Associate Professor of Social Welfare.

Ernest Greenwood, Ph.D., Associate Professor of Social Welfare.

Margaret S. Schubert, Ph.D., Associate Professor of Social Welfare.

Kermit T. Wiltse, D.S.W., Associate Professor of Social Welfare.

Martin Wolins, D.S.W., Associate Professor of Social Welfare.

Irving P. Babow, Ph.D., Acting Assistant Professor of Social Welfare.

Joseph S. Briar, M.S.W., Assistant Professor of Social Welfare.

Irving M. Piliavin, M.S.W., Acting Assistant Professor of Social Welfare.

Absence: Milton Chernin.


Florence D. Clemenger, M.S.W., Lecturer in Social Welfare and Field Work Consultant.

Sally Dewees, M.S., Lecturer in Social Welfare.

Margaret Gordon, Ph.D., Lecturer in Social Welfare.


Herbert Maecoby, Ph.D., Lecturer in Social Welfare.

Anna Maenchen, Ph.D., Lecturer in Social Welfare.


Sheldon Margen, M.D., Lecturer in Social Welfare.

Charles O'Shea, M.S.W., Lecturer in Social Welfare and Field Work Consultant.

Elizabeth E. Pfeiffer, M.S.W., Lecturer in Social Welfare and Field Work Consultant.

Ralph H. Potter, Jr., M.D., Lecturer in Social Welfare.

Margaret E. Purvine, M.S.W., Lecturer in Social Welfare and Field Work Consultant, in Charge of Admissions.

Lydia Rapoport, M.S.S., Lecturer in Social Welfare and Coordinator of Field Work.

William L. Rowe, A.B., Lecturer in Social Welfare.

Mary A. Sarvis, M.D., Lecturer in Social Welfare.

† In residence fall semester only, 1960–1961.
The School of Social Welfare offers two graduate programs: a two-year curriculum, based upon the bachelor's degree, leading to the degree Master of Social Welfare; and a program of advanced study and research, based upon the Master of Social Welfare degree, leading to the degree Doctor of Social Welfare. For information regarding admission to and requirements prescribed for the graduate programs, see the ANNOUNCEMENT OF THE SCHOOL OF SOCIAL WELFARE.

The department administers the group major in social welfare (in the College of Letters and Science), a preprofessional preparatory program, which is described in the CIRCULAR OF INFORMATION.

Letters and Science List.—Courses 100, 106, and 110A–110B are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

UPPER DIVISION COURSES

100. The Field of Social Welfare. (3) I and II. Mr. Chernin
   Not open to students who are taking or have completed course 110A–110B.
   A survey of the field of social welfare and social work functions. The rise of modern social work and the distinctive techniques of the social work profession. Designed to acquaint undergraduates and nonprofessional students with the field of social welfare.

102. Methods in Social Work. (3) I and II. Mr. O'Shea
   Prerequisite: for students in the social welfare major, senior standing and course 110A (may be taken concurrently); others, course 110A (may be taken concurrently) or course 100, and consent of the instructor.
   An introduction to social work methods, including social case work, social group work, and community organization for social welfare. Designed to acquaint students with the basic philosophy, concepts, and applications of these methods. Observational visits to social agencies and institutions will be arranged.
*106. Community. (2) II.
The concept of community; the major institutions of the modern community; community surveys in the United States; how to study the community; the sociological background of "community organization."

110A–110B. The Social Services. (3–3) Yr. Mr. Piliavin
Course 110A is prerequisite to 110B.
110A. Basic concepts of the social services; history of their development in England and the United States from the British Poor Law to the present.
110B. Present system of social services in the United States. Problems of organization and administration of public assistance, child welfare, medical care, mental hygiene, corrections, veterans' services, and social insurance.

*198. Group Study for Advanced Undergraduates. (1–3) I and II.
The Staff (--------- in charge)
Prerequisite: upper division standing and consent of the instructor.

199. Special Study for Advanced Undergraduates. (1–3) I and II.
The Staff (Mr. Piliavin in charge)
Prerequisite: senior standing and approval of the major adviser.
Individual readings, research, and conferences with the instructor in a field chosen by the student with approval of the instructor.

GRADUATE AND PROFESSIONAL COURSES
These courses are intended primarily for students enrolled in the graduate program of the department, and are limited to such students except by permission of the department.

201. Law and Social Welfare. (1) I. Mrs. Taylor
Legal information for social workers; the sources of California laws. The courts of California; fundamentals of law governing domestic relations, neglected and dependent children, delinquents, landlord and tenant, etc.; problems of legal procedure.

202A–202B. Social Case Work. (2–2) Yr.
Miss Alexander, Miss Cooper, Mrs. Dewees, Miss Pfeiffer, Mrs. Schubert
Introduction to the theory and practice of social case work.

203. Community Organization. (2) I and II. Mr. Wolins, Mr. Maldonado
A study of the social resources of the community and of methods of organizing these resources for the meeting of human needs.

205A–205B. Growth and Change of the Individual. (2–2) Yr.
Mr. De Vos (in charge), Mr. Margen, Mrs. Oswald, Mr. Potter, Mr. Rowe, Mrs. Stewart, Mr. Zimmerman
Basic facts, theories, and problems in the physiological, psychological, and social development of the individual, with emphasis on adaption to stress, as related to social welfare.

207. Social Welfare Organization. (2) II. Mrs. Taylor, Mr. Wiltse
Major concepts of organization and administrative relationships in the public and private social welfare programs.

208. Social Welfare and Income Maintenance. (2) I.
Mr. McEntire, Miss McKeany
Critical and evaluative study of social welfare policies, methods, problems, and issues in the use of public assistance and social insurance programs to maintain income.

209. Theory of Group Development. (2) I. Mr. Hearn
The scientific bases of group behavior with emphasis on understanding the universal properties of groups. Open to graduate students in other departments.

*252. Public Welfare Administration. (2) I. 
The administrative process within the public welfare agency. Problems of administration.

253. Family and Child Welfare Service. (2) I. Mr. Wiltse
The development, organization, and administration of specific family and child welfare services, including family and marital counseling, and programs for the care and protection of dependent and neglected children.

254. Medical Social Work. (1) II. Miss Hoodwin, Miss Rapoport
The development, organization, and administration of medical social service functions in institutional and extramural settings including public health.

257A–257B. The Treatment of Delinquency. (2–2) Yr. Mr. Chernin, Mr. Piliavin
257A. Institutional treatment; history and development of penal and correctional institutions for adults and juveniles; theories and programs of treatment; organization and administration of correctional services.
257B. Noninstitutional treatment, probation, and parole; theory and development of probation, parole, and the indeterminate sentence; the organization and administration of parole and probation services.

258A–258B. Advanced Social Case Work. (2–2) Yr. Mr. Briar, Miss Cooper, Mrs. Dewees, Mr. O'Shea, Miss Pfeiffer, Miss Rapoport, Mr. Wiltse
258A. Assignment to sections according to field work placement as follows: corrections; family and child welfare; medical; psychiatric. Emphasis on particular knowledge required in social case work practice in these settings, including organization and administrative structure.
258B. Each section includes students from all settings; emphasis on common elements of social case work practice.

*259. Principles and Methods of Supervision in Social Welfare. (2) II.
Prerequisite: completion of one year of education in a recognized school of social work, including a case work or group work and field work sequence. Educational and psychological principles involved in supervision; purposes, possibilities, and current practices of supervision in social agencies; critical evaluation of supervising case material drawn from present practice.

262. Psychiatry and Social Work. (2) I. Miss Sarvis, Mr. Simon
The diagnosis and treatment of the psychoneuroses, neuroses, psychoses, and mental deficiencies, and their social implications. Various schools of psychiatric thought.

265. Social Welfare Research. (2) I and II. Mr. Greenwood
Prerequisite: Economics 2 or Psychology 5 or the equivalent. Fields and methods of social welfare research; techniques of collecting data; analytical methods.

266. Psychoanalysis and Social Work. (2) II. Mrs. Maenchen, Miss Sarvis
The contribution of psychoanalytic theory to social work.

280. Group Method in Social Work. (2) II. Mrs. Clemenger, Mr. Hearn
Underlying concepts, principles, and techniques of social work methods with groups. Application to groups served by agencies in all fields of social work practice.

281A–281B. Social Group Work. (2–2) Yr. Mrs. Clemenger
  Introduction to the theory and practice of social group work.

282A–282B. Advanced Social Group Work. (2–2) Yr. Miss Wilson
  282A. Advanced analysis of social group work theory and practice; social
  group work practice in secondary settings.
  282B. Administrative aspects of social group work practice.

283. Group Process in Professional Practice. (2) II. Mr. Hearn
  (Formerly numbered 280.)
  Prerequisite: for social welfare students, course 280.
  Theory of group action and leadership essential in the development of
  competence to participate in professional groups. Open to graduate students
  in other departments.

*291. International Social Services. (2) I.
  An examination of the international social agencies and their activities.
  Comparative analysis of the development and main characteristics of the system
  of public and private social services in selected foreign countries.

*292. Cultural and Social Aspects of Social Welfare Practice. (2) II.
  Prerequisite: open to graduate students in any school or department whose
  interest and research is concerned with such problems, and who have consent
  of the instructor.
  Intensive survey of the relationships of diverse social and cultural back­
  grounds of groups (ethnic, racial, religious, class, caste) in the United States
  to the problems and practice of professional social work.

295A–295B. Seminar in Social Research. (2–2) Yr. Mr. Greenwood
  Advanced study of the logic, method, technique, design and organization
  of social research, with special reference to social welfare and social work.

296A–296B. Social Work Practice in Public Health. (2–2) Yr. Miss Hoodwin
  Limited to graduate social workers admitted to the intern year and medical
  social workers employed in public health.
  Theory, problems, and practice of social work in the field of public health.

297. Special Studies. (1–6) I and II.
  The Staff (Mr. Chernin in charge), Mr. De Vos
  Individual or group study, with emphasis on original research, as may be
  arranged.

298. Special Research. (2) I and II.
  Mr. Babow, Mr. Briar, Mr. De Vos, Mr. Maccoby, Mr. Piliavin,
  Miss Rapoport, Mr. Rowe, Mrs. Schubert, Mr. Wiltse, Mr. Wolins
  Open to candidates for the degree of Master of Social Welfare who have
  completed course 265 or the equivalent.
  Group research on selected problems in social welfare.

401. Field Work. (2-12) I and II.

Miss Pettes (in charge), Miss Alexander, Miss Barber, Mr. Bauer, Miss Bland, Mr. Briar, Mrs. Clemenger, Mrs. Cole, Miss Cooper, Mrs. Ferguson, Miss Godfrey, Mr. Hearn, Mr. Jennings, Mr. Kramer, Mrs. Mounts, Mr. O'Shea, Mrs. Oswald, Mrs. Panaccio, Miss Pfeiffer, Miss Rapoport, Mrs. Schubert, Mrs. Stewart, Miss Watt, Miss Wilson

Field work in social agencies under supervision, as prescribed and arranged by the staff. The normal program for first-year students is 400 hours of supervised work (two days per week during two semesters), for which 8 units of credit are granted; for less work, proportionately less credit is allowed. For second-year students, advanced field practice in specialized types of social work, to be offered two or three days a week during each semester, or to be arranged in periods of continuous work, is normally required. Field work arrangements vary in extent and credit in accordance with the needs of individual students.

404. Internship in Social Work Practice in Public Health. (6-10) I and II.

Miss Hoodwin (in charge), Miss Boggs

Limited to graduate social workers admitted to the intern year. Supervised social work practice in public health departments four or five days a week during an eleven-month period.

410A-410B. Program Media in Social Group Work. (1-1) Yr.

Mrs. Clemenger

The development of diagnostic skill in the use of program media in social group work programs in various settings; practice as necessary.

*Conference on Social Welfare. (No credit) I and II.

The Staff (— in charge)

Lectures and discussion on current problems in social welfare by members of the staff and by visitors.

SOCIOLGY AND SOCIAL INSTITUTIONS

(Department Office, 206 South Hall)

Reinhard Bendix, Ph.D., Professor of Sociology and Social Institutions (Chairman of the Department).

Herbert Blumer, Ph.D., Professor of Sociology and Social Institutions, and Director, Institute of Social Sciences.

Kingsley Davis, Ph.D., Professor of Sociology and Social Institutions.

Wolfran Eberhard, Ph.D., Professor of Sociology and Social Institutions.

Charles Y. Glock, Ph.D., Professor of Sociology and Social Institutions, and Director, Survey Research Center.

Seymour M. Lipset, Ph.D., Professor of Sociology and Social Institutions.

Leo Lowenthal, Ph.D., Professor of Sociology and Social Institutions, and Professor of Speech.

Philip Selznick, Ph.D., Professor of Sociology and Social Institutions.

Margaret T. Hodgen, Ph.D., Professor of Sociology and Social Institutions, Emeritus.

Kenneth E. Bock, Ph.D., Associate Professor of Sociology and Social Institutions (Vice-Chairman of the Department).

Erving Goffman, Ph.D., Associate Professor of Sociology and Social Institutions.

William Petersen, Ph.D., Associate Professor of Sociology and Social Institutions.

* Not to be given, 1960-1961.
‡ In residence spring semester only, 1960-1961.
Letters and Science List.—All undergraduate courses in this department are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Nicholls (fall); Mr. Goffman (spring).

The Major.—Candidates' programs must be submitted to a departmental adviser for approval. The department will certify to the completion of the major program for graduation upon fulfillment of the following requirements: completion of the following courses in sociology: 1 or 108, 30, 40, 105, 109, and 141, plus 15 units from other courses within the department. Recommended: Anthropology 2A–2B, Economics 1A–1B, History 4A–4B, Philosophy 20A–20B, Psychology 1A–1B, Social Science 1A–1B.

Honors Program.—Majors who enter their senior year with an over-all B average are invited to join the departmental Honors program.

1. Man and Society. (3) I and II.
   Mr. Kornhauser, Mr. Bendix, Mr. Matza, Mr. Cohen, Mr. Alford
   Two lectures and one weekly discussion section to be arranged.
   An introduction to sociology. Analysis of human group life through principles, concepts, and theories: culture, institutions, community, collective behavior, personality, social roles, social disorganization, social planning, etc.

20. Population. (3) I.
   Mr. Petersen
   An elementary course in population, descriptive rather than technical. Emphasis is on current problems like the “population explosion,” the “baby boom,” and growing cities and suburbs. Such population phenomena will be analyzed using some of the elements of sociological theory.

30. Society and Personality. (3) II.
   Mr. Blumer, Mr. Goffman
   Two lectures and one weekly discussion section to be arranged. Recommended preparation for upper division courses in social psychology; also open to general students.
   Consequences of participation in group life: the social organization of perspective and personality, and the social control of conduct.

‡ In residence fall semester only, 1960–1961.
§ In residence spring semester only, 1960–1961.
40. Introductory Statistics in Sociology. (3) I and II.
(Formerly numbered 106.) Mr. Nicholls, Mr. Selvin
Prerequisite: former course Mathematics D or equivalent.
Two lectures and one three-hour laboratory per week.
An introduction to basic procedures of statistical analysis of social data; frequency distributions, measures of central tendency and dispersion, simple correlation techniques, measures of reliability and significance.

100. Social Evolution. (3) I.
(Formerly numbered 100A.)
Major views of social development; the idea of cycles and the idea of progress. Modern conceptions of social and cultural evolution.

101. Historical Sociology. (3) II.
(Formerly numbered 100B.)
The comparative analysis of social and cultural processes of change and persistence; the contributions of Marx, Toynbee, Kroeber, Spengler, Teggart, Sorokin, Weber, and others.

105. Introduction to Methods of Sociological Study. (3) II. Mr. Nicholls
Prerequisite: course 40 and 6 additional units in sociology, or the equivalent.
Examination of methodological problems and technical procedures involved in the selection and definition of problems of investigation; and in the selection, description, classification, and analysis of data.

107. Social Control. (3) I.
Critical evaluation of divergent approaches to the analysis of social control.

108. Principles of Sociology. (3) I and II. Mr. Cohen, Mr. Matza
Open only to upper division majors in the social sciences or history. Not open to students who have taken course 1.
A comprehensive survey of the fundamentals of general sociology at an advanced level. Consideration of the concepts and principles underlying the various areas of sociological concern.

109. Sociology and Social Thought. (3) II.
History of social thought treated as the source of contemporary problems and hypotheses.

110. Inter-Ethnic Contacts. (3) II.
Prerequisite: course 1 or consent of the instructor.
Consequences of the contact of peoples: the symbolic significance of identification marks, multi-ethnic status systems, minority groups and movements, inter-ethnic tensions, race ideology and public policy.

114. Advanced Quantitative Methods in Sociology. (3) II. Mr. Nicholls
Prerequisite: course 106 or the equivalent.
Analysis of variance and its application to sociological problems. Linear, nonlinear, multiple and partial correlation and regression. Analysis of covariance. Sampling procedures. Scaling theory for questionnaire and interview material. Introduction to factor analysis; logic of measurement.

115. Major Social Problems. (3) I and II. Mr. Cohen, Mr. Matza
The bearing of sociological investigation on the diagnosis and treatment of problems arising from social and cultural disorganization. Race relations, crime, old age, industrial conflict, and political disorder will be among the topics discussed.
118. Political Sociology. (3) I.  Mr. Alford
   Introduction to the study of political processes in organized groups, with particular regard to the social bases of power. The role of social classes, occupational groups, and religious groups, and the influence of cultural values.

120. Organizations and Institutions. (3) II.  Mr. Cohen
   Not open to students who have received credit for course 102 or 111.
   Sociological analysis of administrative organizations and voluntary associations, with emphasis on the major social institutions in industry, government, religion, and education.

*125. Sociology of Intellectual Life. (3) II.  Mr. Bendix
   The social status of the intellectual and the problem of knowledge and action in social thought are discussed. The treatment of this problem by major social theorists is analyzed, together with related issues in the sociology of intellectual life.

129. Sociology of Occupations and Professions. (3) I.  Mr. Kornhauser
   An historical and comparative study of selected occupational and professional groups, with emphasis on the social significance of occupational ideologies and the sociological factors related to their development.

130. Sociology of the Family. (3) II.  Mr. Davis
   Systematic and comparative analysis of family structure and change in relation to other aspects of society, including study of family processes such as marriage, reproduction, child-rearing, and marital dissolution.

*131. Study of Social Processes. (3) I.  Mr. Bock
   Laboratory and discussion sessions, personal conferences, occasional lectures.
   Research course in the comparative and historical study of institutional processes. Individual or group projects in the investigation of processes involved especially in conflict or peaceful contact situations between peoples and groups; other projects accepted with consent of the instructor. Emphasis on the sociological use of historical materials.

132. Social Stratification. (3) I.  Mr. Clark
   Analysis of recent occupational trends and of social problems of occupational stratification; social classes in local communities and the nation as related to interest organizations.

133. Population: Theory and Methods of Study. (3) I.  Mr. Davis
   Prerequisite: course 20 or consent of the instructor.
   Introduction to the science of population, including statistical techniques and theoretical interpretation. Social causes and consequences of population trends; changes in population structure, geographical distribution, and migration; relation of population to resources and levels of living; national population policies.

*134. Sociology of War and Conflict. (3) II.  Mr. Bock
   War as a form of social conflict; violent and peaceful procedures in the pursuit of national objectives; analysis of attempts to specify the common antecedents of war.

135. Social Change in Underdeveloped Countries. (3) II.  Mr. Eberhard
   The problem of progress; the process of change; analysis of factors influencing social change, especially in modern Western and Asiatic society.

140. **Social Change.** (3) I. Mr. Matza
An explanation of the major sources of change in societies and of ways of predicting future changes.

141. **Social Organization of Modern Western Societies.** (3) I. Mr. Eberhard
Major social changes in Western industrial society since the breakdown of feudalism.

142. **Comparative Institutions.** (3) II. Mr. Eberhard
Comparative treatment of selected social institutions, with special reference to present industrial, modern societies. Relation of ideas to institutions; institutions and social change.

*145. **Pre-Industrial Societies.** (3) I. Mr. Eberhard
Comparative treatment of social institutions of political character and their transformation. Village, city, state, and the problem of stratification.

146. **Sociology of Religion.** (3) II. Mr. Clark
A systematic survey of the sociology of religion covering sociological theory of religion, the organizational structure of religion, the character of religious authority and leadership, the individual and his religion, and the interplay between religion and other spheres of social life.

147. **Religious Doctrines and Social Conduct.** (3) II. Mr. Rieff
An introduction to comparable elements in various religious doctrines, with special reference to their direct and indirect effects upon human behavior.

*148. **Elementary Collective Behavior.** (3) II. Mr. Blumer
Spontaneous, non-institutionalized forms of group behavior; social contagion and crowd behavior, psychic epidemics, popular arts and interests, fashion movements, formation and manipulation of public opinion.

*149. **Social Movements and Public Action.** (3) II.
Analysis of social movements, the formation and play of public opinion, and the behavior of interest groups.

160. **Urbanization and the City.** (3) II. Mr. Germani
Analysis of the nature, causes, and consequences of urbanization throughout the world; the growth and structure of metropolitan areas; the location and types of cities; the social and demographic characteristics of urban populations.

161. **Community and Modern Industry.** (3) I. Mr. Clark
Institutional and ideological setting of industry; effects of size and composition of the community on industry and trade unions; social groupings in the community and the factory.

*166. **Oriental Societies.** (3) I. Mr. Eberhard
Main characteristics of Asiatic agricultural societies (China, Japan, India). Differences from Western cultures. Research methods. Emphasis on the medieval periods.

*167. **Nomadic Societies.** (3) II. Mr. Eberhard
Main characteristics of Asiatic nomadic societies (Central Asia, Turks, Mongols, Middle East). Their contacts with non-nomadic cultures.

* Not to be given, 1960—1961.
175. Communication and Social Contact. (3) II. Mr. Goffman
Recommended: course 1 or 30.
The establishment of communication channels through differential contact and association; the emergence of consensus in selected primary and secondary groupings. Special emphasis upon the organization and modification of perspectives in mass societies.

178. Social Interaction and Personal Organization. (3) I. Mr. Blumer
A critical analysis of social interaction and personality. Dominant theoretical approaches and schemes of research in social psychology will be considered.

180. Industrial Societies. (3) II. Mr. Germani
Industrialization and other forms of economic modernization in relation to the changing social structure of selected western societies.

H194. Senior Honors Seminar. (3) I. Mr. Bock
Two lectures and three discussion sections weekly. Prerequisite: open only to senior candidates for honors with bachelor's degree.
Intensive study of selected topic to provide background for honors thesis.

H195. Honors Thesis. (3) II. Mr. Bock
One lecture and six section meetings weekly. Prerequisite: H194 with grade of A or B.
Group and individual conferences.

199. Special Study for Advanced Undergraduates. (1-4) I and II.
The Staff (Mr. Nicholls, Mr. Goffman both in charge)
Introduction to Social Science (Social Science 1A–1B). (3–3) Yr. Mr. Feuer
Speech and Society (Speech 121A–121B). (3–3) Yr. Mr. Lowenthal
Rural Sociology (Agricultural Economics 112A–112B). (2–2) Yr. Mr. Taylor
Theory of Historical Inquiry ( Philosophy 147). (3) II. Mr. Strong

GRADUATE COURSES
(Concerning conditions for admission to graduate courses, see page 18)

201A–201B. Methods of Sociological Research. (3–3) Yr.
Mr. Glock, Mr. Selvin
Prerequisite: Sociology 40, or equivalent, which may be taken concurrently with 201A.
Design of theoretically oriented research; gathering, processing, and analyzing qualitative and quantitative data, including field methods, use of documents, and punched-card techniques. Problems of inference, causality, and measurement.

*204. Social Contacts. (2) I. Mr. Goffman
The components of the communicative act; the units of face to face interaction in natural settings; the dynamics of face to face groupings; the communication aspects of public order.

*207. Analysis of Social Action. (2) I. Mr. Blumer
Advanced social psychology, particularly from the viewpoint of George H. Mead. Analyzes the nature of the social situation, social roles, the self, socialization, the social act. Considers critically social psychological premises in current sociological thought and research.

212. Deviance and Social Control. (2) II. Mr. Goffman
Deals with the various current efforts to draw a conceptual framework for deviance from social system analysis, and will consider ethnographic material on deviant communities.

217. History of Social Thought Since the Enlightenment. (3) I. Mr. Bendix, Mr. Bock
Intellectual background of social theory; surveys of utilitarianism, historicism, conservatism, Marxism, positivism, theories of social evolution, functionalism. Selected writings of major precursors of modern social science will be discussed.

218. Modern Sociological Theory. (3) II. Mr. Davis, Mr. Smelser
A systematic and critical treatment of the major points of view and approach in sociology.

*219. Sociology of Law. (2) II. Mr. Selznick
Functions of law in society; social sources of legal change; social conditions affecting the administration of justice; role of social science in jurisprudence.

*224. Social Change. (2) I. Mr. Smelser
Delineates and explains patterns of social change, especially in the rise and spread of industrial regions. Particular application to underdeveloped countries. Individual projects by students, involving a combination of empirical and theoretical analysis.

*229. Sociology of Work. (2) II. Mr. Kornhauser
Systematic analysis of work institutions, social psychology of work, and social composition of the labor force. Social organization of industries and occupations. Social processes of professionalization. Relations between work institutions and other major social institutions.

230. Population. (2) II. Prerequisite: an undergraduate course in population or consent of the instructor. An analysis of varied problems in the theory of population with particular reference to institutional and motivational aspects of demographic behavior.

231. Sociology of Marriage, Family, and Kinship. (2) I. Mr. Davis
Systematic analysis of family structure and behavior, including such aspects as kinship, marriage, divorce, reproduction, and parental relations. Comparative and historical data used to show the interrelations between family structure and other institutions such as stratification, economy, law, and religion.

*232. Social Stratification. (2) II. Mr. Lipset
An analysis of theoretical and methodological problems in the field, with special emphasis on comparative materials.

*241. Organizations and Institutions. (2) I. Mr. Selznick
242. Comparative Social Structure. (2) I. Mr. Clark
Theory and methods in the comparative study of social structures.

*246. Sociology of Religion. (2) II. Mr. Glock
Prerequisite: course 146, or consent of the instructor. The interplay between theory and research in the sociological study of religion; emphasizing particularly those problems in the field bearing on the interrelationship between religious ideas and institutions and the form of economic, political and social order.

* Not to be given, 1960-1961.
248. Collective Behavior. (2) II. Mr. Blumer, Mr. Smelser
Studies in mass behavior, social movements, and political action.

*253. Sociology of Culture. (2) II. Mr. Lowenthal
Theories of elite and popular cultures, particularly in modern mass society. Major areas for discussion will be: General Theory of Culture and Society, Sociology of Knowledge, Sociology of the Arts, and Sociology of Popular Culture.

260. Political Sociology. (2) II. Mr. Bendix
Contributions of sociology to theory and research in politics. Analysis of structure and ideology of organized groups.

262. Urbanization. (2) II. Mr. Germani
A comparative study of the process of urbanization in the world as a whole and in particular regions and countries. Causes and consequences of organization, theory of urban location, patterns of city growth, and problems of measurement.

290. Seminar. (2) I and II. The Staff
Advanced study in various fields of modern sociology. Topics will vary from year to year and will be announced at the beginning of each semester.

299. Individual Study and Research. (1–6) I and II.
This course is primarily for students directly engaged upon the M.A. or Ph.D. dissertation. It may not be substituted for available graduate lecture courses or course 290.

The Metropolitan Region (City and Regional Planning 226). (2) II. Mr. Foley
Theories of History (Philosophy *247). (3) I. Mr. Strong

SOILS AND PLANT NUTRITION
(Department Office, 140 Giannini Hall)

Daniel I. Arnon, Ph.D., Professor of Cell Physiology.
Geoffrey B. Bodman, Ph.D., Professor of Soil Physics.
Paul R. Day, Ph.D., Professor of Soil Physics.
Constant C. Delwiche, Ph.D., Professor of Soils Science.
Frank F. Harradine, Ph.D., Professor of Soil Technology, Davis.
Louis Jacobson, Ph.D., Professor of Soils and Plant Nutrition.
Hans Jenny, Sc.D., Professor of Soil Chemistry and Morphology.
A. Douglas McLaren, Ph.D., Professor of Soil Chemistry.
Roy Overstreet, Ph.D., Professor of Soil Chemistry.
Perry R. Stout, Ph.D., Professor of Soil Science, Davis (Chairman of the Department).
James P. Bennett, Ph.D., Professor of Plant Physiology, Emeritus.
John S. Burd, B.S., Professor of Soils and Plant Nutrition, Emeritus.
Walter P. Kelley, Ph.D., Professor of Soil Chemistry, Emeritus.
R. Earl Storie, B.S., Professor of Soils and Plant Nutrition, Emeritus.
Kenneth L. Babcock, Ph.D., Assistant Professor of Soil Chemistry.

Isaac Barshad, Ph.D., Lecturer in Soils and Plant Nutrition.

Soil Science 110, 111, 112, 113, 114, and Plant Nutrition 115, 117 are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Adviser: Mr. Babcock.

Preparation for the Major.—For details, see the soil science curriculum, College of Agriculture, on page 85 of the CIRCULAR OF INFORMATION.

No student will be accepted as a major student who has not attained at least an average grade of C in each of the fields of required courses in chemistry, physics, botany, bacteriology, and the geological sciences.

SOIL SCIENCE

LOWER DIVISION COURSES

10. The Soil and Its Significance to Man. (3) II. Mr. Jenny
Prerequisite: Chemistry 1A or high school chemistry. Cannot be used for credit in the soil science majors.

10L. The Soil and Its Significance to Man Laboratory. (1) II. Mr. Williams
Laboratory, demonstrations, and field trips. Prerequisite: course 10 (may be taken concurrently).

UPPER DIVISION COURSES

100. Soil Characteristics. (4) I. Mr. Day
Lectures, laboratory, and field trips. Prerequisite: Chemistry 1A–1B, Physics 2A–2B. Recommended: Geology 1 or 10, or the equivalent.
An introduction to the physical, chemical, and biological properties of the soil.

101. Development and Morphology of Soils. (3) II. Mr. Jenny
Prerequisite: Geology 1, Chemistry 1A. Recommended: course 100.
Influence of climate, vegetation, parent material, topography, and time on soil development; chemistry of soil formation; classification of soils; developed and illustrated by a critical study of representative soils of the world.

101F. Development and Morphology of Soils. (1) II. Mr. Arkley
Field trips. Prerequisite: course 101 should be taken concurrently.
Excursions on Saturdays to illustrate facts and principles discussed in course 101.

102. Soil Physics. (2) II. Mr. Bodman
Prerequisite: course 100, calculus (Mathematics 3A–3B, or 16A–16B). Recommended: physical chemistry. Course 102L should be taken concurrently.
The physical properties of soils and their measurement.
102L. Soil Physics. (2) II. Mr. Day
Laboratory. Prerequisite: course 102 (may be taken concurrently).
Laboratory experiments to accompany course 102.

103. Soils of California. (3) I. Mr. Harradine
Lectures and discussion section. Two field trips during the semester to be arranged. Prerequisite: Geology 1 and Chemistry 1A–1B.
The general character, mode of formation, classification, geography, use, and conservation of the soil resources of the State. Practice in identifying, rating, and judging the probable value of the important soils in California for agricultural, grazing, and forest use.

105. Summer Field Course. (5) Mr. Harradine
Six weeks, daily. Prerequisite: courses 100, 101, or 103, and consent of the instructor.
Study of soil characteristics, development, and morphology of soils. Soil surveying, including mapping and classifying soils; preparation of soil reports. Practice in identifying and judging the probable value of the dominant soils of the State for agricultural, grazing, and forest use.

110. The Soil as a Medium for Plant Growth. (4) I. Mr. Babcock, Mr. Overstreet
Lectures and one other hour to be arranged. Prerequisite: Chemistry 1A–1B and 8. Recommended: Geology 1.
Composition and properties of soils; factors determining productivity; the causes and effects of the soil's reaction, with particular reference to "acid" and "alkali" soils; the nature of fertilizers and some of their effects upon soil and plant; current theory of the soil solution.

111. Soil Microbiology and Soil Biochemistry. (3) II. Mr. McLaren
Lectures and laboratory. Prerequisite: Chemistry 5 and 8, Bacteriology 1, or consent of the instructor.
Microorganisms occurring in soils, biochemical activities of the soil population, and the formation and properties of soil organic matter.

112. Soil Chemistry in Relation to Plant Growth. (2) II. Mr. Delwiche
Lectures. Prerequisite: course 110 and Chemistry 5.
The chemical properties of soils as related to plant growth, and their measurement.

113. Soil Chemistry in Relation to Plant Growth. (2) II. Mr. Delwiche, Mr. Babcock
Laboratory. Prerequisite: Chemistry 5, course 112 (usually taken concurrently).
Soil conditions as phenomena and in relation to factors influencing fertility; liquid and solid phases of the soil, including adsorption phenomena, cation exchange, and buffer effects.

114. Properties of Collodial Particles and Systems. (3) I. Mr. McLaren
Lectures with demonstrations. Prerequisite: a course in physical chemistry.
Properties of colloidal systems of importance in agriculture and biology. Chemistry and physics of surfaces (adsorption, ion interchange), electric double layer, flocculation, polymerization, colloidal optics, viscosity, swelling.

116. Soil Management. (2) I. Mr. Bodman, Mr. Ulrich
Lectures, discussions, and demonstrations by various specialists. Prerequisite: senior standing in soil science.
Evaluation of soil fertility by field experiments; use of fertilizers; cultivation practices; aspects of soil erosion control.
Soils and Plant Nutrition

199. Special Study for Advanced Undergraduates. (1–5) I and II.
The Staff

Open only to students with an average grade of at least B, and subject to the approval of the undergraduate adviser in soil science.

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 18)

201A–201B. Research in Soil Science. (1–9; 1–9) Yr.
The Staff

203. Soil and Land Classification. (3) I.
Prerequisite: training in any one of the following fields: soil science, forestry, range management, irrigation, land economics, geography.
Basic soil resource surveys and physical land inventories. Application of interpretative data, including soil productivity and land-use productivity ratings. Classification of land for: agriculture, forestry, rural land appraisal, tax assessment, engineering, wildlife, and recreational use.

212. Advanced Soil Chemistry. (3) I.
Mr. Babcock, Mr. Overstreet
Prerequisite: courses 110, 114; Chemistry 110A–110B, or Chemistry 109 and consent of the instructor. Open to graduates and qualified seniors.
Applications of thermodynamics to soil systems. Theoretical treatment of ion exchange and membrane phenomena.

213. Pedochemistry and Mineralogy of Soils. (4) II.
Mr. Barshad
Prerequisite: graduate standing in soil science or consent of the instructor.
Lecture: Methods, objectives, and applications of chemical and mineralogical analyses to evaluate soil profile formation. Laboratory: Total-elemental and free-oxide analyses; X-ray, integral, and differential thermal analyses of soil clays; mineralogical analysis of the nonclay fraction.

235. Seminar. (1) I.
The Staff (Mr. Barshad in charge)
Prerequisite: graduate standing in soil science, plant physiology, or related subjects.

Staff Seminar in Soil Science. (No credit) Yr.
The Staff

Plant Nutrition

Upper Division Courses

115. The Nutrition of Green Plants. (2) I.
Mr. Arnon
Prerequisite: Botany 111.
Evolution of modern concepts of plant nutrition; absorption, accumulation, assimilation, and functional aspects of inorganic nutrients; special phases of photosynthesis; nitrogen metabolism; effects of hydrogen ion; deficiency and toxicity diseases; certain relations of plant nutrition to animal nutrition.

117. The Nutrition of Green Plants Laboratory. (2) I.
Mr. Jacobson
Prerequisite: Chemistry 5, course 115 (taken concurrently if possible).
Laboratory and greenhouse experiments in plant nutrition to accompany course 115.

199. Special Study for Advanced Undergraduates. (1–5) I and II.
The Staff
Prerequisite: senior standing and consent of the student’s major adviser.
GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

201A–201B. Research. (1–9; 1–9) Yr. The Staff
Prerequisite: graduate standing and consent of the instructor.
Research on problems of plant nutrition and plant physiology.

206. Seminar in Plant Physiology. (1) I.
Mr. Babcock (in charge), Mr. Arnon, Mr. Broyer, Mr. Cleland,
Mr. Hackett, Mr. Jacobson, Mr. Machlis, Mr. Mackinney,
Mr. Overstreet, Mr. Stone, Mr. Whatley
Prerequisite: qualified graduate students, with consent of the staff
member in charge.
A seminar on problems of plant physiology in the fields of botany, food
technology, forestry, plant nutrition and soil science.
The spring semester of this seminar is listed under Botany 206.

*280. Chemistry of Plant Growth. (2) I.
Prerequisite: Chemistry 1A-1B, 8; Biochemistry 102; Botany 160B.
Recent advances in knowledge of biochemical mechanisms influencing
plant growth; chemistry of plant growth substances and their physiologi­
ical effects on plants; correlation of chemical changes accompanying
growth; methods of research.

Staff Seminar in Plant Nutrition. (No credit) Yr.
The Staff (Mr. Arnon in charge)

SOILS AND PLANT NUTRITION
(GIVEN AT RIVERSIDE)

Mr. Chapman, Mr. Erickson

The Staff (Mr. Chapman in charge)

SPANISH AND PORTUGUESE

(Department Office, 4314 Dwinelle Hall)

†Charles E. Kany, Ph.D., Professor of Spanish.
Yakov Malkiel, Ph.D., Professor of Romance Philology.
Luis Monguío, Licenciado en Derecho, Professor of Spanish.
José F. Montesinos, Licenciado en Filosofía y Letras, Professor of Spanish.
Edwin S. Morby, Ph.D., Professor of Spanish.
Arturo Torres-Rioseco, Ph.D., Professor of Latin-American Literature
(Chairman of the Department).
Erasmo Buceta, Doctor en Derecho, Professor of Spanish, Emeritus.
S. Griswold Morley, Ph.D., Litt.D., Professor of Spanish, Emeritus.
Lesley B. Simpson, Ph.D., Professor of Spanish, Emeritus.
Robert K. Spaulding, Ph.D., Professor of Spanish, Emeritus.
Robert Fernando Alegria, Ph.D., Associate Professor of Spanish.
G. Arnold Chapman, Ph.D., Associate Professor of Spanish.
Dorothy C. Shadi, Ph.D., Associate Professor of Spanish.
Benjamin M. Woodbridge, Jr., Ph.D., Associate Professor of Portuguese.
Raul A. Del Piero, Doctor en Filosofía y Letras, Ph.D., Assistant Professor
of Spanish.

‡ In residence spring semester only, 1960–1961.
Spanish and Portuguese

Louis A. Murillo, Ph.D., Assistant Professor of Spanish.
John H. R. Polt, Ph.D., Assistant Professor of Spanish.
Juan V. Agudiez, Docteur ès Lettres, Instructor in Spanish.
Marian F. Place, M.A., Associate in Spanish.
George G. Wing, B.S., Associate in Spanish.

Antonio Rodríguez-Moñoño, Lic. en D. y en Fil. y Let., Lecturer in Spanish.

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers.—Mr. Chapman, Mr. Polt.

The Major.—Courses 1, 2, and 3 or their equivalents; course 4C or 4L (unless course 3 is passed with a grade of A); course 25A–25B or 25; one year of high school Latin, or Latin 1A (to be completed before entering upon the senior year). Students who may wish to pursue work toward advanced degrees in Spanish should note that a broader foundation in Latin taken in the high school or as part of the undergraduate program is a prerequisite for such work. A minimum of one year of college Latin is therefore strongly recommended.

Students transferring from other institutions with advanced standing and intending to major in the department must present evidence (by examination or otherwise) that their preparation includes the equivalent of Spanish 25A–25B or 25.

Thirty units of upper division work in the department, including courses 107A–107B (6 units), 103A (3 units), and 104A–104B (6 units). The remaining units must be completed from among the upper division courses in Spanish and, with the consent of the adviser, may include up to three units of upper division courses in Portuguese. Recommended electives: further study in French, Italian, Latin, Portuguese; and History 160A–160B, 161A–161B, 165A–165B.

Honor Students.—For the honors program consult one of the major advisers.

Higher Degrees.—See the Announcement of the Graduate Division, Northern Section.

SPANISH

LOWER DIVISION COURSES

Students whose native tongue is Spanish or Portuguese will not normally be admitted into any lower division courses in their respective language except that prospective major students may be admitted in Spanish 25A–25B or 25.

1. Elementary Spanish. (4) I and II. Mrs. Place in charge
   Sections meet five hours per week

2. Elementary Spanish (continuation of 1). (4) I and II. Mr. Wing in charge
   Sections meet five hours per week. Prerequisite: course 1 or two years of high school Spanish, or the equivalent.

3. Intermediate Spanish (continuation of 2). (4) I and II. Mr. Murillo in charge
   Sections meet five hours per week. Prerequisite: course 2 or three years of high school Spanish, or the equivalent.

4. Intermediate Spanish. (4) I and II. Mr. Wing, Mr. Agudiez, Mr. Del Piero
   Prerequisite: course 3 or four years of high school Spanish, or the equivalent.
4C. Oral and Written Composition. (4) I and II.
4L. Introduction to Spanish Literature. (4) I and II.
A student will be allowed to receive credit for both 4C and 4L.

5. Oral Spanish. (2) I and II. Mr. Wing
Prerequisite: course 4 (as formerly given), 4C or 4L or 25A or 25B or 25.
Reading, discussion, and oral interpretation of modern Spanish and Spanish-American plays.

Mr. Morby (in charge), Mr. Agudiez
Prerequisite: course 3 (with a grade of A) or course 4C or course 4L (the latter with a grade of A or B), or the equivalent. Recommended: sophomore standing. Required of majors.

25. Advanced Spanish. (5) II. Mr. Morby
Prerequisite: same as for 25A.
Alternative course to 25A–25B, designed for students entering in mid-year who wish to prepare themselves for entering the upper division the following fall.

39. Spanish and Spanish-American Literature in English Translation. (2)
Open to students in all departments of the University. No knowledge of Spanish necessary.

39A. Spain: Medieval Period, Renaissance, and Golden Age. (2) I.
Mr. Polt

39B. Spain: Neo-Classical Period to Present Day. (2) II.
Mr. Polt

39C. Spanish America: To the End of the Nineteenth Century. (2) I.
Mr. Chapman

39D. Spanish America: Modernism and the Contemporary Period. (2) II.
Mr. Chapman

Spanish for Graduate Students. First Course. (No credit) I and II.
(Formerly numbered 1G.)
Preparation for the graduate reading examinations.

UPPER DIVISION COURSES

Prerequisite to all upper division courses: 16 units of lower division Spanish or the equivalent.

*100. Introduction to Spanish Linguistics. (2) I. Mr. Kany

*102. American-Spanish Divergencies from Standard Castilian. (2) II.
Mr. Kany

103A. History of Spanish Literature (1680–1900). (3) I.
Mr. Polt
Required of majors.

103B. Study of a Prose Genre of the Nineteenth Century. (3) II.
Mr. Polt

104A–104B. Spanish-American Literature. (3–3) Yr. Beginning each semester.
Mr. Alegría, Mr. Chapman, Mr. Monguio
Required of majors.

105. Modern Peninsular Drama: From the Romantic Movement to the Present. (3) I.
Mrs. Shadi

107A–107B. History of Spanish Literature to 1680. (3–3) Yr.
Mr. Morby, Mr. Rodriguez-Moñino
Prerequisite: senior standing in Spanish. Required of majors.

108A–108B. Introduction to the Ballad. (2–2) Yr. Mr. Rodríguez-Moñino

109A–109B. The Spanish Drama of the Sixteenth and Seventeenth Centuries. (2–2) Yr. Mr. Montesinos

*110A–110B. Twentieth-Century Peninsular Prose. (2–2) Yr. Mr. Murillo

111A–111B. Cervantes. (3–3) Yr. Mr. Montesinos

112A–112B. A Survey of Spanish Culture. (2–2) Yr. Mr. Monguío

113A–113B. A Survey of Latin-American Culture. (2–2) Yr. Mr. Torres-Rioseco

114A: Mr. Chapman. Mr. Chapman, Mr. Alegria
114B: Mr. Alegria.
Prerequisite: course 104A–104B.

115. A Survey of Spanish Lyric Poetry. (3) II. Mrs. Shadi

116A–116B. Advanced Grammar and Composition. (3–3) Yr. Mr. Murillo, Mr. Polt

Required of candidates for the Certificate of Completion, teacher-training curriculum, whose major or minor is Spanish.

125. Spanish Pronunciation. (2) I and II. Mr. Agudiez

Required of candidates for the Certificate of Completion, teacher-training curriculum, whose major is Spanish, and recommended for those whose minor is Spanish.

131. A History of the Spanish Lexicon. (2) II. Mr. Malkiel

A brief introductory survey of the lexical strata against the background of Hispanic cultural history.

199. Special Study for Advanced Undergraduates. (1–3) I and II.

Mr. Morby in charge

Restricted to senior honor students, by previous arrangement with members of the departmental staff.

GRADUATE COURSES

(Concerning conditions for admission to graduate courses, see page 18)

In the requirements for the master's degree this department follows Plan II.

*200A–200B. Early Spanish Literature. (2–2) Yr. Mr. Del Piero

200A: To the Fifteenth Century.
200B: The Fifteenth Century.

Analytical history of Spanish literature to the Renaissance: the development of the various genres; the provincial literatures; a thorough grounding in bibliography; the development of a critical attitude.

201A–201B. History of Hispanic Poetry. (2–2) Yr. Mr. Monguíó

Studies of a period, movement, or type of Spanish language poetry. When appropriate the study will include both Spanish and Spanish American poetry.


203A–203B. Techniques of Literary Scholarship. (2–2) Yr. Mr. Rodríguez-Moñino

*204A–204B. The Spanish-American Novel. (2–2) Yr. Mr. Torres-Rioseco
*205A–205B. Contemporary Spanish-American Poetry. (2–2) Yr.
   A study of aesthetic principles and poetic movements. Mr. Alegria
*208A–208B. The Ballad. (2–2) Yr.
212A–212B. Old Spanish. (2–2) Yr. Mr. Malkiel
   Required for candidates for the master’s degree.
   1960–1961: Galdós. Mr. Montesinos
214A–214B. Modernism in Hispano-America. (2–2) Yr. Mr. Torres-Rioseco
*216. Spanish Versification. (1) II. Mrs. Shadi
*226. Critical and Stylistic Studies of a Single Author or Genre. (2) II.
   The Staff
   (2–2) Yr. Mr. Chapman
299. Special Advanced Study. (1–4) I and II. Mr. Morby in charge
   Restricted to candidates for higher degrees, by previous arrangement
   with members of the departmental staff.

PORTUGUESE

LOWER DIVISION COURSES

1. Elementary Portuguese. (4) I. Mr. Woodbridge
   Sections meet five hours per week.
2. Elementary Portuguese. (4) II. Mr. Woodbridge
   Sections meet five hours per week. Prerequisite: course 1 or the equivalent.
21A–21B. Readings in Portuguese. (3–3) Yr. Mr. Woodbridge
   For advanced students in Romance languages who have no previous
   preparation in Portuguese but wish to acquire a reading knowledge. Also
   open to students completing course 1 with a grade of A or B or course 2, or
   the equivalent.
   Reading and translation.
22. Oral Portuguese. (1) I. Mr. Woodbridge
   Prerequisite: course 21A, which may be taken concurrently.
   Reading, discussion, and oral interpretation of modern plays.

UPPER DIVISION COURSES

Portuguese 120, 122, and 123 are open to upper division and graduate stu-
dents in Romance languages with no previous knowledge of Portuguese.
With the approval of the graduate adviser, upper division and graduate
units in Portuguese may be applied toward the M.A. degree in Spanish.

*120. Gil Vicente and Camões. (3) I. Mr. Woodbridge
   Major works in Spanish as well as in Portuguese.
122. Portuguese Literature. (3) I. Mr. Woodbridge
   Survey of the literature of Portugal.

Spanish and Portuguese; Speech

123. Brazilian Literature. (3) II.
Survey of the literature of Brazil.
Mr. Woodbridge

199. Special Study for Advanced Undergraduates. (1–3) I and II.
Restricted to senior honor students.
Mr. Woodbridge

Graduate Courses

201. The Brazilian Novel. (2) II.
Mr. Woodbridge

299. Special Advanced Study. (1–4) I and II.
Restricted to candidates for higher degrees.
Mr. Woodbridge

SPEECH

(Department Office, 3125 Dwinelle Hall)

Woodrow Borah, Ph.D., Professor of Speech.
Isabel C. Hungerland, Ph.D., Professor of Speech.
Leo Lowenthal, Ph.D., Professor of Speech and Professor of Sociology and Social Institutions.
Gerald E. Marsh, M.A., Professor of Speech.
David Rynin, Ph.D., Professor of Speech.
Jacobus ten Broek, J.S.D., Professor of Speech (Chairman of the Department).
Garff B. Wilson, Ph.D., Professor of Speech and Professor of Dramatic Art.
Edward Z. Rowell, Ph.D., Associate Professor of Speech, Emeritus.
Edward N. Barnhart, Ph.D., Associate Professor of Speech and Lecturer in Psychology.
Robert L. Beloof, Ph.D., Associate Professor of Speech.
Don Geiger, Ph.D., Associate Professor of Speech.
Richard Hagopian, M.F.A., Associate Professor of Speech.
Anthony Ostroff, M.S., Associate Professor of Speech.
Arnold Perstein, Ph.D., Associate Professor of Speech.
Philip Rieff, Ph.D., Associate Professor of Speech.
William F. Shepard, Ph.D., Associate Professor of Speech.
Ethel M. Albert, Ph.D., Assistant Professor of Speech.
Christian Bay, Ph.D., Assistant Professor of Speech.
Susan Ervin, Ph.D., Assistant Professor of Speech.
Morton Paglin, Ph.D., Assistant Professor of Speech.
Jesse O. Sawyer, Ph.D., Assistant Professor of Speech.
Herman Tenessen, M.A. (Magister), Assistant Professor of Speech.
Edgar Austin, Ph.D., Instructor in Speech.
Arlene Daniels, M.A., Instructor in Speech.
Elizabeth F. Russell, Ph.D., Associate in Speech.
Fred S. Stripp, Th.D., Associate in Speech.
Ward E. Tabler, A.B., Associate in Speech.

Floyd Matson, M.A., Lecturer in Speech.
Joseph P. Morray, LL.B., Visiting Associate Professor of Speech.
Shirley K. Silver, A.B., Lecturer in Speech.

Students must have passed Subject A before taking any course in speech.

The central concern of the Department of Speech is the study of discourse—

² In residence spring semester only, 1960–1961.
Speech

the formal and orderly communication of thought in speech and writing—and of its character, forms, values, institutions, and social effects. Departmental courses are designed to give the student an understanding of the various forms of discourse in our society, such as public address, court decisions, and fictional works. The critical analysis of various forms of discourse and the application of logical, aesthetic, or moral standards relevant to their character and purpose are stressed. Further, departmental offerings seek to deepen the student's insight into the role of language in human affairs from a study of the effect of social circumstances, belief, and opinion, on the contents of radio, film, public debate and discussion, and their effect in turn on society and its institutions. Finally, the student is given firsthand experience with the creation, interpretation, and presentation of various forms of discourse.

Letters and Science List.—All undergraduate courses in speech are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Barnhart, Mr. Beloof, Mr. Borah, Miss Ervin, Mr. Geiger (spring only), Mr. Ostroff (spring only).

The Major.—Speech 1A–1B and 2A–2B or their equivalent.

Departmental upper division courses are classified into five categories as follows:


The major shall include 24 units of upper division courses: 6 units from each of four of the five categories.

Subject to the approval of the major adviser, up to 6 units of related courses in other departments may be substituted for one of the above groups.

Students enrolled in the honors program may depart from the above scheme to the extent permitted by the chairman of the honors program.

Lower Division Courses

1A–1B. First Year Reading, Writing and Speaking. (3–3) Yr.
Beginning each semester.
The Staff (Mr. Barnhart in charge), Mrs. Albert, Mr. Austin, Mr. Bay, Mr. Borah, Mrs. Daniels, Mr. Geiger, Mrs. Hungerland, Mr. Marsh, Mr. Matson, Mr. Morray, Mr. Paglin, Mr. Perstein, Mr. Rieff, Mr. Rynin, Mr. Stripp, Mr. Tabler, Mr. ten Broek, Mr. Tennessen
Prerequisite: a passing grade in Subject A. In each semester there are sections of 1A and 1B intended primarily for prelegal students.
Training in written and oral composition, based upon readings and discussions of major works of literature, philosophy, and science.

Beginning each semester.
Mr. Beloof, Mr. Geiger, Mr. Hagopian, Mr. Ostroff, Mr. Wilson
Introduction to the oral reading of prose and poetry; practice in speaking and reading with training in the principles of effective delivery.

10A. The Logic and Semantics of Argument. (3) I and II. Mr. Rynin
An introduction to the theory of argument, with emphasis on the problems of meaning, inference, and evidence.
10B. **The Logic and Semantics of Argument.** (3) II. Mr. Rynin

Application of the principles developed in course 10A to the construction and criticism of arguments, especially those concerned with the rational discussion of social issues.

12. **Psychology of Argument.** (3) II. Mr. Barnhart

Primarily concerned with the function of communication in inducing belief and directing behavior; an introductory study of techniques used in political propaganda and other forms of persuasion.

15A–15B. **Masterpieces of Rhetoric.** (3–3) Yr. Mr. Geiger, Mr. Matson

Great works of rhetoric in western civilization, from Demosthenes to Churchill, read and analyzed in the context of their times.

24. **Elementary Oral English for Foreign Students.** (8) I and II. Miss Ervin, Mr. Sawyer, Mrs. Silver

This course is required of all foreign students who receive marks on the diagnostic examination indicating their need for thorough basic training in English in order that they may successfully pursue their University work.

26. **Intermediate Oral English for Foreign Students.** (4) I and II. Miss Ervin, Mr. Sawyer, Mrs. Silver

This course is required of all foreign students who receive marks on the diagnostic examination indicating their need for further instruction in English in order that they may effectively pursue their University work.

40. **Advanced Oral English for Foreign Students.** (3) I and II. Mrs. Russell, Mr. Sawyer

This course is an elective course for the foreign student with advanced ability in English. The course is designed specifically to be of assistance to foreign students in handling the language problems which arise in their other University work.

45. **Public Speaking.** (3) I and II. Mr. Marsh, Mr. Perstein, Mr. Stripp

Designed for sophomores, but open to students in the upper division.

Intensive work in the essentials of public speaking and the forms of public address; platform theory and practice; principles of oral style.

**Upper Division Courses**

103. **General Phonetics.** (3) II. Mr. Sawyer


106. **The Oral Reading of Poetry and Prose.** (3) I and II. Mr. Beloof, Mr. Ostroff

Prerequisite: primarily for candidates for teaching credentials whose major is English; others admitted with consent of the instructor. Not open to students who have taken course 2A or 2B.

The study of poetry and prose from the point of view of oral interpretation. The principles of effective oral reading of literature; much practice in platform reading.

107A–107B. **Argumentative Discourse: Oral and Written.** (3–3) Yr.

Beginning each semester.

Mrs. Albert, Mr. Borah, Mrs. Hungerland, Mr. Matson, Mr. Morray, Mr. Paglin, Mr. Shepard, Mr. Tennesen

Prerequisite: course 1A–1B. Students completing this course may not receive more than 2 units of credit for course 152.
Principles of effective reasoning applied to discussion of sociopolitical and related problems. Training in research, systematic discernment and evaluation of issues, in preparation and organization of materials, outlines and briefs, for presentation in oral and written form.

110A–110B. The Art of Argument. (3–3) Yr. Mr. Marsh, Mr. Perstein
Principles of and intensive practice in oral argumentation, in group discussion and in cross-examination. Conducted so as to be of special value to those intending to teach speech.


111A: The essay and the short story.
111B: The ballad, the lyric, the ode, etc.

Prerequisite: course 2A–2B.

111C. The Reading of Drama. (3) I.

Mr. Beloof, Mr. Hagopian, Mr. Ostroff, Mr. Wilson

The oral interpretation of poetic and prose drama.

117A–117B. Semantics. (3–3) Yr. Mr. Rynin

Prerequisite: junior standing.
117B: The language of action: non-designative meaning.

An examination of the nature and functions of language, with special emphasis on the problems of meaning.

118. Symbolism: A Study of the Expressive Functioning of Signs. (3) II. Mrs. Hungerland

The functions of language in literature, especially poetry; the literary symbol; the nature and function of figures of speech.

119. Analysis of Communication Content. (3) I. Mr. Barnhart

Introduction to research techniques in communication, with special emphasis on content analysis and audience response; individual and group research projects will be carried out by students under supervision.

121A–121B. Speech and Society. (3–3) Yr. Mr. Lowenthal

A general survey of types of speech and discourse; their effects on interpersonal relations, personality development, and social integration; their influence on development and character of social institutions, mores and belief; and the reciprocal influence of social institutions on speech.

123. Freedom of Speech. (3) II. Mr. Morray, Mr. ten Broek

A critical and historical analysis of the main theories and justifications of freedom of expression developed in England and the United States, and of the factors and tests determining its scope and practical exercise.

135. British Public Address during the Eighteenth and Nineteenth Centuries. (3) II. Mr. Borah

Critical analysis of speeches of Burke, Pitt, Peel, Cobden, Bright, Gladstone, Disraeli, Newman, Huxley, Mill, and others. Attention given to issues with which they were identified and their relationship to the social movements of their time.

136. Latin-American Spokesmen. (3) I. Mr. Borah

Critical analysis of the speeches (in translation) of Bolivar, Mier, Sarmiento, and other Latin-American leaders of the nineteenth and twentieth centuries. Special attention will be given to major movements, controversies, issues, and problems.
137. American Public Address during the Eighteenth and Nineteenth Centuries. (3) I. Mr. ten Broek

138. Modern Public Address. (3) II. Mr. Morray, Mr. ten Broek
Critical analysis of speeches of Wilson, Roosevelt, Churchill, and other leaders from 1914 to the present time.

139. Modern Spokesmen. (3) I. Mr. Morray
An examination of the writings and speeches of leading spokesmen for major contemporary movements—political, social, and religious—with special reference to problems of ideology and ideological conflict, objectivity and evaluation, and the rationalization of conflict.

141A–141B. Classical Rhetoric. (3–3) Yr.
(Formally numbered 132A–132B.)
A study of rhetoric based on the writings of Isocrates, Plato, Aristotle, Cicero, Quintilian, and other classical writers with reference to criticism, aesthetic theory, and speech in the Classical era.

144A–144B. Medieval and Renaissance Rhetoric. (3–3) Yr.
Rhetorical theory and practices from the decline of the Classical World through the Middle Ages to the new rhetoric of the humanities.

145. The Rhetoric of the Enlightenment. (3) II. Mr. Rieff
Rhetorical theory and practice in the period of the Enlightenment and the beginnings of the Industrial Revolution.

147. Modern Rhetoric. (3) I. Mr. Rieff
(Formerly numbered 133.)
Contemporary rhetorical theory. Emphasis on modern views of symbolic action. Specific analysis of selected literature.

149. Comparative Discourse. (3) I. Mrs. Albert
Rhetorical patterns of persuasion, reasoning and the expression of beliefs and values of selected contemporary societies, civilized and primitive.

152. Debate. (2) I and II. Mr. Stripp
Designed for those who wish to participate in intercollegiate debate. May be repeated for a maximum of 6 units. Students wishing to take this course and 107A–107B may enroll in the latter only with the consent of the instructor and may not receive more than 8 units of credit in any combination of the two courses.

162A–162B. Theory of Interpretation. (3–3) Yr.
Mr. Geiger, Mr. Tenessen
162A: Problems concerned with interpretation of scientific and descriptive texts.
162B: Problems concerned with interpretation of literary texts, especially as they concern the oral interpreter.

H195A–H195B. Honors Course. (3–3) Yr. Mr. Borah in charge
Prerequisite: speech majors, senior standing, and on the honors list.
A special program of study extending through the senior year for speech majors who are on the honors list. The course may be substituted for 6 units of the major requirement with the approval of the major adviser.

198. Directed Group Studies for Upper Division Students. (1–5) I and II. The Staff (Mr. ten Broek in charge)
199. Special Study for Advanced Undergraduates. (1–5) I and II.
The Staff (Mr. ten Broek in charge)

STATISTICS

(Department Office, 501 Campbell Hall)

Edward W. Barankin, Ph.D., Professor of Statistics.
David Blackwell, Ph.D., Professor of Statistics (Chairman of the Department).
Joseph L. Hodges, Jr., Ph.D., Professor of Statistics.
George M. Kuznets, Ph.D., Professor of Agricultural Economics, Statistics, and Economics.
*Lucien Le Cam, Ph.D., Professor of Statistics.
Erich L. Lehmann, Ph.D., Professor of Statistics.
Michel Loève, Docteur ès Sciences, Professor of Statistics and Mathematics.
Jerzy Neyman, Ph.D., Professor of Statistics and Director of the Statistical Laboratory.
Henry Scheffé, Ph.D., Professor of Statistics.
Evelyn A. Fix, Ph.D., Associate Professor of Statistics.
Roy Radner, Ph.D., Associate Professor of Economics and Statistics.
Elizabeth L. Scott, Ph.D., Associate Professor of Statistics.
Robert F. Cogburn, Ph.D., Assistant Professor of Statistics.
Aram J. Thomasian, Ph.D., Assistant Professor of Statistics and Electrical Engineering.

Tore E. Dalenius, Ph.D., Visiting Professor of Statistics.
George B. Dantzig, Ph.D., Professor of Industrial Engineering.
Peter W. M. John, Ph.D., Visiting Assistant Professor of Statistics.
James G. Mauldon, Ph.D., Visiting Associate Professor of Statistics.

Letters and Science List.—All undergraduate courses in statistics except courses 142A, 142B, 142C, 142D, 144 are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Adviser: Miss Fix.

The Major.—Before undertaking the upper division program in statistics the student should acquire a thorough knowledge of elementary calculus and algebra with an emphasis on the conceptual side of the material offered.

In addition to Mathematics 1A–1B and 2A–2B (or preferably the corresponding honor courses) the student may consider taking Mathematics 11. Statistics 12 is an excellent preparation for the upper division program in statistics.

In the 24-unit upper division program, the student should acquire substantial knowledge of statistics and probability combined with a background in the theory of functions of real and complex variables. To this end the program must include Statistics 112, 113 and 120A and Mathematics 111 or 113B. In addition the student must select at least one course from Mathematics 104, 105, 122, 125A, 125B, 135A, 135B, 185 and at least one course from Statistics 120B, 132, 134, 152, 155, 166, 168, 169. It is recommended that Statistics 112, 113, 120A–120B be combined with the corresponding laboratory courses. The remaining courses for the major must be selected in consultation with the major adviser.

The undergraduate courses are divided into two basic cycles. One cycle, emphasizing theory, includes courses 12, 112, 113, 120A–120B, 120C–120D (or 202A–B–C–D) and leads to courses 255 and 260. The other cycle, emphasizing applications, is based on courses 130A–B–C–D and leads to 261, 280, and 281. Courses 1, 2 and 3 do not belong to the basic cycles. Course 1 is a purely general education course. Courses 2 and 3 are intended as a prerequisite to appilcational courses in other departments.

Those contemplating graduate studies leading to higher degrees in statistics should make an effort to include in the major the undergraduate courses which are prerequisite to the graduate ones. It is also recommended that students majoring in statistics acquire some familiarity with French, German, or Russian.

Higher Degrees.—See the Announcement of the Graduate Division, NORTHERN SECTION.

Attention of the student is drawn to the possibility of a group major in statistics combined with an empirical science. This major includes courses 130A–130B, 130C–130D, and 132.

LOWER DIVISION COURSES

1. Introduction to Probability and Statistics. (3) I and II.
   Mr. Mauldon, Mr. Lehmann
   General education course. Deterministic and indeterministic approaches to natural phenomena. Probability as an idealization of relative frequencies. Role of statistics in scientific research. Illustrations from astronomy, engineering, genetics, medicine, physics, social sciences, and everyday life.

2. Introduction to Statistical Methods. (3) I and II.
   Mr. Scheffé, Mr. Blackwell
   Prerequisite: two years of high school algebra or Mathematics D. Course intended for majors in the natural and social sciences using statistics as a tool.

3. Introduction to Probability Methods. (3) I.
   Mr. Blackwell
   Prerequisite: one course in college mathematics or Statistics 1 or Statistics 2.
   Course intended for majors in the natural and social sciences using probability as a tool. Combinatorial probability, Bayes' rule, law of large numbers, entropy, Markov chains, random walks, Monte Carlo methods, central limit theorem, games.

12. Elements of Probability and Statistics. (3) I and II.
   Mr. Lehmann, Mr. Cogburn
   Prerequisite: Mathematics course 1A or the equivalent. For students with mathematical background who wish to acquire basic concepts for general education.
   Relative frequency. Discrete probability. Testing statistical hypotheses. Illustrations from genetics, bacteriology, industrial sampling and public health.
Upper Division Courses

112. Discrete Probability. (3) I. Mr. Cogburn
Prerequisite: Mathematics 2A–2B. It is recommended that 112L be taken concurrently.
Combinatorial probability. Stirling's formula, normal and Poisson approximations to binomial, random variables, expectation, law of large numbers, generating functions.

112L. Laboratory Course in Discrete Probability. (1) I.
May be taken in conjunction with 112. Mr. Cogburn in charge
Illustrative examples in probability theory and applications in various fields.

113. Introduction to Theory of Statistics. (3) II. Miss Scott
Prerequisite: course 112 or 134. It is recommended that 113L be taken concurrently.

113L. Laboratory Course in Introduction to Theory of Statistics. (1) II.
May be taken in conjunction with 113. Miss Scott in charge
Illustrative examples in statistics and applications to various fields.

120A–120B. Theory of Statistics. (3–3) Yr. Mr. Hodges
Prerequisite: course 113 and Mathematics 111 or 113B. Also Mathematics 122 or 104 (may be taken concurrently). It is recommended that Statistics 120C–120D be taken concurrently.

120C–120D. Laboratory for Theory of Statistics. (1–1) Yr. Mr. Hodges in charge
May be taken in conjunction with course 120A–120B. Course 120C is not prerequisite to 120D.

130A–130B. Statistical Inference. (3–3) Yr. Miss Fix
Prerequisite for 130A: two years of high school algebra or Mathematics D; prerequisite for 130B: 130A and Mathematics 1A or 16A. It is recommended that 130C–130D be taken concurrently.
First of a cycle of courses, including 280A and 280B, meant for "users" of statistics. Not open for credit to students who have completed courses 12 and 113. Not more than one of the courses 130A, 130E, and 130G may be taken for credit.
The basic concepts and principal tools of probability theory, hypothesis testing, and estimation, presented for students of natural and social sciences. While the conceptual and applicational aspects are treated carefully, the more difficult mathematical theorems are stated without proof.

130C–130D. Laboratory Course in Statistical Inference. (1–1) Yr. Miss Fix in charge
May be taken in conjunction with course 130A–130B. Course 130C is not prerequisite to 130D.
130E. Statistical Inference for Engineers. (3) I and II.
Mr. Dantzig, Mr. John

Lectures and laboratory. Prerequisite: Mathematics 2A–2B or consent of the instructor. Not open for credit to students who have completed courses 12 and 113. Not more than one of the courses 130A, 130E, 130G may be taken for credit.

Essential elements of course 130A–130B, with all of the applications and illustrations chosen from the field of engineering.

131. Statistical Inference for Social Scientists. (3) I and II.
Mr. Cogburn, Mr. Radner

Prerequisite: Mathematics 11 or 16A or 190A.
Probability and random variables. The basic ideas of estimation and hypothesis testing. Applications to sampling inspection and quality control. Linear estimation and normal regression theory. The chi-square test and contingency tables.

131L. Laboratory Course in Statistical Inference for Social Scientists.
(1) I and II.
Mr. Cogburn, Mr. Radner in charge
Prerequisite: may be taken concurrently with Statistics 131.

132. Descriptive Statistics. (3) II.
Miss Fix

Lectures and laboratory. Prerequisite: course 12 or 112 or 130A; and Mathematics 2A–2B, or grade of at least B in Mathematics 1A–1B or 16A–16B.

134. Methods of Probability Theory. (3) I.
Mr. Thomasion

A systematic development of the concepts and facts of probability theory needed for the technical treatment of statistical communications problems. Laws of large numbers, Markov chains, characteristic functions, central limit theorem, continuous time stochastic processes, spectral analysis.

*142A–142B. Life Contingencies. (3–3) Yr.

Prerequisite: course 12 and 113 or 130A and 130C. It is recommended that 142C–142D be taken concurrently.

*142C–142D. Laboratory Course in Life Contingencies. (1–1) Yr.
May be taken in conjunction with course 142A–142B.

*144. Population Statistics. (3) II.

Prerequisite: course 12 and Mathematics 1A, or course 130A.

152. Elementary Stochastic Processes. (3) II.

Prerequisite: course 112 or 134.
Random walks, branching processes, recurrent events, Markov chains, birth and death processes.

155. Introduction to Continuous Probability. (3) II. Mr. Cogburn
   Prerequisite: course 112 and Mathematics 104.

166. Sampling Surveys. (3) I. Miss Scott
   Prerequisite: course 12 or 112 or 130A or consent of the instructor. Recommended: course 113.

168. Linear Programming and Game Theory. (3) II. Mr. Barankin
   (Formerly numbered 168A.)
   Prerequisite: Mathematics 1A (may be taken concurrently), Mathematics 11 or consent of the instructor. It is recommended that 168L be taken concurrently. Not open for credit to students who have taken 168A.

168L. Linear Programming and Game Theory Laboratory. (2) II.
   (Formerly numbered 168B.) Mr. Barankin in charge
   May be taken in conjunction with course 168. Not open for credit to students who have taken 168B.
   Solution of linear programming and game theory problems, using methods developed in course 168.

169. Dynamic Programming. (3) I. Mr. Blackwell
   Prerequisite: course 112, Mathematics 104 or equivalent.

H195. Special Study for Honors Candidates. (1–5) I and II. The Staff

199. Special Study for Advanced Undergraduates. (1–5) I and II. Mr. Blackwell in charge
   Investigation of special problems under the direction of members of the department.


Graduate Courses

Courses 255A–255B and 260A–260B constitute the basis of graduate instruction for students whose primary interest is in theory. Similarly, courses 280A–280B, 281, and 261 represent the core of the graduate program for students interested in statistics as a tool in empirical research, either experimental or observational.

With the approval of the instructor, students engaged in empirical research may register in appropriate courses without the indicated prerequisites.

In addition to supervised practical work during the laboratory courses, the students registered in these courses will be able to use the laboratory at other times.
Statistics

202A–202B. Theory of Probability and Statistics. (3–3) Yr.  Mr. Scheffé
Prerequisite: 12 units of upper division mathematics with honor grades. An advanced treatment of the material covered in courses 12, 113, 120A–120B, designed as a unique statistical prerequisite for course 260A–260B. It is recommended that course 202C–202D be taken concurrently.

202C–202D. Laboratory Course in Theory of Probability and Statistics. (1–1) Yr.  Mr. Scheffé in charge
It is recommended that course 202A–202B be taken concurrently. Course 202C is not prerequisite to 202D.

252. Topics in the Theory of Stochastic Processes. (3) I.  Mr. Barankin
Prerequisite: course 134 or 152 or 155, recommended 255A.

Prerequisite: Mathematics 105 and 185. It is recommended that course 255C–255D be taken concurrently.

255C–255D. Laboratory Course in Probability Theory and Its Analytic Basis. (1–1) Yr.  Mr. Barankin in charge
Prerequisite: Mathematics 105 and 185. May be taken concurrently with 255A–255B.
Illustrative examples in probability theory and applications to probability problems in various fields such as statistical physics.

256. Nonparametric Inference. (3–3) II.  Mr. Hodges
Prerequisite: course 260A.

258. Theory of Statistical Decision Functions. (3) II.
Prerequisite: course 260A–260B.

259. Probability Models of Natural Phenomena. (3) I.  Mr. Neyman
Prerequisite: course 260A–260B or 280A–280B.

260A–260B. Advanced Topics in Probability and Statistics. (3–3) Yr.  Mr. Lehmann
Prerequisite: course 120A–120B, Mathematics 111 (or 113B), 105 and 185. Mathematics 201A–201B will be accepted in replacement of 105 and 185. Course 255A is prerequisite to 260B. It is recommended that 260C–260D be taken concurrently.


260C–260D. Laboratory Course in Advanced Topics in Probability and Statistics. (2–2) Yr. Mr. Lehmann in charge
May be taken concurrently with course 260A–260B. 260C is not prerequisite to 260D.

261. Statistical Problems in Experimentation. (3) II. Mr. Scheffé
Lectures and laboratory. Prerequisite: some familiarity with analysis of variance and consent of the instructor.

262. Information Theory. (3) II. Mr. Blackwell
Prerequisite: course 255A–255B.
Stationary processes, ergodic theorems, martingales. Entropy, mutual information, finite-state channels, coding theorems.

*263. Statistical Studies of Risks. (3) I. Prerequisite: course 130A–130B or 113.

264. Advanced Statistical Inference for Engineers. (3) I. Mr. John
Lectures and laboratory. Prerequisite: course 130E. Not open for credit to students who have completed course 280A.
Introduction to the following statistical methods, with illustrations from engineering: analysis of variance and covariance, variance components analysis, analysis of count data including acceptance sampling, control charts.

265A–265B. Advanced Probability. (3–3) Yr. Mr. Loève
Prerequisite: course 255A–255B or consent of the instructor.

*267. Large Sample Theory. (3) I. Prerequisite: course 260A.
General convergence theorems. Classical properties of maximum likelihood estimates. Regularly best asymptotically normal estimates and related tests, including the $\chi^2$ test. Likelihood ratio and related tests.

269A–269B. Recent Developments in the Theory of Statistics. (3–3) Yr. Mr. Dalenius, Miss Scott
Recent developments in the theories of hypothesis testing, estimation, and multiple decisions.

280A. Advanced Statistical Inference. (3) I. Miss Fix
Prerequisite: Mathematics 11 or equivalent knowledge of matrix algebra, and course 130A–130B or consent of the instructor. It is recommended that course 280C be taken concurrently.


280B. Advanced Statistical Inference. (3) II. Mr. Neyman
Prerequisite: course 280A or consent of the instructor. It is recommended that course 280D be taken concurrently.
Nonparametric methods. Introduction to sequential analysis. Analysis of quantile response data. Illustrations adjusted to the interests of the audience in each year.

280C–280D. Laboratory Course in Advanced Statistical Inference. (1 or 2; 1 or 2) Yr. Miss Fix, Mr. Neyman in charge
May be taken concurrently with courses 280A and 280B. 280C is not prerequisite to 280D.

281. Analysis of Discrete Observations. (3) I. Miss Scott
Prerequisite: course 130A–130B or course 120A–120B.

290S. Statistical Seminar. (2–6) I and II. Mr. Blackwell in charge
290W. Seminar on Statistical Problems in Economics and Agricultural Economics. (2–4) I. Mr. Kuznets
Prerequisite: consent of the instructor.
Statistical problems in the measurement of economic magnitudes and relations. Correlation and regression studies. Current research.

295S. Individual Research Leading to Higher Degrees. (2–6) I and II. The Staff, Mr. Blackwell in charge

Statistics Colloquium. (No credit) I and II. The Staff
Meetings for the presentation of original work by members of the Staff and graduate students.

SUBJECT A: ENGLISH COMPOSITION
(Subject A Office, 216 Dwinelle Hall Annex)

Committee in charge:
Bertrand H. Bronson, Ph.D., Professor of English.
Ernest S. Starkman, M.S., Professor of Aeronautical Engineering.
Robert A. Wiggins, Ph.D., Associate Professor of English, Davis.

John L. Halverson, M.A., Supervisor of Subject A.

Subject A (No credit) I and II. Mr. Halverson and Associates
Three hours weekly. Required of all students who do not pass the examination in Subject A. Fee, $35. To those students who maintain an average grade of A during the first seven weeks of the semester half of the fee will be refunded, and they may discontinue attending the course. For the regulations governing this requirement, see the CIRCULAR OF INFORMATION.
Training in correct writing, including drill in sentence and paragraph construction, diction, punctuation, grammar, and spelling. Weekly compositions and written tests on the text. The principles of English composition are presented, and typical student compositions are analyzed and discussed in sections limited to thirty students.
VIROLOGY

(Department Office, 438 Biochemistry and Virus Laboratory)

Heinz L. Fraenkel-Conrat, M.D., Ph.D., Professor of Virology.
C. Arthur Knight, Ph.D., Professor of Virology (Vice-Chairman of the Department, fall semester; Acting Chairman of the Department, spring semester).
Harry Rubin, D.V.M., Professor of Virology.
Howard K. Schachman, Ph.D., Professor of Virology and of Biochemistry.
Wendell M. Stanley, Ph.D., Sc.D., LL.D., Docteur h.c. (Paris), Professor of Virology and of Biochemistry and Director of the Virus Laboratory (Chairman of the Department of Virology).
Gunther S. Stent, Ph.D., Professor of Virology and of Bacteriology.
Robley C. Williams, Ph.D., Professor of Virology and Associate Director of the Virus Laboratory.
Arthur B. Pardee, Ph.D., Associate Professor of Virology and of Biochemistry.

Letters and Science List.—All undergraduate courses in virology are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Upper Division Courses

100A–100B. General Virology. (3–3) Yr.
   Mr. Fraenkel-Conrat, Mr. Rubin, Mr. Weidel, Mr. Williams
100A: Mr. Weidel, Mr. Rubin.
100B: Mr. Fraenkel-Conrat, Mr. Williams.
Prerequisite: Biology 11A–11B, or Zoology 1A, or Botany 1, or Bacteriology 1 or 2; Biochemistry 102 or 100A (may be taken concurrently); one year each of college mathematics and physics.
   Lectures on the biological, chemical, and physical properties of animal, bacterial, and plant viruses. 100A: Dynamics of growth, genetics, radiobiology, neutralization, and interference. 100B: Morphology, chemical composition, molecular structure, and metabolism.

177. A Survey of General Virology. (3) I.
   Mr. Knight
Prerequisite: Biochemistry 100A or 102, or consent of the instructor. Not open for credit to students who have credit in course 100A–100B.
   Lectures on the general nature of viruses and methods for their purification; and on biological, chemical, and physical properties of viruses.

199. Special Study for Advanced Undergraduates. (1–2) I and II.
   The Staff (Mr. Pardee in charge)
   Reading and conference for properly qualified students under the direction of a member of the staff.

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 18)

†201. General Virology Laboratory. (4) II.
   Prerequisite: course 100A–100B, the latter may be taken concurrently.
   Experimental techniques used in research on animal, bacterial, and plant viruses illustrating their assay, growth kinetics, genetics, neutralization, purification and structure.

† Not to be given, 1960–1961.
**Virology; Zoology**

280. **Research.** (1-9) I and II.  
The Staff (Mr. Williams in charge)

290. **Seminar.** (1) I and II.  
The Staff (Mr. Pardee in charge)  
Advanced study in the various fields of virology.

299. **Special Study for Graduate Students.** (1-3) I and II.  
The Staff (Mr. Schachman in charge)  
Reading and conference for properly qualified graduate students under the direction of a staff member.

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**ZOOLOGY**

(Department Office, 4079 Life Sciences Building)

*William Balamuth, Ph.D., Professor of Zoology.*
†Howard A. Bern, Ph.D., Professor of Zoology.
Kenneth B. DeOme, Ph.D., Professor of Zoology and Director of the Cancer Research Genetics Laboratory.
†Richard M. Eakin, Ph.D., Professor of Zoology.
Jonas E. Gullberg, A.B., Professor of Metrology.
*Morgan Harris, Ph.D., Professor of Zoology.*
A. Starker Leopold, Ph.D., Professor of Zoology and Associate Director of the Museum of Vertebrate Zoology.
Daniel Mazia, Ph.D., Professor of Zoology.
Alden H. Miller, Ph.D., Professor of Zoology and Director of the Museum of Vertebrate Zoology.
Paul R. Needham, Ph.D., Professor of Zoology.
Frank A. Pitelka, Ph.D., Professor of Zoology and Curator of Birds, Museum of Vertebrate Zoology.
Ralph I. Smith, Ph.D., Professor of Zoology.
Robert C. Stebbins, Ph.D., Professor of Zoology and Curator in Herpetology, Museum of Vertebrate Zoology.
Curt Stern, Ph.D., D.Sc., Professor of Zoology.
Samuel J. Holmes, Ph.D., LL.D., Professor of Zoology, Emeritus.
Max Alfert, Ph.D., Associate Professor of Zoology.
Seth B. Benson, Ph.D., Associate Professor of Zoology and Curator of Mammals, Museum of Vertebrate Zoology.
William E. Berg, Ph.D., Associate Professor of Zoology (Vice-Chairman of the Department).
Cadet Hand, Ph.D., Associate Professor of Zoology (Acting Chairman of the Department).
William Z. Lidicker, Jr., Ph.D., Assistant Professor of Zoology and Assistant Curator of Mammals, Museum of Vertebrate Zoology.
Peter Marler, Ph.D., Assistant Professor of Zoology.
Wilbur B. Quay, Ph.D., Assistant Professor of Zoology.
Richard C. Strohman, Ph.D., Assistant Professor of Zoology.
Ned K. Johnson, B.S., Acting Instructor in Zoology.

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John Davis, Ph.D., Lecturer in Zoology and Assistant Research Zoologist, Museum of Vertebrate Zoology.
Ralph Emerson, Ph.D., Professor of Botany.
Oliver P. Pearson, Ph.D., Lecturer in Zoology and Research Associate, Museum of Vertebrate Zoology.

Letters and Science List.—All undergraduate courses in zoology except courses 109, 116, 119A–119B, 120, and 145 are included in the Letters and Science List of Courses. For regulations governing this list, see page 11.

Departmental Major Advisers: Mr. Berg, Mr. Alfert, Mr. Quay, Mr. Marler, Mr. Lidicker, Mr. Strohman.

The Major.—Required: (1) Courses 1A, 1B, Botany 1 or 10 or equivalent, Chemistry 1A and 8, Physics 2A–2B, 3A–3B. Recommended: German, French, Chemistry 1B, and elementary courses in other biological sciences. (2) 24 units of upper division courses in zoology, including the following: (a) 100 or 106, (b) 101, (c) 108 or 113, (d) 114 or 115, (e) two additional upper division laboratory courses. For 6 of these units substitutions may be made with the approval of the undergraduate adviser, from upper division courses in anatomy, bacteriology, biochemistry, botany, entomology, genetics, organic chemistry, paleontology, parasitology, physical chemistry, physics, physiological psychology, and physiology. (3) Seniors with a B average or better in zoology are encouraged to avail themselves of the opportunity of course 199 work and of the proseminar, course 198.

Honors Program.—Students with a major in zoology may qualify as candidates for honors with the A.B. degree on completion of Zoology 198 (Proseminar) and Zoology H196 (Thesis course).

GENERAL BIOLOGY

(3–3) Yr. Mr. Smith, Mr. Emerson
Lectures and laboratory. To receive credit toward the natural science requirement of the College of Letters and Science both semesters must be taken. Not open for credit to students who have taken Botany 1, 12, Zoology 1A, 1B, 10.
An introductory course in biology offered jointly by the departments of Botany and Zoology. Presents and illustrates the main facts and principles of organization, functions, heredity, and evolution of plants and animals, and introduces the student to the methods of the life sciences.

ZOOLOGY

Lower Division Courses

1A. General Zoology. (4) I and II. Mr. Alfert, Mr. Newman, ———
I: Mr. Alfert, Mr. Newman; II: Mr. Newman, ———.
Lectures and laboratory. Prerequisite: Chemistry 1A.
An introduction to the principles of biology, with special reference to structure, physiology, heredity, and evolution of animals.

1B. General Zoology. (4) II. Mr. Marler, Mr. Bern, ———
Lectures and laboratory. Prerequisite: course 1A or Biology 11A–11B.
An introduction to vertebrate zoology. Structure, function, development, and history of the vertebrate body.

10. Animal Biology. (3) I and II. Mr. Strohman, ———
Lectures and demonstrations. Open without prerequisite to all students, but designed for those not specializing in zoology. Not open for credit to students who have had course 1A or Biology 11A–11B, but students who have taken course 10 may elect course 1A for credit.
An outline of the main facts and principles of biology, with special reference to the bearing of biology upon human life.
100. **Vertebrate Embryology.** (4) I. Mr. Eakin, ———
Lectures and laboratory. Prerequisite: course 1B.
Details of development of the vertebrate body, with emphasis in lectures on human embryology, and in laboratory on that of the chick and pig.

101. **Introduction to Physicochemical Biology.** (3) I. Mr. Mazia
Prerequisite: an introductory course in zoology, botany, or bacteriology, with 4 additional units in biological sciences; organic chemistry; general physics. Graduate students may be admitted by consent of the instructor with less complete preparation.
Cell structure and function with emphasis on molecular organization and mechanisms. Central themes include the growth-reproduction cycle of cells, the physical and chemical basis of structure, energy transformations, exchanges of materials between cell and environment, movement and other types of work-output, and interactions between cell and environment.

102. **Laboratory in Physicochemical Biology.** (3) II. Mr. Strohman
Laboratory with lecture or conference. Prerequisite: course 101 and consent of the instructor.
Experimental approaches to problems of cell structure and function. Isolation, handling, and assay of some biological molecules.

103. **Experimental Embryology.** (2) II. Mr. Berg
(Formerly numbered 123.)
Prerequisite: course 100.
An introduction to the mechanisms of embryonic development of vertebrate and invertebrate animals as elucidated by experimental methods.

103C. **Experimental Embryology Laboratory.** (2) II. Mr. Berg
(Formerly numbered 123C.)
Prerequisite: course 103 (may be taken concurrently). Enrollment limited to ten students.
An introduction to problems and experimental procedures in embryology using sea urchin and amphibian embryos.

104. **Animal Behavior.** (3) I. Mr. Marler
Prerequisite: course 1B.
An introduction to vertebrate and invertebrate ethology; perception of the external world; navigation; instinct and learning; motivation; behavior in simple and complex societies with emphasis on problems of communication.

104C. **Laboratory in Animal Behavior.** (2) I. Mr. Marler
Prerequisite: course 104 (may be taken concurrently) and permission of the instructor.
An introduction to the methods for study of the behavior of vertebrates and invertebrates, with emphasis on individual problems. Limited to ten students.

*105. **Growth and Form.** (2) II. Mr. Harris
Prerequisite: course 1B.
The mechanics and regulation of growth processes; dynamic aspects of body form as seen in senescence, regeneration, tissue culture, and the development of tumors.

106. Comparative Anatomy of the Vertebrates. (4) II. Mr. Quay
Lectures and laboratory. Prerequisite: course 1B. Recommended: course 100.
Evolution of organ systems and phylogeny of the major vertebrate groups.

107. Cytology. (2) II. Mr. Alfert
Prerequisite: course 1A, or Biology 11A–11B and Chemistry 1A.
The structure and activities of the cell, especially in development, in sex determination, and in heredity.

107C. Cytology Laboratory. (2) II. Mr. Alfert
Prerequisite: course 107 (may be taken concurrently). Recommended: course 117.

108. Invertebrate Zoology. (4) II. Mr. Hand
(Formerly numbered 112.)
Lectures, laboratory, and field trips. Prerequisite: course 1A or Biology 11A–11B.
Morphology, development, and classification of invertebrate animals.

109. Zoological Microtechnique. (3) I. Mr. Quay
Lecture and laboratory. Prerequisite: upper division or graduate standing in a biological science. Enrollment limited to twenty students.
Techniques for analysis of the microanatomy and histochemistry of multicellular animals. Emphasis will be placed on interpretation as well as method. Advanced students may be allowed to pursue more specialized laboratory programs.

*110. Biology of the Protozoa. (5) I. Mr. Balamuth
Lectures and laboratory. Prerequisite: course 1A or Biology 11A–11B and senior or graduate standing. Enrollment limited to twelve students.
Treatment of protozoa in relation to comparative aspects of morphology, physiology, and natural habitats. Emphasis in the laboratory upon experimental treatment of living forms, including techniques of cultivation and staining.

*111. General Animal Parasitology. (4) II. Mr. Balamuth
Lectures and laboratory. Prerequisite: course 1A or Biology 11A–11B and upper division standing. Recommended: course 119A.
An introduction to general principles of parasitology, based upon studies of protozoa, helminths, and other invertebrates, excepting higher arthropods. Emphasis in the laboratory upon morphology, life histories and host-parasite interactions, including techniques of host examination and staining.

*112. Natural History of Marine Invertebrates. (6) Mr. Hand, Mr. Smith
Lectures, laboratory, field work, and special problems. Given at the seashore in Summer Session I. Prerequisite: course 1A or Biology 11A–11B.
Anatomy, classification, and natural history of invertebrate animals, chiefly marine.

113. Natural History of the Vertebrates. (4) II.
Mr. Stebbins, Mr. Benson, Mr. Johnson
Lectures, field trips, and laboratory. Prerequisite: course 1B.
The birds, mammals, reptiles, and amphibians, chiefly of California; identification of species; observational methods in study of behavior and habitat relations; systematics. Field work emphasized.

114. Genetics. (3) I. Mr. Stern
Prerequisite: course 1A, or Biology 11A–11B, or Botany 1, or course 10, and upper division standing. Not open for credit to students who take Genetics 100.
The facts of heredity, basic and advanced.

114C. Genetics Laboratory. (2) I. Mr. Stern
Prerequisite: course 114 (may be taken concurrently). Limited to twenty-four students.

115. Human Genetics. (3) II. Mr. Stern
Prerequisite: course 1A, or Biology 11A–11B, or Botany 1, or course 10, and upper division standing.
A study of the principles of inheritance as applied to the physical and mental characteristics of man, of the heredity-environment problem, and of the genetic constitutions of populations.

116. Introduction to Wildlife and Fisheries Management. (4) I. Mr. Leopold, Mr. Needham
Lectures and laboratory. Prerequisite: course 1A or 10 or Biology 11A–11B and upper division standing.
Theory and practice of wildlife and fisheries management; identification, distribution, and life histories of important species.

117. Comparative Microscopic Anatomy. (4) I. Mr. Quay, Mr. DeOme
Lectures and laboratory. Prerequisite: course 1B or the equivalent. Recommended: a course in comparative or mammalian gross anatomy.
Comparative microscopic anatomy of vertebrates including correlations with phylogeny and function, and training in identification and interpretation of tissues and organs.

118. Comparative Endocrinology. (3) I. Mr. Bern
Prerequisite: course 1B and Chemistry 8.
Lectures on the biology of hormonal mechanisms, with reference to the invertebrates and lower vertebrates, as well as mammals.

118C. Comparative Endocrinology Laboratory. (2) I. Mr. Bern
Prerequisite: course 117 and 118 (course 118 and 117 may be taken concurrently). Enrollment limited to ten students.
Laboratory exercises and demonstrations illustrating hormonal mechanisms.

119A–119B. Optics and Metrology in Biology. (2–2) Yr. Mr. Gullberg
119A. The theoretical principles and the critical use of the microscope, spectroscope, and other primary optical instruments. Open to students with upper division or graduate standing in biological or physical science.
119B. The theory and advanced technique of scientific photography, photomicrography, and special photometric methods.

120. Electrical Measurements in Biology. (3) I. Mr. Gullberg
Lectures and laboratory. Enrollment limited and requires consent of the instructor.
An analytical study of direct- and alternating-current circuits and instruments used in biological research.

123. Physiological Embryology. (2) I. Mr. Berg
(Formerly numbered 103.)
Prerequisite: course 100. Recommended: course 103.
A survey of physiological and biochemical studies of developmental processes. Reading of research literature and term paper required.

124. Invertebrate Physiology. (4) I.  Mr. Smith
  Lectures, laboratory, and individual reports. Prerequisite: course 108 or a course of comparable level in physiology or entomology. Enrollment limited to ten students.
  Comparative physiology of the invertebrates, with individual problems on nutrition, respiration, excretion, coordination, and other functions.

125. Animal Ecology. (2) II.  Mr. Pitelka
  Prerequisite: two semesters of upper division work in biology, or graduate status in a related field.
  Structure and dynamics of natural populations of animals; mechanisms of population control; animal relationships in communities and ecosystems, with emphasis on terrestrial habitats.

125C. Field Ecology. (2) II.  Mr. Pitelka
  Prerequisite: courses 108 or 113 or the equivalent; 125 (may be taken concurrently), and Botany 108. Enrollment limited to ten students.
  Study of distribution, composition, and dynamic relations of terrestrial communities in central California; descriptive and quantitative methods.

126. Animal Evolution. (2) II.  Mr. Miller
  Prerequisite: course 1B. Recommended: course work in taxonomy and elementary genetics.
  The evolutionary history of animals and evolutionary processes.

128. Vertebrate Reproduction. (3) II.  Mr. Lidicker
  Lectures and laboratory. Prerequisite: course 100 or 106.
  The reproductive biology of vertebrate animals, with a consideration of the factors influencing reproductive physiology in natural populations.

135. Systematic Mammalogy. (2) I.  Mr. Benson
  Lectures and laboratory. Prerequisite: courses 106 and 113.
  Principles of classification and nomenclature; anatomy, relationships, and distribution of mammalian groups.

136. Ornithology. (2) I.  Mr. Miller
  Lectures and laboratory. Prerequisite: course 113. Enrollment limited to ten students.
  Advanced study of classification, anatomy and function in birds.

137. Herpetology. (2) II.  Mr. Stebbins
  Lectures and laboratory. Prerequisite: course 113.
  Advanced study of classification, anatomy, and function in amphibians and reptiles.

138. Ichthyology. (4) II.  Mr. Needham
  Lectures and laboratory. Prerequisite: course 1B and two semesters of upper division work in zoology. Recommended: courses 106 and 116.
  Structure, classification, and ecology of fishes, including the application of limnological methods to problems of fish culture and management.

145. Wildlife Populations. (3) II.  Mr. Leopold
  Prerequisite: an elementary course in animal ecology or wildlife management (course 116 or 125 or equivalent).
  Properties of wildlife populations; particularly of game birds and mammals; habitat relationships; mechanisms regulating natality, mortality, and population density; management of wildlife populations; research techniques.

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146. Field Course in Wildlife and Fisheries. (4) Mr. Needham, Mr. Leopold
Lectures, laboratory and field work. Given in Summer Session I at Sage Hen
Creek Experiment Station, California. Prerequisite: course 1B or equivalent
and consent of the instructor.
Practice, techniques, and theories in wildlife and fisheries problems; field
inspection of habitats and of research and management projects in eastern
California and western Nevada.

*151. Comparative Population Ecology. (2) I. Mr. Pitelka
Prerequisite: an upper division course in animal ecology (course 125 or
145 or Entomology 127 or an equivalent), or graduate status.
A comparative review of population and life cycle characteristics, fac-
tors and mechanisms affecting densities, turnover, and fluctuations; types
of population organization evolved among higher animals, especially ver-
tebrates.

H196. Thesis Course. (2) II. Mr. DeOme
Prerequisite: restricted to candidates for honors with the A.B. degree.
Preparation of a thesis, to be chosen from a list of broad topics provided
by the staff member in charge, who will also consult with students during
the semester.

197. Extra Session Work. (1–4) The Staff (Mr. Hand in charge)
Work on assigned topics carried on in the field, or in Berkeley when the
University is not in session, under the direction of a member of the staff.

198. Proseminar in Zoology. (1) I. Mr. Berg
Prerequisite: upper division standing with at least a B average in upper
division courses in zoology.
Reading, reporting, and group discussion on selected topics in zoology.
Although organized by designated faculty member, others will participate.

199. Special Study for Advanced Undergraduates. (1–4) I and II.
The Staff (Mr. Hand in charge)
Prerequisite: senior standing with at least a B average in upper division
courses in zoology; background courses in chosen subjects.

Graduate Courses

For admission to a graduate course, a student should have permission of the
instructor (which may be given to graduate students and seniors with not less
than a B average), and should have 12 units of basic upper division work.

201. Seminar in Physicochemical Biology. (2) II. Mr. Mazia, Mr. Strohman
Prerequisite: courses 101 and 102 or consent of the instructor.
Seminar discussion of recent literature on the physicochemical organization
of the cell and the physicochemical mechanisms underlying cell functions.

202. Comparative and Functional Neurology. (2) I. Mr. Quay
Prerequisite: consent of the instructor.
The organization and activities of the nervous systems of vertebrates and
invertebrates, with emphasis on regulatory mechanisms.

204. Seminar in Animal Behavior. (2) II. Mr. Marler
Prerequisite: course 104 or Psychology 150A, or consent of the instructor.
Relationships of animal behavior to ecology, physiology, and evolution.

207. Seminar in Cytology. (1-2) II. Mr. Alfert
Prerequisite: course 107.
Critical discussion of basic problems and recent literature in descriptive cytology and cytochemistry.

208. Seminar in Invertebrate Zoology. (1-2) II. Mr. Smith, Mr. Hand
Topics will vary from year to year. Topic for 1960–1961: to be arranged.

209. Seminar on the Biology of Tumors. (1) I. Mr. DeOme, Mr. Bern
Admission with consent of the instructors. Recommended: courses 105 and 217.
Review and discussion of current information on the origin and properties of tumors.

*212. Advanced Marine Invertebrate Natural History. (4) Mr. Smith, Mr. Hand
Given at the seashore in Summer Session I. Prerequisite: course 108 or 112; or consent of the instructor.
Semi-independent investigations of marine invertebrates.

*213. Advanced Invertebrate Zoology. (4) II.
(Formerly numbered 142.)
Lectures and laboratory.
Prerequisite: course 108 or 112. May be repeated without duplication of credit.
The biology of major invertebrate groups.

217. Comparative Histopathology. (3) II. Mr. DeOme
Prerequisite: course 106, 117, Bacteriology 101, or equivalent experience.
A presentation of normal and pathological material to illustrate the reaction of normal tissue to various environmental agents. Special emphasis is placed upon the neoplastic changes.

218. Seminar in Comparative Endocrinology. (1) II. Mr. Bern
Prerequisite: course 118 or the equivalent.

219. Seminar in Animal Ecology. (1) I. Mr. Pitelka
Prerequisite: course 125 or consent of the instructor.
Review of special topics, with emphasis on current literature.

220. Seminar on Speciation in Vertebrates. (2) I. Mr. Benson
Prerequisite: course 113.
Problems of speciation and isolating mechanisms in vertebrates.

*221. Seminar in Optics and Metrology. (2) II. Mr. Gullberg
Prerequisite: courses 119A and 119B, or consent of the instructor.
Critical evaluation of recent advances in instrumentation in biological research fields.

222. Seminar in Wildlife Management and Population Dynamics. (1) II. Mr. Leopold
Prerequisite: courses 116 and 145, or consent of the instructor.
Review of literature in wildlife ecology and management.

223. Seminar in Fisheries Management. (2) I. Mr. Needham
Prerequisite: courses 116 and 138.
Analysis of fish population problems, including review of recent research, special phases, and work of students.

224. Research. (1–8) I and II. The Staff (Mr. Hand in charge)
Original study on special topics in laboratory, field, and museum. The work may be carried on in the laboratories at Berkeley, or in the field, or at a marine station at any season of the year. Credit awarded according to work accomplished.

*241. Seminar in Protozoology and Parasitology. (2) I. Mr. Balamuth

242. Seminar in Experimental Morphogenesis. (2) I. Mr. Berg

243. Vertebrate Review. (1) II. Mr. Benson, Mr. Pitelka
Review of current literature on ecology and evolution of higher vertebrates.

244. Genetics Review. (1–2) I and II. Mr. Stern
Prerequisite: graduate standing and one course in genetics. May be repeated without duplication of credit.
Review of current literature and of special topics.

*245. Seminar in Advanced Genetics. (2) II. Mr. Stern
Prerequisite: one course in genetics.
Topics will vary from year to year.

299. Special Study for Graduate Students. (1–4) I and II. The Staff (Mr. Hand in charge)
Any properly qualified graduate student who wishes to pursue a problem through reading or other advanced study may do so if his proposed project is acceptable to a member of the staff.

Zoology Seminar. (No credit) I and II.
The Staff (Mr. Eakin in charge, fall semester; Mr. Marler in charge, spring semester)
Meetings for the presentation of original work by the faculty, visiting lecturers, and graduate students.

**MUSEUM OF VERTEBRATE ZOOLOGY**

This museum was founded as a research institute and repository for specimens and information relative to the higher vertebrate animals by the late Annie M. Alexander. The museum serves several departments on the campus in respect to research programs and contracts. The academic staff members of the museum offer in the Department of Zoology upper division and graduate courses pertinent to their special areas of scholarship in systematics, ecology, evolution, and wildlife conservation and management.

**Collections.**—The museum is situated in the Life Sciences Building on the Berkeley campus and has a large and continually growing collection of mammals, birds, reptiles, and amphibians; on March 1, 1960, these totaled 348,611 catalogue entries. The specimens with the accompanying field notes, photographs, and maps provide the basis for research.

**Field Station.**—The Frances Simes Hastings Natural History Reservation in the upper Carmel Valley of Monterey County is operated by the museum as a research center for investigations in general ecology and natural history, with emphasis on vertebrate animals. The flora and fauna of this 1600-acre tract are completely protected in order to study ecologic relations in undisturbed communities. The station is provided and supported by Mrs. Hastings.

Qualified graduate students and guest workers may pursue advanced studies.

and use the facilities of the Museum and the Natural History Reservation under the sponsorship of a member of the museum staff. Persons interested may address the director of the museum, or associate director, 2593 Life Sciences Building.

CANCER RESEARCH GENETICS LABORATORY

The Department of Zoology's Cancer Research Genetics Laboratory, situated in Earl Warren Hall, was established to implement a program of graduate student and staff research in cancer genetics, especially in small mammals, and to develop, maintain, and produce strains of mice with predictable incidences of tumor. Persons interested in employing the facilities of the laboratory may address the Director, 230 Earl Warren Hall.
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I like to compare scientific research to mountain climbing in an unexplored range. Considerable preparation, training, and a strong motivation are required to get up to the upper altitudes even if no one particular stretch of the way is particularly difficult. But once there, it is relatively easy for one to see vistas or even to stumble across new riches that people of equivalent ability who have stayed behind, have no possibility to see or to find.

GLENN T. SEABORG
Chancellor at Berkeley
Nobel Laureate in Chemistry, 1951